IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	Unassigned
First Inventor	:	Robert E. Wright et al.
Title	:	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY
Filed	:	December 17, 2020
Examiner	:	Unassigned
Customer No.	:	148468

Mail Stop Amendment

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

PRELIMINARY AMENDMENT

Commissioner:

Prior to examination of the above-identified application, which is being filed concurrently herewith, the Applicant respectfully requests entry of the following amendments:

Amendments to the Specification begin on page 2.

Amendments to the Claims are reflected in the Listing of Claims that begins on page 3 of this paper.

Remarks begin on page 7 of this paper.

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Amendments to the Specification

Please replace paragraph [0001] of the specification with the following amended paragraph:

[0001] This application is a continuation of U.S. Patent Application No. 16/933,995, filed on July 20, 2020, titled METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NUROTOMY, which is a continuation of U.S. Patent Application No. 15/098,673, filed on April 14, 2016, titled METHODS AND SYSTEMS FOR RADIO FREQUENCY NEUROTOMY, issued as U.S. Patent No. 10,736,688, which is a continuation of U.S. Patent Application No. ~~App. No.~~ 12/940,974, filed on November 5, 2010, titled METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY, ~~which is hereby incorporated by reference in its entirety and~~ which claims the benefit of U.S. Provisional Patent Application ~~App.~~ No. 61/280,557, filed on November 5, 2009, titled NOVEL MEDICAL NEEDLE INCORPORATING MULTIPLE FILAMENTS FOR IMPROVED ENERGY DELIVERY and U.S. Provisional Patent ~~App.~~ Application No. 61/347,351, filed on May 21, 2010, titled METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY; the entire contents of each of the foregoing applications ~~both of which~~ are hereby incorporated by reference herein in their entirety.

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Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Cancelled)

2. (New) A method of performing spinal RF neurotomy in a patient, the method comprising:

moving a tip of a needle to a first position proximate to a target nerve along the spine of the patient;

after achieving the first position, advancing a plurality of filaments relative to the tip to a deployed position; and

after the advancing step, applying RF energy to the tip and plurality of filaments, wherein said applying generates heat that ablates a portion of the target nerve.

3. (New) A method of performing spinal RF neurotomy in a patient as recited in Claim 2, wherein the first position is proximate to the target nerve.

4. (New) A method of performing spinal RF neurotomy in a patient as recited in Claim 2, wherein the target nerve is a medial branch nerve.

5. (New) A method of performing spinal RF neurotomy in a patient as recited in Claim 2, wherein the target nerve is a posterior rami proximate the sacrum.

6. (New) A method of performing spinal RF neurotomy in a patient as recited in Claim 2, further comprising piercing skin of the patient with the tip of the needle.

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7. (New) A method of performing spinal RF neurotomy in a patient as recited in Claim 2, further comprising:

imaging the tip of the needle during the moving step.

8. (New) A method of performing spinal RF neurotomy in a patient as recited in Claim 2, further comprising imaging the tip of the needle to verify the position of the tip of the needle relative to the target nerve.

9. (New) A method of performing spinal RF neurotomy in a patient as recited in Claim 8, further comprising:

repositioning the tip of the needle in response to the imaging step prior to the advancing step.

10. (New) A method of performing spinal RF neurotomy in a patient as recited in Claim 8, wherein the imaging is fluoroscopic.

11. (New) A method of performing spinal RF neurotomy in a patient as recited in Claim 2, further comprising:

rotating the needle about a central longitudinal axis of the needle to position the tip in a predetermined orientation relative to the target nerve.

12. (New) A method of performing spinal RF neurotomy in a patient as recited in Claim 11, wherein said rotating occurs after the moving step and prior to the advancing step.

13. (New) A method of performing spinal RF neurotomy in a patient as recited in Claim 2, wherein advancement of a distal end of each of the plurality of filaments relative to the tip is along a curved path.

14. (New) A method of performing spinal RF neurotomy in a patient as recited in Claim 2, wherein the plurality of filaments consists of a first filament and a second filament, wherein the needle contains no filaments other than the plurality of filaments, wherein the advancing step comprises:

advancing the plurality of filaments such that when the first and second filaments are in their respective deployed positions, a midpoint between a distal end of the first filament and a distal end of the second filament is offset from a central longitudinal axis of the elongate member.

15. (New) A method of performing spinal RF neurotomy in a patient as recited in Claim 14, wherein in the deployed position, the distal ends of all of the filaments are positioned distally to the tip.

16. (New) A method of performing spinal RF neurotomy in a patient as recited in Claim 14, wherein the midpoint is offset from the central longitudinal axis by about 2 mm.

17. (New) A method of performing spinal RF neurotomy in a patient as recited in Claim 2, wherein a central longitudinal axis of the needle is disposed entirely within a central plane of the needle, wherein the advancing step comprises:

advancing the plurality of filaments such that when the plurality of filaments are in their respective deployed positions, the distal ends of all of the filaments are disposed on a common side of the central plane.

18. (New) A method of performing spinal RF neurotomy in a patient as recited in Claim 17, wherein in the deployed position, the distal ends of all of the filaments are positioned distally to the tip.

19. (New) A method of performing spinal RF neurotomy in a patient as recited in Claim 2, wherein each filament of the needle comprises a distal end, wherein in their respective deployed positions each distal end defines a vertex of a polygon, wherein the advancing step comprises:

advancing the plurality of filaments such that a centroid of the polygon is offset from a central longitudinal axis of the needle.

20. (New) A method of performing spinal RF neurotomy in a patient as recited in Claim 19, wherein in the deployed position, the distal ends of all of the filaments are positioned distally to the tip.

21. (New) A method of performing spinal RF neurotomy in a patient as recited in Claim 19, wherein the centroid is offset from the central longitudinal axis.

Remarks

By this paper, amendments to paragraph [0001] of the specification are presented, claim 1 is cancelled without prejudice or disclaimer, and new claims 2-21 are added. Upon entry of this paper, claims 2-21 will be pending in the Application. The Applicant respectfully submits that the claim amendments are fully supported by the present application and/or its progenitors and add no new matter to the present application.

The Applicant respectfully requests examination of the present application as amended herein. The Examiner is invited to contact the undersigned attorney should there be any impediment to the prompt allowance of this Application that is susceptible to being addressed by a telephonic interview or overcome by an examiner's amendment.

DATED this 18th day of December, 2020.

Respectfully submitted,

/Daniel C. Higgs/

Daniel C. Higgs
Registration No. 55,265
Attorney for Applicant

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PTO/AIA/01 (06-12)
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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 15/098,673 filed on April 14, 2016

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Robert E. Wright Date (Optional): _____

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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- ☒ United States application or PCT international application number 15/098,673 filed on April 14, 2016

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LEGAL NAME OF INVENTOR

Inventor: Scott A. Brandt Date (Optional): 2/16/20

Signature: _____

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
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Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY
First Named Inventor/Applicant Name:	Robert E. Wright
Filer:	Daniel Christopher Higgs
Attorney Docket Number:	NBUS.001C1C1C1

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	80	80
UTILITY SEARCH FEE	2111	1	350	350
UTILITY EXAMINATION FEE	2311	1	400	400
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

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Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**830**

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Electronic Acknowledgement Receipt

EFS ID:	41432347
Application Number:	17126675
International Application Number:	
Confirmation Number:	1065
Title of Invention:	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY
First Named Inventor/Applicant Name:	Robert E. Wright
Customer Number:	148468
Filer:	Daniel Christopher Higgs
Filer Authorized By:	
Attorney Docket Number:	NBUS.001C1C1C1
Receipt Date:	18-DEC-2020
Filing Date:	
Time Stamp:	14:16:15
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$830
RAM confirmation Number	E2020BHE17127755
Deposit Account	602176
Authorized User	Daniel Higgs

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37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

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37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	NBUS001C1C1C1_ADS.pdf	1256815 b0c08fe0c7c794b52aa912005b700778574 0b3b7	no	9
Warnings:					
Information:					
2		NBUS001C1C1C1_Specification _ASFILED.pdf	199282 90b3bd499c3c70643cb15edfe82bbf16ecfd c475	yes	48

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Specification	1	46
	Claims	47	47
	Drawings-only black and white line drawings	48	48

Warnings:					
Information:					
3	Drawings-only black and white line drawings	NBUS001C1C1C1_Drawings_A SFILED.PDF	189731 de0407f49ac8927711876c7cf67f4afd0658d 5be	no	19
Warnings:					
Information:					
4		NBUS001C1C1C1_Preliminary_ Amendment_ASFILED.pdf	108978 c8495a953df375cfc8d3cbdb04713070253 b4c01	yes	7

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Preliminary Amendment	1	1

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	Specification		2		2
	Claims		3		6
	Applicant Arguments/Remarks Made in an Amendment		7		7
Warnings:					
Information:					
5	Oath or Declaration filed	15_098673_Declaration_Wright.pdf	486240 f61615f3151482a75d3382ddd51d43183c9fd32d	no	2
Warnings:					
Information:					
6	Oath or Declaration filed	15_098673_Declaration_Brandt.pdf	518382 486ca7ccec20903833f47b565f1c868535299f80	no	2
Warnings:					
Information:					
7	Fee Worksheet (SB06)	fee-info.pdf	35228 fe233829ac5c085840caedd3c015cbe00962f856	no	2
Warnings:					
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		Total Files Size (in bytes):	2794656		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	NBUS.001C1C1C1
	Application Number	
Title of Invention	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

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☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Robert	E.	Wright	

Residence Information (Select One) US Residency ● Non US Residency Active US Military Service

City	Country of Residence i
Clayton	AU

Mailing Address of Inventor:

Address 1	Metro Pain Group Pty Ltd
Address 2	Monash House, Ground Floor, 271 Clayton Road
City	Clayton
State/Province	
Postal Code	3168
Country i	AU

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Scott	A.	Brandt	

Residence Information (Select One) ● US Residency ◯ Non US Residency Active US Military Service

