



- (51) **International Patent Classification:**
A61B 17/32 (2006.01) *A61B 18/14* (2006.01)
- (21) **International Application Number:**
PCT/US2017/013293
- (22) **International Filing Date:**
13 January 2017 (13.01.2017)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
62/279,635 15 January 2016 (15.01.2016) US
62/330,669 2 May 2016 (02.05.2016) US
15/382,238 16 December 2016 (16.12.2016) US
- (71) **Applicant:** ETHICON LLC [US/US]; #475 Street C, Suite 401, Los Frailes Industrial Park, Guaynabo, 00969 (PR).
- (72) **Inventors:** SHELTON, IV, Frederick E.; 4545 Creek Road, Cincinnati, Ohio 45242 (US). YATES, David C.; 4545 Creek Road, Cincinnati, Ohio 45242 (US). HOUSER, Kevin L.; 4545 Creek Road, Cincinnati, Ohio 45242 (US). MESSERLY, Jeffrey D.; 4545 Creek Road, Cincinnati, Ohio 45242 (US). HARRIS, Jason L.; 4545 Creek Road, Cincinnati, Ohio 45242 (US). STROBL, Geoffrey S.; 4545 Creek Road, Cincinnati, Ohio 45242 (US).
- (74) **Agents:** SHIRTZ, Joseph F. et al.; JOHNSON & JOHNSON, One Johnson & Johnson Plaza, New Brunswick, New Jersey New Jersey (US).
- (81) **Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).
- Published:**
— with international search report (Art. 21(3))

[Continued on next page]

(54) **Title:** MODULAR BATTERY POWERED HANDHELD SURGICAL INSTRUMENT WITH SELECTIVE APPLICATION OF ENERGY BASED ON TISSUE CHARACTERIZATION

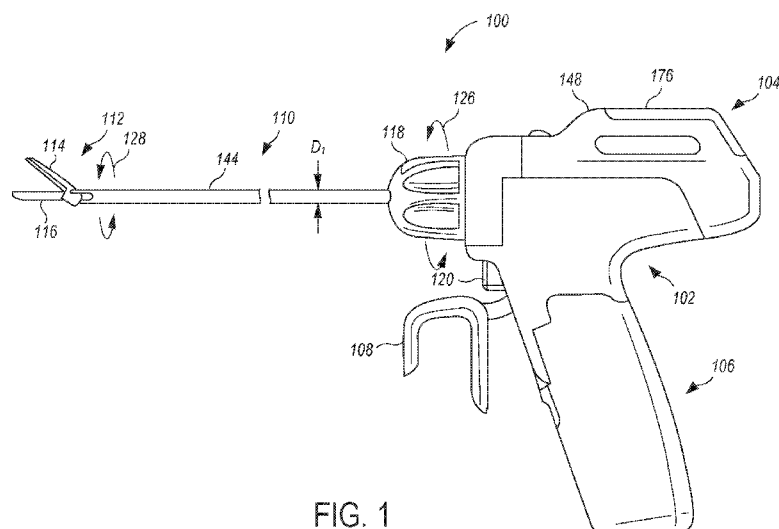


FIG. 1

(57) **Abstract:** A surgical instrument comprises a shaft assembly comprising a shaft and an end effector coupled to a distal end of the shaft; a handle assembly coupled to a proximal end of the shaft; a battery assembly coupled to the handle assembly; a radio frequency (RF) energy output powered by the battery assembly and configured to apply RF energy to a tissue; an ultrasonic energy output powered by the battery assembly and configured to apply ultrasonic energy to the tissue; and a controller configured to, based at least in part on a measured tissue characteristic, start application of RF energy by the RF energy output or application of ultrasonic energy by the ultrasonic energy output at a first time.



— *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:
24 August 2017

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2017/013293

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61B17/32 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)

EP0-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.
X	US 2014/005667 A1 (STULEN FOSTER B [US] ET AL) 2 January 2014 (2014-01-02) paragraphs [0061] - [0069]; figure 1 paragraphs [0109] - [0112]; figures 11-18C paragraphs [0126] - [0129] paragraphs [0177] - [0186]; figures 47-49 -----	1-8, 18
X	US 2015/141981 A1 (PRICE DANIEL W [US] ET AL) 21 May 2015 (2015-05-21) paragraphs [0041] - [0048]; figures 1-2; table 1 paragraphs [0054] - [0058]; figures 7-12 -----	1-8, 18

☐

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

3 May 2017

Date of mailing of the international search report

10/07/2017

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Schnurbusch, Daniel

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2017/013293

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.: 22, 23
because they relate to subject matter not required to be searched by this Authority, namely:
see FURTHER INFORMATION sheet PCT/ISA/210
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.:
1-8, 18

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2017/013293

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2014005667 A1	02-01-2014	CN 104582606 A EP 2866700 A1 JP 2015521900 A US 2014005667 A1 US 2016192999 A1 WO 2014004116 A1	29-04-2015 06-05-2015 03-08-2015 02-01-2014 07-07-2016 03-01-2014
US 2015141981 A1	21-05-2015	CN 105764435 A EP 3071129 A1 JP 2016537129 A US 2015141981 A1 WO 2015077119 A1	13-07-2016 28-09-2016 01-12-2016 21-05-2015 28-05-2015

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-8, 18

A surgical instrument comprising a handle and a battery assembly. The battery assembly configured to power a radio frequency energy output and an ultrasound energy output and a controller configured to, based at least in part on a measured tissue characteristic starts the application of RF energy or ultrasonic energy, further specified in that the switching order is determined and that the measured tissue characteristic is tissue impedance.

2. claims: 9, 13-17

A surgical instrument comprising a handle and a battery assembly. The battery assembly configured to power a radio frequency energy output and an ultrasound energy output and a controller configured to, based at least in part on a measured tissue characteristic starts the application of RF energy or ultrasonic energy, further specified in that the measured tissue characteristic is the gap distance of the jaw members or tissue thickness.

3. claims: 10-12

A surgical instrument comprising a handle and a battery assembly. The battery assembly configured to power a radio frequency energy output and an ultrasound energy output and a controller configured to, based at least in part on a measured tissue characteristic starts the application of RF energy or ultrasonic energy, further specified in that the measured tissue characteristic is based on the behavior of a force applied on tissue.

4. claims: 19-21

A surgical instrument comprising a handle and a battery assembly. The battery assembly configured to power a radio frequency energy output and an ultrasound energy output and a controller configured to, based at least in part on a measured tissue characteristic starts the application of RF energy or ultrasonic energy, further specified in that the measured tissue characteristic is a tissue short circuit condition.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.1

Claims Nos.: 22, 23

Method claim 22 defines a method for treatment of the human or animal body by surgery practised on the human or animal body, because "[...] starting [...] application of RF energy [...] or application of ultrasonic energy [...]" (claim 22) is seen as a surgical step performed on a patient. Therefore no search has been performed for the subject-matter of this claim and the corresponding dependent claims (see Article 17 (2) PCT and Rule 39.1.(iv) PCT) and no written opinion is required for the subject-matter of these method claims (see Rule 43bis.1 and Rule 67.1 (iv) PCT).