City	State/Province	Country of Residence i
Denver	CO	US

Mailing Address of Inventor:

Address 1	333 S. Monroe St. Unit 113
Address 2	
City	Denver
State/Province	CO
Postal Code	80209
Country i	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	NBUS.001C1C1C1
	Application Number	
Title of Invention	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY	

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	148468		
Email Address	dhiggs@biomerics.com	Add Email	Remove Email
Email Address	dhiggs@medvent ureholdings.com	Add Email	Remove Email
Email Address	acharlton@biomerics.com		Remove Email

Application Information:

Title of the Invention	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY		
Attorney Docket Number	NBUS.001C1C1C1	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	19	**Suggested Figure for Publication (if any)**	14

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	NBUS.001C1C1C1
	Application Number	
Title of Invention	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY	

Please Select One:	● Customer Number	US Patent Practitioner	◯ Limited Recognition (37 CFR 11.9)
Customer Number	148468		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	16933995	2020-07-20
Prior Application Status	Patented		Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16933995	Continuation of	15098673	2016-04-14	10736688	2020-08-11

Prior Application Status	Abandoned		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
15098673	Continuation of	12940974	2010-11-05
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12940974	Claims benefit of provisional	61347351	2010-05-21
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12940974	Claims benefit of provisional	61280557	2009-11-05

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Foreign Priority Information:

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	NBUS.001C1C1C1
	Application Number	
Title of Invention	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY	

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

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Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

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Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	NBUS.001C1C1C1
	Application Number	
Title of Invention	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

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B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

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☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	NBUS.001C1C1C1
	Application Number	
Title of Invention	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	Stratus Medical, LLC		
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Assignee Information including Non-Applicant Assignee Information:

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	NBUS.001C1C1C1
	Application Number	
Title of Invention	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☒

Organization Name	Stratus Medical, LLC

Mailing Address Information For Assignee including Non-Applicant Assignee:

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Address 2			
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Country i	US	Postal Code	77354
Phone Number		Fax Number	
Email Address	dhiggs@medventureholdings.com		

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See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Daniel C. Higgs/			Date (YYYY-MM-DD)	2020-12-18
First Name	Daniel	Last Name	Higgs	Registration Number	55265

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	NBUS.001C1C1C1
	Application Number	
Title of Invention	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

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METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

RELATED APPLICATIONS

[0001] This application is a continuation of U.S. Patent App. No. 12/940,974, filed on November 5, 2010, which is hereby incorporated by reference in its entirety and which claims the benefit of U.S. Provisional Patent App. No. 61/280,557, filed on November 5, 2009, and U.S. Provisional Patent App. No. 61/347,351, filed on May 21, 2010, both of which are hereby incorporated by reference in their entirety.

FIELD OF THE INVENTION

[0002] The present invention relates to thermal ablation systems and methods and, more specifically, to improved systems and methods for performing Radio Frequency (RF) neurotomy. The invention is particularly apt for spinal RF neurotomy procedures.

BACKGROUND OF THE INVENTION

[0003] Thermal ablation involves the creation of temperature changes sufficient to produce necrosis in a specific volume of tissue within a patient. The target volume may be, for example, a nerve or tumor. A significant challenge in ablation therapy is to provide adequate treatment to the targeted tissue while sparing the surrounding structures from injury.

[0004] RF ablation uses electrical energy transmitted into a target volume through an electrode to generate heat in the area of the electrode tip. The radio waves emanate from a non-insulated distal portion of the electrode tip. The introduced radiofrequency energy causes molecular strain, or ionic agitation, in the area surrounding the electrode as the current flows from the electrode tip to ground. The resulting strain causes the temperature in the area surrounding the electrode tip to rise. Temperature calibration or measurement devices, for example thermocouples, in the electrode may provide feedback and allow precise control of the temperatures produced at the electrode tip.

[0005] RF neurotomy uses RF energy to cauterize a target nerve to disrupt the ability of the nerve to transmit pain signals to the brain. Known RF neurotomy methods typically use a single RF probe generating a generally oval or oblate spheroid lesion. The RF

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probe is positioned in an attempt to include the target nerve within the oval or oblate spheroid lesion. In various procedures, access to a target nerve may be limited (e.g., limited to a restricted angular range), thereby raising significant challenges to medical personnel to create sufficient lesions to provide optimal clinical outcomes. Additionally, anatomical variations of the nerve location relative to anatomical landmarks provide additional challenges.

SUMMARY OF THE INVENTION

[0006] The present invention is directed toward improved methods, systems, and related apparatuses for performing thermal ablation in general, and in particular, improved methods, systems, and related apparatuses for performing RF neurotomy, specifically in the region of the spine of a patient.

[0007] In one aspect, a needle is provided for use (e.g., insertion into a patient) during an RF ablation procedure that comprises a hub, an elongate member fixed to the hub, a tip fixed to the elongate member at a distal end thereof, and a plurality of filaments disposed within at least a portion of the elongate member. The needle may further include an actuator interconnected to the plurality of filaments, wherein the actuator may move relative to the hub so as to move the plurality of filaments relative to the tip of the needle.

[0008] In one approach, the tip and first and second ones of the plurality of filaments are operable as a single monopolar RF electrode. By way of example, in one implementation the needle may include a lumen disposed within the elongate member, wherein the lumen and tip are configured to receive an RF probe, wherein the tip and the first and second filaments may be electrically connected to the RF probe for delivery of an RF energy signal. In another implementation, an RF probe may be integrated into the needle structure for communication of an RF signal to the tip and plurality of filaments.

[0009] In another approach, the tip and the plurality of filaments may be operable in a bipolar manner. For example, the tip and/or one or more of the plurality of filaments may be electrically interconnected to an RF energy source to combinatively operate as an active RF electrode. In turn, one or a plurality of additional ones of the plurality of filaments may be electrically interconnected to combinatively function as a return RF electrode.

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[0010] In a further aspect, the actuator may be operable to move the plurality of filaments relative to the tip between a retracted position and a deployed position, wherein in the deployed position the plurality of filaments extend outwardly from the tip. In this regard, each filament may comprise a distal end, wherein in a deployed position the distal ends of the filaments each define a point, and wherein the average of all the points is offset from a central longitudinal axis of the elongate member.

[0011] In one embodiment, the average of distal end points of first and second filaments may be at midpoint between such distal ends. In certain embodiments, the distal end of each of the plurality of filaments defines a vertex of a polygon, wherein an average of corresponding points is a centroid of the polygon.

[0012] In certain embodiments, a first filament and a second filament may have corresponding distal ends which, together with a distal end of the tip, define a polygon therebetween. In this regard, in various implementations the plurality of filaments may be disposed asymmetrically about a central longitudinal axis of the elongate member in their deployed position.

[0013] In another aspect, a method for performing RF neurotomy in a patient is provided (e.g., spinal RF neurotomy), and includes the steps of moving a tip of a needle to a first position proximate to a target nerve along the spine of a patient, and after achieving the first position, advancing a plurality of filaments relative to the tip to a deployed position. After such positioning, the method may include the step of applying RF energy to the tip and/or at least one of the plurality of filaments, wherein said RF energy application generates heat to ablate at least a portion of the target nerve.

[0014] In one approach, the RF energy may be applied to the needle tip and each of the plurality of filaments to yield monopolar operation. In another approach, the RF energy may be applied to the tip and/or one or more of the plurality of filaments to define an active electrode, while one or more additional one of the plurality of filaments are electrically isolated to function as a return electrode for bipolar operation.

[0015] In relation to the present invention it is recognized that, as RF energy penetrates biological tissue, protein and water molecules oscillate in response to the RF current and the tissue adjacent to the active needle tip heats secondary to ionic friction. As the

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tissue heats, and coagulates, the biophysical properties of the tissue change. These tissue changes limit penetration of the RF energy beyond a leading edge defined by the shape and size of the active needle tip. The size of a radiofrequency lesion using conventional needle technology is limited regardless of the duration of lesion or maximum temperature delivered.

[0016] The described invention overcomes this obstacle and expands the effective area of RF energy delivery by increasing the overall active tip surface area from which the RF energy emanates. The use of multiple filaments provides additional conduits for RF energy creating a multipolar RF field effect. The size and specific conformation of the RF lesion may be dictated by the location and orientation of the filaments, and may be beneficially modified to suit a specific anatomical application by changing the size, placement, and number of filaments.

[0017] Additional aspects and advantages of the present invention will become apparent to one skilled in the art upon consideration of the further description that follows. It should be understood that the detailed description and specific examples are intended for purposes of illustration only and are not intended to limit the scope of the invention. Furthermore, any of the above arrangements, features and/or embodiments may be combined with any of the above aspects where appropriate.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] For a more complete understanding of the present invention and further advantages thereof, reference is now made to the following Detailed Description of the Invention taken in conjunction with the accompanying drawings, wherein:

[0019] FIG. 1 is a schematic diagram of an RF neurotomy system being used to perform RF neurotomy on a patient.

[0020] FIG. 2A is a perspective view of a needle that may be used in an RF neurotomy procedure.

[0021] FIG. 2B is a cut away perspective view of a portion of the needle of FIG. 2A.

[0022] FIG. 2C is a cut away view of a portion of an alternate embodiment of a needle that may be used in an RF neurotomy procedure.

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[0023] FIG. 3A is a detailed view of a tip of the needle of FIG. 2A with filaments disposed in a fully deployed position.

[0024] FIG. 3B is a detailed view of a tip of the needle of FIG. 2A with filaments disposed in a retracted position.

[0025] FIG. 3C is a detailed view of an alternate tip of the needle of FIG. 2A with filaments disposed in a deployed position.

[0026] FIG. 4 is a schematic diagram of an RF probe assembly.

[0027] FIG. 5 is an end view of the needle of FIG. 2A.

[0028] FIG. 6 is a side view of the tip of the needle of FIG. 2A.

[0029] FIG. 7 is an end view of another alternate embodiment of the needle of FIG. 2A.

[0030] FIG. 8 is an end view of another alternate embodiment of the needle of FIG. 2A.

[0031] FIG. 9 is an end view of another alternate embodiment of the needle of FIG. 2A.

[0032] FIG. 10 is a side view of another alternate embodiment of the needle of FIG. 2A.

[0033] FIG. 11A is an illustration of an exemplary set of isotherms that may be created with the needle of FIG. 2A.

[0034] FIG. 11B is an illustration of an exemplary lesion that may be created with the needle of FIG. 2A.

[0035] FIG. 11C is an illustration of an exemplary lesion that may be created with a single-filament needle.

[0036] FIG. 12 is a perspective view of the needle of FIG. 2A positioned relative to a lumbar vertebra for performing RF neurotomy.

[0037] FIG. 13 is an illustration of a sacrum including target lesion volumes for performing Sacroiliac Joint (SIJ) RF neurotomy.

[0038] FIG. 14 is a perspective view of the needle of FIG. 2A positioned relative to a thoracic vertebra for performing RF neurotomy.

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[0039] FIG. 15 is a perspective view of the needle of FIG. 2A positioned relative to the C2/3 cervical zygapophyseal joint (z joint)for performing cervical medial branch RF neurotomy on the third occipital nerve.

DETAILED DESCRIPTION OF THE INVENTION

[0040] In the following description, the invention is set forth in the context of apparatus and methods for performing RF ablation. More particularly, the systems and methods may be used to perform RF neurotomy to ablate portions of target nerves. Even more particularly, the systems and methods may be used to perform spinal RF neurotomy to ablate portions of target nerves along the spine of a patient to relieve pain. For example, embodiments of methods and apparatuses described herein relate to lumbar RF neurotomy to denervate a facet joint between the L4 and L5 lumbar vertebrae. Denervation is achieved by application of RF energy to a portion of a medial branch nerve to ablate or cauterize a portion of the nerve, thus interrupting the ability of the nerve to transmit signals to the central nervous system. In another example, embodiments described herein relate to sacroiliac joint RF neurotomy.

[0041] FIG. 1 is an illustration of an RF neurotomy system 100 for performing RF neurotomy on a patient 101. The patient 101 may be positioned face down on a table 109 or surface to allow access along the spine of the patient 101. The table 109 may be made of radiolucent materials substantially transparent to x-rays, such as carbon fiber.

[0042] The system 100 may include an RF generator 102 capable of generating an RF energy signal sufficient to ablate target tissue (e.g. cause lesions in targeted volumes; cauterize targeted portions of target nerves). The RF generator 102 may, for example, be capable of delivering RF energy of about 460,000-500,000 Hz. A needle 103 capable of conducting (e.g., transmitting or directing) RF energy may be interconnected to the RF generator 102 and may be used to deliver an RF energy signal to a specific site within the patient 101. Where the needle 103 is a monopolar device, a return electrode pad 104 may be attached to the patient 101 to complete a circuit from the RF generator 102, through the needle 103, through a portion of the patient 101, and back to the RF generator 102 through

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the return electrode pad 104. In other bipolar arrangements the needle 103 may comprise at least one supply electrode and at least one return electrode to define the circuit.

[0043] The RF generator 102 may be operable to control the RF energy emanating from the needle 103 in a closed-loop fashion. For example, the needle 103 and/or an RF probe disposed within the needle 103 may contain a temperature measurement device, such as a thermocouple, to measure the temperature at the target tissue. Data may also be available from the RF generator 102, such as power level and/or impedance, which may also be used for closed-loop control of the needle 103.

[0044] Turning to FIG. 4, an exemplary RF probe assembly 400 compatible with the needle 103 is illustrated. The RF probe assembly 400 includes an RF probe 401 that may be inserted into a patient (e.g., through needle 103) and may direct RF energy to the target tissue. The RF probe 401 may include a thermocouple operable to measure temperature at a distal end 402 of the RF probe 401. The RF probe assembly 400 may include a connector 403 and a cable 404 for use in connecting the RF probe 401 to the RF generator 102.

[0045] Returning to FIG. 1, the system 100 may include an imaging system 105 capable of producing internal images of the patient 101 and the needle 103 to facilitate navigation of the needle 103 during a procedure. The system 100 may further include a display for displaying the generated images to a physician performing the RF ablation procedure. In one example, the imaging system 105 may be a fluoroscope capable of generating real-time two dimensional images of the needle 103 and internal structures of the patient 101. As such, the imaging system may include an X-ray source 106, an X-ray detector 107 and a controller 108. The X-ray source 106 and X-ray detector 107 may be mounted on a movable structure (e.g., a C-arm), to facilitate capturing a variety of images of the patient 101 (e.g., at various angles or projection views). Alternatively, the imaging system 105 may be any other appropriate imaging system, such as, for example, a computed tomography (CT) scanner.

[0046] FIG. 2A is a detailed view of the needle 103 of the system 100 for performing RF neurotomy. The needle 103 may include a tip 201 that tapers to a point 301 capable of piercing the skin of a patient. The needle 103 may further include an elongate member 203 connected to the tip 201 at a distal end 202 of the needle 103 and connected to a

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hub 204 at a proximal end 205 of the needle 103. The needle 103 includes a central longitudinal axis 223 that is disposed along the center of the elongate member 203.

[0047] The needle 103 may include a self-contained mechanical mechanism, in the form of deployable filaments 206a, 206b, operable to expand the volume of effective RF energy delivery as compared to known single-electrode RF probes. The filaments 206a, 206b may be at least partially disposed within the elongate member 203 and may be operable to emerge through a side wall of the needle 103 proximate to the distal end 202 of the needle 103. Alternatively, the needle 103 may include a single filament or three or more filaments. The filaments 206a, 206b allow offsetting and/or contouring of the lesion geometry produced using the needle 103 to match a desired target volume. The filaments 206a, 206b may be deployable and/or retractable by moving an actuator 216 relative to the hub 204.

[0048] As will be further described, the needle 103 may further include a tube 207 that includes a lumen therethrough. The lumen may be used to transport fluids to and/or from the target volume. The lumen may also accept the RF probe 401 for delivery of RF energy to the target volume. In an alternate embodiment, the RF probe 401 may be integrated into the needle 103. In such an embodiment, the tube 207 need not be present for RF energy delivery, although it may be included to facilitate fluid delivery. The filaments 206a, 206b may include lumens therethrough for the transportation of fluid to and/or from the target volume. The filaments 206a, 206b may function as thermocouples.

[0049] As RF energy penetrates biological tissue, protein and water molecules oscillate in response to the RF current and the tissue adjacent to the RF electrode is heated. As the tissue heats and coagulates, the biophysical properties of the tissue change. These tissue changes limit penetration of the RF energy beyond a leading edge defined by the shape and size of an active needle tip. Accordingly, the size of a radiofrequency lesion using conventional single needle technology is thus practically limited after achievement of a certain temperature delivered for a certain time.

[0050] The needle 103 with deployable filaments 206a, 206b overcomes this obstacle and expands the effective area of RF energy delivery by providing multiple locations (e.g., tip 201 and filaments 206a, 206b) from which the RF energy emanates. The use of multiple filaments 206a, 206b provides additional conduits for RF energy creating a multiple

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electrode RF field effect. The size, shape and location of a lesion created with the needle 103 may be established by the quantity, location and orientation of the filaments, and may be beneficially modified to suit a specific anatomical application by changing various aspects of the filaments as discussed below.

[0051] Where it is desired to create a lesion offset from the central longitudinal axis 223, the lesion may be preferentially offset in a desired direction from the central longitudinal axis 223 by rotationally orienting the needle 103. Moreover, the needle 103 may be used to create a lesion offset from the central longitudinal axis 223 in a first direction. Then, the filaments 206a, 206b may be retracted, the needle 103 rotated, and the filaments 206a, 206b re-deployed to create a lesion offset from the central longitudinal axis 223 in a second direction.

[0052] FIGS. 3A and 3B are detailed views of the distal end 202 of the needle 103 that includes the tip 201. The tip 201 may include the sharpened point 301 for piercing the skin of a patient and facilitating advancement through tissue. The tip 201 may further include a tapered portion 302 that transitions the tip 201 from the point 301 to a body portion 303. The body portion 303 is the portion of the tip 201 that is disposed proximal to the tapered portion 302. The body portion 303 may be cylindrical as illustrated, or it may be of any other appropriate shape. The body portion 303 may have a cross-section that coincides with the cross section of the elongate member 203.

[0053] The tip 201 may act as an RF energy delivery element. As such, the tip 201 may be made from a conductive material such as, for example, stainless steel. The tip 201 may be coated. The tip 201 material and optional coating may be selected to improve radiopacity, improve and/or alter RF energy conduction, improve lubricity and/or reduce tissue adhesion.

[0054] The tip 201 may include filament port or slot 304a (not visible in the views of FIGS. 3A and 3B) and filament port or slot 304b. The geometry of the filament slots 304a, 304b may be selected to allow filaments 206a, 206b to be adequately retracted (e.g., such that they are disposed within a cross-sectional envelope of the body portion 303 of the tip 201) while the needle 103 is inserted into the body, so that the filaments 206a, 206b do not cause any unintended damage to the patient. Such positioning of the filament slots 304a,

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304b avoids having filament exit features on the tapered portion 302 and thus avoids potential coring that could be caused by such positioning.

[0055] The internal geometry of the filament slots 304a, 304b may be designed such that the filaments 206a, 206b may be easily retracted and advanced. For example, the internal geometry of the filament slots 304a, 304b may include a transition region 305 that meets the outer surface of the body portion 303 at an angle of about 30 degrees. The transition region 305 may, for example, be curved or planar. Thus, when the filaments 206a, 206b are in the form of a member without a pre-set bias (e.g., substantially straight), advancement of the filaments 206a, 206b relative to the filament slots 304a, 304b, will cause the filaments 206a, 206b to be deflected outwardly as the filaments 206a, 206b move distally along the transition region 305. Depending on the positioning of the transition region 305 relative to where the filaments 206a, 206b are confined (e.g., in the needle 103 of FIG. 3A the filaments 206a, 206b are confined to only longitudinal movement where they enter into the elongate member 203) and on the mechanical properties of the filaments 206a, 206b, various deployment angles of the filaments 206a, 206b relative to the central longitudinal axis 223 may be achieved. Generally, the portions of the filaments 206a, 206b that extend outwardly away from the filament slots 304a, 304b may be unrestrained and thus may take any appropriate form. For example, where there is no pre-set bias, the portions of the filaments that extend outwardly away from the filament slots (and therefore from the tip) may be substantially straight, such as shown in FIGS. 2A, 3A, 3C, 6, 11A-11C and 14. Where a pre-set bias is present, the portions of the filaments that extend outwardly away from the filament slots may take any appropriate shape, such as, for example, curved as shown in FIG. 10.

[0056] The radial orientation of the filament slots 304a, 304b may be selected such that a center point between the filament slots 304a, 304b does not coincide with the central longitudinal axis 223. For example, as shown in FIGS. 2A, 3A and 3B, the filament slots 304a, 304b may be positioned such that they are about 120 degrees apart about the circumference of the tip 201. Other filament slot configurations may be configured to achieve the filament placements discussed below. These configurations may be achieved by varying the quantity of filament slots, the placement of filament slots about the circumference of the

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tip 201, and/or the placement of filament slots along the center longitudinal axis 223 to achieve the filament placements discussed below.

[0057] As noted above, and illustrated in FIGS. 3A and 3B, the needle 103 may comprise a tube 207 that includes a lumen 222 therethrough. The lumen 222 may be employed to accept the RF probe 40 for delivery of RF energy and/or for the transport of fluids. In this regard, the tip 201 may further include a fluid port 210 that may be in fluid communication via a channel through the tip 201 with the lumen 222. The fluid port 210 may be centrally located or it may be located offset from the center longitudinal axis 223 as shown in FIGS. 2A and 3A. The fluid port 210 may be used to transfer fluid between the region of the tip 201 and the proximal end 205 of the needle 103. For example, during an RF neurotomy procedure, an anesthetic and/or an image enhancing dye may be introduced into the region of tissue around the tip 201 through the fluid port 210. In an alternate embodiment, the fluid port 210 may be located along the body portion 303 of the tip 201.

[0058] As may be appreciated, the channel through the tip 201 may be sized to accommodate a tip of the RF probe 401 that may be inserted into the needle 103. The channel may be sized such that RF energy from the inserted RF probe 401 is satisfactorily passed from the RF probe 401 to the tip 201 and filaments 206a, 206b.

[0059] The elongate member 203 may be in the form of a hollow tube (e.g., sheath, cannula) interconnecting the tip 201 with the hub 204. The elongate member 203 may be configured with adequate strength to allow the needle 103 to pierce the patient's skin and advance to a target area through various tissue types, including, for example, fat and muscle tissue. The elongate member 203 may also be capable of resisting kinking as it is advanced. In an alternate embodiment, the elongate member 203 may be a rod with a plurality of lumens along its length to accommodate filaments 206a, 206b, the RF probe 401, and/or a fluid passage.

[0060] The elongate member 203 houses portions of the filaments 206a, 206b and the tube 207, and allows for relative movement of the filaments 206a, 206b. The elongate member 203 may be of any appropriate size and internal configuration to allow insertion into the patient 101 and to house componentry therein. In an exemplary embodiment, the elongate member 203 may, for example, be a 16 gauge round tube or smaller. For example, the

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elongate member 203 may be 18 or 20 gauge. For example, the elongate member may have a maximum cross dimension of at most about 1.7 mm. In another example, the elongate member may have a maximum cross dimension of at most about 1 mm. The elongate member 203 may have a length selected for performing a specific spinal RF neurotomy procedure on a particular patient. The elongate member 203 may be constructed from an insulative material to reduce the amount of RF energy emitted along the length of the elongate member 203 when the RF probe 401 is disposed therein. For example, the elongate member 203 may be constructed from polymeric, ceramic or other insulative material. The elongate member 203 may include a coating that may improve radiopacity to aid in visualization of the position of the needle 103 using fluoroscopy. The elongate member 203 may include a coating to improve its insulative properties. The elongate member 203 may include a lubricious coating to improve its ability to be inserted and positioned within the patient and to reduce tissue adhesion. The elongate member 203 may include markers 224 along its length to assist in determining the depth to which the needle 103 has entered into the anatomy. Such markers 224 may be radiopaque so that they may be viewed under fluoroscopy. A collar (not shown) may be disposed about the elongate member 203 to assist in placement of the tip 201 of the needle 103. For example, the tip 201 may be positioned in a first position, the collar may then be placed against the patient's 101 skin, and then the needle 103 may be withdrawn a certain distance. Such a distance will be indicated by the distance between the collar and the patient's 101 skin.

[0061] The elongate member 203 may be fixedly interconnected to the tip 201 and hub 204 in any appropriate manner. For example, the tip 201 may be press fit into the elongate member 203 and the elongate member 203 may be press fit into the hub 204. Other possible methods of attachment include adhesive bonding and welding. In an alternate embodiment, the elongate member 203 and the tip 201 may be a single unitary structure. The elongate member 203 may be steerable and incorporate controlling mechanisms allowing the elongate member 203 to be deflected or steered after insertion into the anatomy.

[0062] The tube 207 containing the lumen 222 may be constructed from any appropriate material. For example, the tube 207 may be constructed from a conductive material, such as stainless steel, such that when the RF probe 401 is inserted within the tube

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207, the RF energy emitted by the RF probe 401 may be conducted through the tube 207 and into and through the tip 201 and filaments 206A, 206b. The tube 207 may be interconnected to the tip 201 such that the lumen 222 is in sealed, fluid communication with the channel through the tip 201. This may be accomplished by a press fit, weld, or any other appropriate method.

[0063] As noted, the lumen 222 may be in fluid communication with the tip 201 at the distal end 202. A proximal end of the lumen 222 may be disposed at the proximal end 205 of the needle 103. In this regard, the lumen 222 may run from the distal end 202 to the proximal end 205 with the only access being at the distal and proximal ends. Furthermore, the lumen 222 may be the only lumen of the needle 103 disposed along the elongate member 103.

[0064] Accordingly, the RF probe 401 inserted into the lumen 222 may be positioned such that an end of the RF probe 401 is proximate the tip 201. For example, the RF probe 401 may be positioned such that the distal end 402 of the RF probe 401 is in the lumen 222 near the tip 201 or in the channel through the tip 201. Thus, RF energy transmitted through the RF probe 401 may be conducted by the tip 201 and filaments 206a, 206b. The size of the lumen 222 may be selected to accommodate a particular size of RF probe 401. For example, for a 22 gauge RF probe 401, at least a 21 gauge or larger lumen 222 may be employed. For example, the lumen 222 may have a maximum cross-dimension of less than about 0.85 mm.

[0065] The proximal end of the tube 207 may be operable to receive the RF probe 401. Moreover, the proximal end of the tube 207 and the actuator 216 may be configured to accept a connector, such as a Luer fitting, such that a fluid source may be connected to the tube 207.

[0066] As illustrated in FIGS. 2A and 3A, the needle 103 includes two filaments 206a, 206b disposed within and along elongate member 203. Distal ends of the filaments 206a, 206b are disposed proximate to the tip 201 and proximal ends of the filaments 206a, 206b are fixed to a filament hub 221 discussed below. The filaments 206a, 206b are movable along the central longitudinal axis 223 between a fully deployed position as illustrated in FIGS. 2A and 3A and a retracted position illustrated in FIG. 3B. Moving the filaments 206a,

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206b distally from the retracted position moves the filaments 206a, 206b toward the fully deployed position, while moving the filaments 206a, 206b proximally from the deployed position moves the filaments 206a, 206b toward the retracted position. The filaments 206a, 206b may be deployed in intermediate positions between the fully deployed positions and the retracted positions.

[0067] In the fully deployed position as shown in FIG. 3A, the distal ends of the filaments 206a, 206b are disposed away from the tip 201. In the refracted position as shown in FIG. 3B, the distal ends of the filaments 206a, 206b are disposed entirely within an outer perimeter (e.g., circumference where the non-tapered portion 303 of the tip 201 is round) of the tip 201. In the deployed position, the filaments 206a, 206b act as broadcast antennae for the RF probe 401 (e.g., RF energy passes from the RF probe 401 to tip 201 and filaments 206a, 206b, and into a target volume within the patient 101). In this regard, together, the RF probe 401 inserted into the lumen 222, the tip 201, and the filaments 206a, 206b, may form a monopolar electrode for application of RF energy to the target volume. The filaments 206a, 206b allow the RF energy from the RF probe 401 to be dispersed over a larger volume than would be possible with the tip 201 alone.

[0068] The filaments 206a, 206b may be constructed from a material operable to conduct RF energy, e.g., a metal such as stainless steel, Nitinol or shape memory alloy. The filaments 206a, 206b may be coated to enhance their ability to conduct RF energy. The filaments 206a, 206b may include a lubricious coating to aid in insertion and/or reduce tissue adhesion. The distal ends of the filaments 206a, 206b may be shaped (e.g., pointed) to improve their ability to move through tissue.

[0069] The positioning of the filaments 206a, 206b of the embodiment illustrated in FIGS. 2A and 3A will now be described in relation to FIG. 5. FIG. 5 is an end view of the tip 201 and deployed filaments 206a, 206b of the embodiment illustrated in FIGS. 2A and 3A. The filaments 206a, 206b are positioned at a filament angle 503 of about 120 degrees apart from each other about the central longitudinal axis 223. This coincides with the positions of the filament slots 304a, 304b discussed above since the filaments 206a, 206b emerge from the filament slots 304a, 304b. Accordingly, a filament-free angle 504 of about 240 degrees is defined as the largest angle about the circumference of the tip 201 that is free

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of filaments 206a, 206b. In an embodiment consisting of two filaments, the filament angle 503 may be less than 180 degrees and the filament-free angle 504 may be correspondingly greater than 180 degrees (e.g., greater than 200 degrees or greater than 240 degrees).

[0070] In FIG. 5, the central longitudinal axis 223 is perpendicular to the plane of the illustration. A midpoint 502 is defined between distal ends 501a, 501b of the filaments 206a, 206b, respectively. The midpoint 502 is offset from the central longitudinal axis 223. For example, in an embodiment, the midpoint 502 may be offset from the central longitudinal axis 223 by about 2 mm. Accordingly, when RF energy is transmitted from the tip 201 and filaments 206a, 206b, it will be transmitted asymmetrically with respect to the central longitudinal axis 223 as energy will be emitted from the tip 201 and the filaments 206a, 206b. As oriented in FIG. 5, the energy will be biased in an upward direction in the direction from the point 301 toward the midpoint 502. Thus, when RF energy is transmitted during an RF neurotomy procedure, a lesion will be created that is correspondingly offset from the central longitudinal axis 223 in the direction from the point 301 toward the midpoint 502.

[0071] FIG. 6 is a side view of the tip 201 and filaments 206a, 206b oriented such that deployed filament 206b is disposed entirely within the plane of the figure. The filaments 206a, 206b extend from the tip 201 at a common distance, or location, along the central longitudinal axis 223. The filament 206b is deflected radially outwardly from the central longitudinal axis 223. The filament 206b emerges from the tip 201 at an angle 601 of about 30 degrees as dictated by the positioning of the transition region 305 relative to where the filament 206b is confined and on the mechanical properties of the filament 206b (as previously discussed). Also, it is noted that the distal tips 501a, 501b are positioned distally beyond the point 301 by a distance 602 and are disposed at a distance 603 from the central longitudinal axis 223. In the embodiment illustrated in FIG. 6, the distance 602 may be about 3.5 mm and the distance 603 may be about 3 mm. Such an arrangement may distally offset a lesion created by the needle 103 as compared to a lesion created with a tip without filaments or a lesion created with the needle 103 with the filaments 206a, 206b in the retracted position.

[0072] Accordingly, the filament 206a, 206b arrangement illustrated in FIGS. 2A, 3A, 3B, 5 and 6 may be operable to produce lesions that are radially offset from the central longitudinal axis 223 and distally offset from the point 301 as compared to a lesion created

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by the tip 201 without the filaments or a lesion created with the needle 103 with the filaments 206a, 206b in the retracted position.

[0073] Variations of filament positions and configurations from those illustrated in FIGS. 2A, 3A, 3B, 5 and 6 will now be addressed. Variations in the relative shapes, positions and sizes of lesions created with the needle 103 may be achieved by repositioning the filaments. For example, as noted above, the lesion produced by the needle 103 will be in different positions depending on whether the filaments are in the deployed or refracted positions. Accordingly, intermediately shaped, positioned and/or sized lesions may be achieved by positioning the filaments in intermediate positions between the fully deployed or refracted positions. Thus, for any given configuration of deployable filaments discussed herein, the positions and/or sizes of lesions created by those configurations may be varied by varying the positioning of the filaments to intermediate positions between the fully deployed and retracted positions. As noted above, the needle 103 with deployed filaments is operable to produce larger lesion volumes than the needle 103 with retracted filaments. For example, the needle 103 with fully deployed filaments may be operable to produce lesion volumes of about 500 mm^3.

[0074] Further variation in the shape, position and/or size of lesions created by needles with deployable filaments may be achieved by different configurations of filaments. Variations may include variations in materials, the number of filaments, the radial positioning of the filaments, the axial positioning of the filaments, the length of the filaments, the angle at which the filaments exit the tip, and the shape of the filaments. By varying these parameters the needle may be configured to produce lesions of various sizes and shapes that are positioned at various locations relative to the tip. Such variations may be specifically tailored to be used in specific procedures, such as RF neurotomy procedures of particular nerves adjacent to particular vertebrae.

[0075] Variations of the materials used for the tip and/or the filaments may be selected to achieve particular lesion sizes, positions and/or shapes. For example, the tip may be made form a material that does not conduct RF energy. In such an embodiment, RF energy from the RF probe 401 may be conducted by substantially only the deployed filaments. Such an arrangement may provide for a lesion with a larger offset from the central longitudinal

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axis 223 than would be produced where the tip conducts RF energy and acts as an electrode along with the filaments.

[0076] Another material-related variation that may affect lesion shape, size and/or position is the addition and placement of insulation over the tip and/or filaments. For example, by placing a layer of insulation over the proximal half of the portions of the filaments that extend from the tip when in the deployed position, the shape of the lesion may be altered since RF energy may primarily emanate from the distal, non-insulated portion of the filaments. Similarly, insulation may be added to the tip to alter the RF energy delivered from the tip.

[0077] Moreover, the materials used in making the filaments and tip may be selected based on RF conductivity. For example, by using a material for the tip that is less conductive of RF energy, the proportion of RF energy emanating from the tip as compared to that emanating from the filaments may be altered resulting in a corresponding change in lesion size, position and/or shape.

[0078] The RF needles and RF probes discussed herein may be constructed from materials that are Magnetic Resonance Imaging (MRI) compatible. As such, MRI equipment may be used to verify the positioning of such RF needles and/or monitor the progress of an ablation procedure (e.g., RF neurotomy) using such RF needles.

[0079] Variations of the number of filaments used for needle may be selected to achieve particular lesion sizes, positions and/or shapes. For example, as illustrated in FIG. 7, a third filament 701 may extend from tip 201' in a position between filaments 206a, 206b. The tips 501a, 501b of the filaments 206a, 206b and a tip 702 of filament 701 may form a polygon 703 that has a centroid 704. The centroid 704 is offset from the central longitudinal axis 223. Such an arrangement may produce a lesion that is offset from the central longitudinal axis 223 to a different degree than, and shaped differently than, a lesion created by the needle of FIG. 5. In general, where a centroid of a polygon formed by the tips of filaments (or, in the case where there are two filaments, the midpoint between them) is offset from the central longitudinal axis 223, a lesion created by such a configuration will be correspondingly offset from the central longitudinal axis 223. The filaments 206a, 206b, 702 are positioned within the same filament angle 503 of about 120 degrees as in the embodiment

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of FIG. 5. Furthermore, the embodiment of FIG. 7 has a filament-free angle 504 of about 240 degrees, also the same as in the embodiment of FIG. 5. In general, where the filaments are positioned within an arc that is less than 180 degrees, resultant lesions will be offset from the central longitudinal axis 223 in the direction of the filaments. In general, in an embodiment consisting of three or more filaments where the filaments are positioned within an arc that is less than 180 degrees, the filament-free angle may be correspondingly greater than 180 degrees (e.g., greater than 200 degrees or greater than 240 degrees).

[0080] Variations in the radial positioning of filaments of a needle may be selected to achieve particular lesion sizes, positions and/or shapes. For example, as illustrated in FIG. 8, four filaments 801a-801d are positioned about a tip 201". The tips of the filaments 801a-801d may form a polygon 802 that has a centroid 803. Such an arrangement may produce a lesion whose center is offset from the central longitudinal axis 223 in the direction of the centroid 803. The filaments 801a-801d are positioned within a filament angle 804 of about 200 degrees. Furthermore, the embodiment of FIG. 8 has a filament-free angle 805 (i.e., the largest angle about the circumference of the tip 201" that is free of filaments) of about 160 degrees. It will be appreciated that, as illustrated in FIG. 8, a configuration capable of producing a lesion offset from the central longitudinal axis 223 may have a filament-free angle that is less than 180 degrees.

[0081] In the above-described embodiment of FIGS. 2A, 3A, 3B, 5, and 6 with two filaments, a midpoint 502 between the filaments was discussed. In embodiments with more than two filaments, a centroid of a polygon formed by the distal ends of the filaments was discussed. Both the midpoints and the centroids may be considered to be "average" points of the filaments for their particular configurations. In such embodiments, the midpoint between filaments in two-filament embodiments and the centroid of the polygon in embodiments with more than two filaments may be offset from the central longitudinal axis of the elongate member. For example, the midpoint or centroid may be offset from the central longitudinal axis by 1 mm or more. In embodiments, the polygon may lie in a plane perpendicular to the central longitudinal axis.

[0082] As illustrated in, for example, FIGS. 2A, 3A, 3C, 5, 7, 8 and 9 the distal ends of the filaments when fully deployed may be disposed in a common plane. In an

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embodiment, the common plane may be disposed perpendicular to the central longitudinal axis. Such a common plane for the distal ends of deployed filaments may be disposed distally from the distal end of the tip.

[0083] As illustrated in, for example, FIGS. 2A, 3A, 3C, 5 and 7 the filaments of the needle may be deployed on a common side of a central plane of the needle (where the central longitudinal axis is disposed entirely within the central plane). In such embodiments, the distal ends of the fully deployed filaments may all be disposed on a common side of the central plane. Such a configuration may enable the needle to be used to create a lesion that is offset from the tip of the needle to the same side of the central plane as the deployed filament ends.

[0084] As illustrated, inter alia, in FIG. 2A, the filaments when fully deployed may point in an at least partially distal direction. In this regard, a vector extending axially from the distal end of a filament and coinciding with a central axis of the filament at the end of the filament has at least some distal component. Accordingly, the fully deployed filaments embodiments shown in FIGS. 2A, 3A and 10 all point in an at least partially distal direction.

[0085] In another variation of the radial positioning of filaments of a needle, the filaments may be uniformly distributed about the circumference of the tip. Such an embodiment is illustrated in FIG. 9. The needle of FIG. 9 includes 3 equally distributed filaments 901a, 901b, 901c. Consequently, the angles 902a, 902b, 902c between the filaments 901a, 901b, 901c may each equal 120 degrees. Such a needle may be operable to produce a lesion that is generally centered along the central longitudinal axis 223. However, the position of the produced lesion axially along the central longitudinal axis 223 may be determined by the configuration of the filaments. For example, relatively longer filaments may be operable to produce lesions that are positioned distal to lesions produced by configurations with relatively shorter filaments.

[0086] Variations in the axial positioning of where deployed filaments emerge from the tip of a needle may be selected to achieve particular lesion sizes, positions and/or shapes. For example, returning to FIG. 7, if the third filament 701 of the embodiment of FIG. 7 were axially positioned such that it is distal to filaments 206a, 206b, the resultant lesion may be produced may be longer along the central longitudinal axis 223 than that of an

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embodiment where the filaments 206a, 206b, 701 are positioned at the same point along the central longitudinal axis 223. In another variation, as deployed, two or more filaments may be disposed at the same radial position and at different axial positions. Such embodiments may include multiple rows of filaments.

[0087] The lengths of filaments beyond the tip (when the filaments are in the deployed position) in a needle may be varied to achieve particular lesion sizes, positions and/or shapes. For example, increasing the length of the deployed portions of the filaments 206a and 206b of the embodiment illustrated in FIGS. 5 and 6 may result in a needle capable of producing lesions that are more distally positioned than those created by the embodiment as shown in FIGS. 5 and 6. The effects of lengthening or shortening the deployed length of the filaments are similar to those discussed above with respect to partially deploying filaments.

[0088] Embodiments of a needle may include deployed filaments of different lengths. Where all of the filaments of a particular needle are moved by a common actuator, such variations may be achieved by varying the overall length of the filaments. In such an embodiment, the end points of the shorter filaments may be retracted further into the tip or elongate member than longer filaments. The effects of lengthening or shortening the deployed length of the filaments are similar to those discussed above with respect to variations in the axial positioning of where deployed filaments emerge from the tip of the needle.

[0089] The angle (such as angle 601 of FIG. 6) at which a filament exits a tip may be varied to achieve particular lesion sizes, positions and/or shapes. For example, an embodiment similar to the embodiment of FIGS. 5 and 6, but where the deployed filaments are at a 60 degree angle instead of the 30 degree angle shown in FIG. 6, may be operable to produce a lesion that has a larger maximum cross-sectional dimension in a plane perpendicular to the central longitudinal axis 223 than the embodiment of FIGS. 5 and 6. This may be due to the filaments emanating RF energy at a distance further away from the central longitudinal axis than the embodiment of FIGS. 5 and 6. A particular embodiment of the needle may include deployed filaments at different angles relative to the central longitudinal axis.

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[0090] The shapes of the portions of the filaments that extend away from the tip may be varied to achieve particular lesion sizes, positions and/or shapes. For example, FIG. 10 illustrates the tip 201 and filaments 1001a, 1001b, where the portions of the filaments 1001a, 1001b that extend beyond the tip 201 are curved. Such curvatures may be achieved by, for example, filaments that comprise a shape memory alloy (e.g., Nitinol) or spring material. When the filaments 1001a, 1001b are retracted, the shape of the tip 201 and/or elongate member 203 may keep the filaments 1001a, 1001b in a constrained straightened position. As the filaments 1001a, 1001b are advanced toward the fully deployed position, they become unconstrained and return to their curved shape as shown in FIG. 10. The deployed shape of the filaments 1001a, 1001b may be predetermined, or the filaments 1001a, 1001b may be made from a material that may be shaped by a user prior to insertion.

[0091] The curved filaments 1001a, 1001b of FIG. 10 are positioned within planes that include the central longitudinal axis 223. In other embodiments, the filaments 1001a, 1001b may be curved in other directions, such as in a corkscrew arrangement. This may be beneficial to assist the filaments in remaining anchored to the tissue during delivery of RF energy. The curved filaments 1001a, 1001b of FIG. 10 may be operable to produce a flatter (in a plane perpendicular to the central longitudinal axis 223) lesion than the straight filaments 206a, 206b of FIG. 6.

[0092] FIG. 3C is a detailed view of the distal end 310 of a needle 309 that is an alternate embodiment of the needle 103. The distal end 310 includes a tip 311 that may include a sharpened point 312 for piercing the skin of a patient and facilitating advancement through tissue. The tip 311 may further include a tapered portion 313 that transitions the tip 311 from the point 312 to a first body portion 314. The first body portion 314 may be connected to a second body portion 315 at an angle 316. In an exemplary embodiment, the angle 316 may be about 15°. The second body portion 315 may be aligned with an elongate member 317. The elongate member 317 may be similarly configured as the elongate member 203 of FIGS. 3A and 3B. The angle 316 between the first body portion 314 and the second body portion 315 may aid the physician in navigating the needle 309 to a desired position. For example, by rotating the needle 309 such that the first body portion 314 is pointing in a

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desired direction, subsequent advancement of the needle 309 may result in the needle 309 following a non-straight path biased toward the desired direction.

[0093] The first and second body portions 314, 315 may be cylindrical as illustrated, or they may be of any other appropriate shape. The first and second body portions 314, 315 may have cross-sections that coincide with the cross section of the elongate member 317.

[0094] The tip 311, or a non-insulated portion thereof, may act as an RF energy delivery element. As such, the tip 311 may be made from a conductive material such as, for example, stainless steel. The tip 311 may be coated. The tip 311 material and optional coating may be selected to improve radiopacity, improve and/or alter RF energy conduction, improve lubricity and/or reduce tissue adhesion.

[0095] The tip 311 may include filament slot 318a and filament slot 318b. The geometry of the filament slots 318a, 318b may be selected to allow filaments 319a, 319b to be adequately retracted (e.g., such that they are disposed within a cross-sectional envelope of the second body portion 315) while the needle 309 is inserted into the body, so that the filaments 319a, 319b do not cause any unintended damage to the patient. Such positioning of the filament slots 318a, 318b avoids having filament exit features on the tapered portion 313 and on the first body portion 314 and thus avoids potential coring that could be caused by such positioning.

[0096] The internal geometry of the filament slots 318a, 318b may be designed such that the filaments 319a, 319b may be retracted and advanced. For example, the internal geometry of the filament slots 318a, 318b may be configured such that advancement of the filaments 319a, 319b relative to the filament slots 318a, 318b, will cause the filaments 319a, 319b to be deflected outwardly as the filaments 319a, 319b move distally relative to the second body portion 315. Depending on the configuration of the filament slots 318a, 318b and on the mechanical properties of the filaments 319a, 319b, various deployment angles of the filaments 319a, 319b relative to a central longitudinal axis of the second body portion 315 may be achieved.

[0097] The configuration and orientation of the filament slots 318a, 318b may be selected such that deployed filaments 319a, 319b may achieve the positioning illustrated in

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FIG. 3C. In FIG. 3C, the filaments 319a, 319b are generally positioned in a plane that is perpendicular to a plane that includes the angle 316 between the first and second body portions 314, 315. As illustrated, the filaments 319a, 319b may be positioned such that they extend at an angle relative to the plane that includes the angle 316. Other filament slot 318a, 318b configurations may be configured to achieve other desired filament 319a, 319b placements. These configurations may be achieved by varying the quantity of filament slots and filaments, the placement of filament slots about the circumference of the tip 311, the angle at which the filaments extend away from the first and second body portions 314, 315, and/or the placement of filament slots along the first and second body portions 314, 315.

[0098] Similar to the embodiment of FIGS. 3A and 3B, the needle 309 may comprise a tube that includes a lumen therethrough. The lumen may be employed to accept an RF probe for delivery of RF energy and/or for the transport of fluids. In this regard, the tip 311 may further include a fluid port 320 that may be in fluid communication via a channel through the tip 311 with the lumen. The fluid port 320 may be used to transfer fluid between the region of the tip 311 and a proximal end of the needle 309.

[0099] In the deployed position as shown in FIG. 3C, the distal ends of the filaments 319a, 319b are disposed away from the tip 311. In a retracted position (not shown, but similar to as shown in FIG. 3B), the distal ends of the filaments 319a, 319b are disposed entirely within an outer perimeter (e.g., circumference where the second body portion 315 of the tip 311 is round) of the tip 311. In the deployed position, the filaments 319a, 319b act as broadcast antennae for an RF probe inserted into the needle 309. In this regard, together, the RF probe inserted into the lumen, the tip 311, and the filaments 319a, 319b, may form a monopolar electrode for application of RF energy to the target volume. The filaments 319a, 319b may allow the RF energy from the RF probe to be dispersed over a larger volume than would be possible with the tip 311 alone.

[0100] The filaments 319a, 319b may be constructed in a manner similar to as described with respect to the filaments 206a, 206b.

[0101] In general, any or all of the above variables may be incorporated into a particular embodiment of a needle to yield a needle capable of producing a lesion with a particular size, position and shape relative to the tip of the needle. Such custom sizes,

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positions and shapes may be designed for specific procedures. For example, a particular lesion size, position and shape may be selected to enable a physician to navigate the needle to a particular landmark (e.g., proximate or touching a bone visible using fluoroscopy) and then orient the needle such that deployed filaments will be operable to produce a lesion at a particular location relative to the landmark. By navigating to a particular internal landmark, as opposed to attempting to visualize a relative position of a needle offset from a landmark, a more accurate and/or consistent positioning of the needle may be achieved. In this regard, the skill level required to accurately position the needle for a particular procedure may be reduced.

[0102] The lesion shapes achievable through selection of the above variables may include, for example, generally spherical, oblong, conical, and pyramidal shapes. The orientation relative to, and the amount of offset from, the tip of such shapes may be selectable. In an embodiment, the tips of the deployed filaments may be positioned distally relative to the point of the tip to provide for a facile positioning of the lesion relative to the tip. Such capability may allow for the needle to be inserted directly toward a target volume. In other embodiments, the tips of the deployed filaments may be positioned at the same axial position along the central longitudinal axis as the point of the tip or the tips of the deployed filaments may be positioned proximally relative to the point of the tip. In other embodiments, some filament endpoints may be located distal to the point of the tip while others are disposed proximal to the point of the tip.

[0103] In the embodiment of FIGS. 2A, 2B, 3A, 3B, 5 and 6, the filaments 206a, 206b have been illustrated as running the entire length of the elongate member 203 from the filament hub 221 to the tip 201. In an embodiment, a single member may run along at least part of the elongate member 203 and the filaments may be interconnected to the single member at some point proximal to the tip 201. Furthermore, the filaments 206a, 206b have been illustrated as being straight within the elongate member 203. In alternate embodiments, the filaments within the elongate member 203 may be braided, wrapped or twisted together. Such embodiments may have increased column strength, providing resistance to buckling and/or bending within the elongate member 203.

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[0104] The filaments discussed herein may be encased within lumens sized to help prevent buckling or bending of the filaments within the elongate member 203. Such lumens may be part of the elongate member or they may be separate members (e.g., tubes within the elongate member). Such lumens may be formed by an inner member (not shown) within the elongate member where the inner member includes channels along its periphery in which the filaments may lie with the elongate member forming a portion of the lumens. Lumens used for filaments may also serve as lumens for the transfer of liquid to and/or from the region surrounding the tip. In another variation, the filaments may be hollow and may be used for transfer of liquid to and/or from the region surrounding the tip.

[0105] The illustrated embodiments show all of the filaments of a given embodiment as commonly deployed or refracted. In a variation, one or more filaments may be separately deployed and/or refracted such that the physician could selectively engage a desired number of elements. In another variation, a plurality of filaments may exit from the tip at a common location and form a fan-like arrangement as they are deployed.

[0106] Deployment of filaments discussed above has been described as the filaments moving relative to a stationary tip. Alternatively, embodiments may be deployed by pulling the tip back relative to the filaments. Such embodiments may be beneficial where the needle is initially advanced such that it is in contact with bone to ensure proper positioning. Then the tip may be withdrawn, leaving the filaments (e.g., curved shape memory filaments) in a precise, known position.

[0107] Returning to FIGS. 2A and 2B, as noted, the hub 204 may be fixedly attached to the elongate member 203. The hub 204 may be the primary portion of the needle 103 gripped by the physician during insertion and manipulation of the needle 103. The hub 204 may have an asymmetric feature, such as indicator 225, that is oriented in a known fashion relative to the asymmetry of the tip 201. In this regard, the indicator 225 may be used to communicate to the physician the orientation of the tip 201 within the patient 101. Internally, the hub 204 may include a cavity 213 sized to house a protrusion 218 of the actuator 216. The hub 204 may include a hole through which a projection 215 may project into the interior of the cavity 213 to control the motion of the actuator 216 relative to the hub

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204 and to secure the actuator 216 to the hub 204. The hub 204 may be made from any appropriate material, e.g., a thermoset plastic.

[0108] The actuator 216 may be used to control the motion to deploy and/or retract the filaments 206a, 206b. The actuator 216 is operable to move along the central longitudinal axis 223 relative to the hub 204, elongate member 203 and tip 201. The actuator 216 includes the protrusion 218 extending into the cavity 213 of the hub 204. The outer surface of the protrusion 218 includes a helical track 219 sized to accommodate the projection 215. In this regard, as the actuator is rotated relative to the hub 204 (e.g., by a physician to deploy the filaments 206a, 206b), the helical track 219 and projection 215 combine to cause the actuator 216 to move axially along the central longitudinal axis 223. The actuator 216 has an interface portion 217 that may be gripped by a user when twisting the actuator 216. The interface portion 217 may be knurled or otherwise textured to enhance the physician's ability to twist the actuator 216. The protrusion 218 may include an inner cavity 226 sized to accept the filament hub 221 and to allow the filament hub 221 to rotate freely relative to the actuator 216. In this regard, the linear motion of the actuator 216 may be transmitted to the filament hub 221 while the rotational motion of the actuator 216 may not be transmitted to the filament hub 221.

[0109] The actuator 216 may include a Luer fitting 220 or any other appropriate fitting type on a proximal end thereof. The Luer fitting 220 may be in fluid communication with the lumen 222 and provide a connection such that fluid may be delivered into the lumen 222 and to the fluid port 210 of the tip 201. The Luer fitting 220 may also be configured to allow for the insertion of the RF probe 401 into the lumen 222. The actuator 216 may be made from any appropriate material.

[0110] The filaments 206a, 206b may be fixedly interconnected to the filament hub 221. In this regard, the axial movement of the filament hub 221 due to the actuator 216 may be communicated to the filaments 206a, 206b to deploy and retract the filaments 206a, 206b when the actuator 216 is rotated. The filament hub 221 may be made from any appropriate material.

[0111] Thusly, the physician may be able to deploy or retract the filaments 206a, 206b by twisting the actuator 216. For example, as illustrated, a counterclockwise (as seen

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from the viewpoint of FIG. 5) rotation of the actuator 216 relative to the hub 204 will result in the deployment (extension) of the filaments 206a, 206b. Relatedly, a clockwise rotation of the actuator 216 relative to the hub 204 will result in the retraction of the filaments 206a, 206b. Additionally, by partially rotating the actuator 216 relative to the hub 204, the filaments 206a, 206b may be partially deployed or refracted. The actuator 216 and/or the hub 204 may include markings to indicate the position of the filaments 206a, 206b (e.g., the depth of deployment). The actuator 206 and/or hub 204 may include detents to provide a tactile feedback of the position of the filaments 206a, 206b.

[0112] Other types of mechanisms may be used to control the deployment and retraction of the filaments 206a, 206b. For example, a spring loaded mechanism may be used. Such a configuration may use a spring that acts upon the filaments 206a, 206b to bias the filaments 206a, 206b toward a predetermined position (e.g., either deployed or retracted). Such a mechanism may be analogous to a spring loaded mechanism used in retractable ballpoint pens. In another example, a roll clamp mechanism may be incorporated. A roller wheel could be incorporated into the hub 204 such that as the wheel is rotated with the user's thumb, the filaments 206a, 206b would advance or retract. In another example, the hub 204 and actuator 216 may interact via complimentary threaded features. As the actuator 216 is threaded into the hub 204, the filaments 206a, 206b would advance. As the actuator 216 is threaded out of the hub 204, the filaments 206a, 206b would retract. In another example, a Touhy-Borst type mechanism could be incorporated to control the deployment and retraction of the filaments 206a, 206b. Any other appropriate mechanism for controlling linear motion of the filaments 206a, 206b may be incorporated into the needle 103.

[0113] FIG. 2C is a cut away view of a portion of an alternate embodiment of a hub 231 and actuator 232 that may be part of RF needle 103 used in an RF neurotomy procedure. The hub 231 may be fixedly attached to the elongate member 203. The hub 231 may be the primary portion of the needle 103 gripped by the physician during insertion and manipulation of the needle 103. The hub 231 may have an asymmetric feature, such as indicator 233, that is oriented in a known fashion relative to the asymmetry of the tip 201. In this regard, the indicator 233 may be used to communicate to the physician the orientation of the tip 201 within the patient 101. Internally, the hub 231 may include a cavity 234 sized to

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house a protrusion 235 of a slide member 236. The protrusion 235 may include a keyway or key slot 237 that may run along a longitudinal direction of the protrusion 235. The internal surface of the hub 231 through which the protrusion 235 moves may include a mating key (not shown) configured to fit and slide within the key slot 237. Together, the key slot 237 and mating key of the hub 231 may limit the slide member 236 to a linear motion along the central longitudinal axis 223.

[0114] Filaments 206a, 206b may be fixedly connected to the protrusion 235 of the slide member 236 for movement therewith. In this regard, distal movement (e.g., movement to the right as shown in FIG. 2C) of the protrusion 235 relative to the hub 231 may cause extension of the filaments 206a, 206b relative to the hub 231, elongate member 203 and tip 201 (not shown in FIG. 2C). For example, distal movement of the protrusion 235 may be used to move the filaments 206a, 206b from a retracted position to a deployed position. Similarly, proximal movement (e.g., movement to the left as shown in FIG. 2C) of the protrusion 235 relative to the hub 231 may result in retraction of the filaments 206a, 206b relative to the hub 231, elongate member 203 and tip 201 (not shown in FIG. 2C).

[0115] The hub 231 may be made from any appropriate material, e.g., a thermoset plastic. The hub 231 may be at least partially transparent such that the position of the protrusion 235 and/or other components within the hub 231 may be observable by a user. The hub 231 may further include demarcations (e.g., molded or printed marks) such that the amount of extension of the filaments 206a, 206b may be determined from the position of the protrusion 235 and/or other components relative to the demarcations.

[0116] An actuator 232 may be used to control the motion to deploy and/or retract the filaments 206a, 206b fixedly connected to the protrusion 235. The actuator 232 may be generally tubular such that it may fit around a hub projection 238 projecting from the proximal end of the hub 231. At least a portion of the cavity 234 may be disposed within the hub projection 238. The actuator 232 may also include an annular feature 239 configured to fit within an annular slot 240 in the slide member 236. The annular feature 239 may be sized relative to the annular slot 240 such that the actuator 232 may rotate relative to the slide member 236 about the central longitudinal axis 223 (or an axis parallel thereto) while the position of the actuator 232 relative to the slide member 236 along the central longitudinal

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axis 223 remains fixed. In this regard, the actuator 232 and the slide member 236 may be configured to move in tandem relation along the central longitudinal axis 223. The annular feature 239 and annular slot 240 may be configured such that, during assembly, the actuator 232 may be pressed onto the slide member 236 and the annular feature 239 may snap into the annular slot 240.

[0117] The inner surface of the actuator 232 may include a helical track 241 sized to accommodate a corresponding mating helical thread 242 on the hub projection 238. In this regard, as the actuator 232 is rotated relative to the slide member 236 and hub 231 (e.g., by a physician to deploy the filaments 206a, 206b), the helical track 241 and helical thread 242 combine to cause the actuator 232 and the slide member 236 to move axially along the central longitudinal axis 223. In this regard, a linear motion of the slide member 236 relative to the hub 231 may be created while the rotational motion of the actuator 232 may not be transmitted to the slide member 236 and the hub 231. An outer surface of the actuator 232 may be textured or include features to assist the user in gripping and twisting the actuator 232. In an alternative configuration, the helical track 241 may be disposed on the hub projection 238 and the helical thread 242 may be disposed on the inner surface of the actuator 232.

[0118] The slide member 236 may include a Luer fitting 243 or any other appropriate fitting type on a proximal end thereof. The Luer fitting 243 may be in fluid communication with a lumen passing through the slide member 236 and may provide a connection such that fluid may be delivered through the Luer fitting 243 and into the lumen of the slide member 236. In turn, the lumen of the slide member 236 may be in fluid communication with the cavity 234 of the hub 231, which may in turn be in fluid communication with a lumen disposed within the elongate member 223. The lumen disposed within the elongate member 223 may be in fluid communication with the tip 201. In this regard, fluid may flow into the Luer fitting 243, into and through the lumen within the slide member 236, into and through the cavity 234 of the hub 231, into and through the elongate member 223, and out from the tip 201. The Luer fitting 243, the lumen within the slide member 236, the cavity 234 of the hub 231, and the lumen of the elongate member 223 may all also be configured to allow for the insertion of the RF probe 401 therethrough. Moreover,

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the protrusion 235 and cavity 234 of the hub projection 238 may be sized and/or configured to form a fluid seal therebetween. Accordingly, fluid delivered under pressure through the Luer fitting 220 may flow through the cavity 238 and into the elongate member 203 substantially without leaking past the interface between the protrusion 235 and the cavity 234 of the hub projection 238.

[0119] As noted, the filaments 206a, 206b may be fixedly interconnected to the slide member 236. In this regard, the axial movement of the slide member 236 due to the actuator 232 may be communicated to the filaments 206a, 206b to deploy and retract the filaments 206a, 206b when the actuator 232 is rotated. The slide member 236 may be made from any appropriate material. The actuator 232 may be made from any appropriate material.

[0120] Thusly, the physician may be able to deploy or retract the filaments 206a, 206b by twisting the actuator 232. Additionally, by partially rotating the actuator 232 relative to the hub 231, the filaments 206a, 206b may be partially deployed or refracted. The actuator 232 and/or hub 231 may include detents to provide a tactile feedback of the position of the filaments 206a, 206b. The detents may be configured such that tactile feedback associated with engagement of a detent coincides with a predetermined amount of deployment or retraction of the filaments 206a, 206b. In this regard, such tactile feedback may be used in determining filament position.

[0121] In alternate embodiments, the needle 103 may be a bipolar device instead of the monopolar device described above. In such embodiments, the filaments may be isolated from each other and the tip to enable bipolar operation. Where more than two filaments are included, elements may be included to allow for selection of the polarity of the filaments to aid in lesion shape, size and position control. In another variation, the needle 103 may be used in either a monopolar or a bipolar mode as selected by the physician.

[0122] The above-described embodiments of needles may used in spinal RF neurotomy procedures, which will now be described. In general, for an RF neurotomy procedure, the patient may lie face down on a table so that the spine of the patient is accessible to the physician. At any appropriate time before, during, and/or after the procedure, the physician may use imaging equipment, such a fluoroscope, to visualize the

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patient's anatomy and/or to visualize the positioning of equipment (e.g., the needle relative to a target volume).

[0123] The patient may be administered sedatives and/or intravenous fluids as appropriate. The skin of the patient surrounding where the procedure will take place may be prepared and maintained using an appropriate sterile technique. Where the needle is a monopolar device, a return electrode pad may be attached to the patient. A local anesthetic may be injected subcutaneously where the needle will be inserted. Anesthetic may also be administered along the approximate path the needle will take.

[0124] With the filaments in the retracted position, the needle may be introduced into the patient and moved to a target position relative to a target portion of a target nerve or to a target position relative to a target volume in which the target nerve is likely situated (all of which are generally referred to herein as the target nerve or portion of the target nerve). The target nerve may be an afferent nociceptive nerve such as, for example, a medial branch nerve proximate a lumbar facet joint. Introduction into the patient may include percutaneously using the tip of the needle to pierce the skin of the patient. The moving of the needle may include navigating toward the target position using fluoroscopic guidance. Furthermore, the moving of the needle may include advancing the needle to an intermediate position and then repositioning the needle to the target position. For example, the needle may be advanced until it contacts a bone or other structure to achieve the intermediate position. This may be followed by retracting the needle a predetermined distance to achieve the target position. Such a procedure may be facilitated by the markers 224 or collar previously discussed.

[0125] During the moving of the needle or after the target position has been achieved, the needle may be used to inject an anesthetic and/or a dye. The dye may increase contrast in fluoroscopic images to assist in visualizing the patient's anatomy, which may aid the physician in guiding and/or verifying the position of the needle.

[0126] The needle may be rotated about the central longitudinal axis of the elongate member of the needle to achieve a desired orientation relative to the target nerve. For example, the needle may be rotated such that a lesion created with the needle with the filaments deployed will be offset from the central longitudinal axis toward the target nerve.

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Such rotation of the needle may be performed prior to insertion of the needle into the patient and/or after insertion into the patient. For example, the physician may rotate the needle prior to insertion such that the needle is generally in the desired rotational orientation. Then, after achieving the target position, the physician may fine tune the rotational orientation of the needle by rotating the needle to a more precise orientation.

[0127] Once the target position and desired rotational orientation have been achieved, the next step may be to advance one or more filaments of the needle relative to the tip of the needle. The particular needle used for a procedure may have been selected to enable the creation of a particular sized and shaped lesion at a particular position relative to the needle. As such, the particular needle used may be of any appropriate configuration (e.g., any appropriate number of filaments, any appropriate filament positioning) discussed above.

[0128] Where the needle is configured as shown in FIG. 5, the advancement of filaments may include advancing the filaments such that when the filaments are in their respective deployed positions, a midpoint between a distal end of the first filament and a distal end of the second filament is offset from the central longitudinal axis of the needle and the filament endpoints are disposed distal to the tip of the needle. Such deployment may enable the needle to be used to create a lesion that is offset from the tip of the needle toward the midpoint between the deployed filament ends. The lesion created may also be positioned at least partially distal to the tip of the needle.

[0129] FIG. 11A is an illustration of an exemplary set of isotherms 1010a-1010c that may be created with the needle 103 of FIG. 2A. As illustrated by the set of isotherms 1010a-1010c, RF energy emanating from the tip 201 and filaments 206a, 206b, may produce a region of elevated temperatures disposed about the tip 201 and filaments 206a, 206b. The isotherms 1010a-1010c may be offset from the central longitudinal axis 223 such that a centroid of the isotherms as viewed in FIG. 11A is offset from the central longitudinal axis 223 in the direction of the filaments 206a, 206b. The centroid of the isotherms 1010a-1010c as viewed in FIG. 11A may also be disposed distally relative to the tip 201 such that it is disposed between the tip 201 and the distal ends of the deployed filaments 206a, 206b. The isotherms 1010a-1010c may also be shaped such that, as viewed in FIG. 11A, the isotherms 1010a-1010c have a maximum cross dimension along the central longitudinal axis 223 that is

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greater than a maximum cross dimension in the plane of FIG. 11A perpendicular to the central longitudinal axis 223. Similarly, as shown in FIG. 11B discussed below, the isotherms 1010a-1010c may have a maximum cross dimension along the central longitudinal axis 223 that is greater than a maximum cross dimension perpendicular to the plane of FIG. 11A and perpendicular to the central longitudinal axis 223.

[0130] The offset of the centroid of the isotherms 1010a-1010c from the central longitudinal axis 223 results in greater lesion width in a plane perpendicular to the central longitudinal axis 223, as compared to a similarly sized straight needle with no filaments. The offset of the centroid of the isotherms 1010a-1010c also allows for projection of the centroid of a corresponding lesion volume in a direction away from the central longitudinal axis 223. By way of example, such offsets may advantageously enable the execution of the exemplary procedures described herein. In addition, such offsets may advantageously enable the creation of lesion volumes distal (relative to the needle 103) to potentially interfering structures (e.g., an ossified process). Moreover, such offsets may advantageously enable the needle 103 to be inserted into a patient at a more desirable angle (e.g., closer to perpendicular to the surface of the patient such as within 30° of perpendicular to the surface of the patient) than would be required using a needle without offset lesion capabilities.

[0131] FIG. 11B is an illustration of an exemplary lesion 1011 that may be created with the needle 103 of FIG. 2A. In FIG. 11B, the needle 103 has been placed perpendicular to a surface 1012. The surface 1012 may, for example, be the surface of a bone, such as a lumbar vertebra. As illustrated, the filaments 206a, 206b are deployed such they are proximate to the surface 1012. As such, the lesion 1011 has a width along the surface 1012 that is wider than would be created by the needle 103 if the filaments 206a, 206b were not deployed. Such capabilities may, for example, be advantageous where a target structure (e.g., a nerve) is known to be positioned along the surface 1012, but its exact position is unknown. In such a case, the needle 103 may be positioned generally perpendicular to the surface 1012 to achieve the illustrated lesion width along the surface 1012, whereas the needle 103 without the filaments 206a, 206b deployed, would require either multiple repositioning steps or for the needle 103 to be placed generally parallel to the surface 1012 to achieve the same lesion width along the surface 1012.

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[0132] FIG. 11C is an illustration of an exemplary lesion 1022 that may be created with a single-filament needle 1020. The single-filament needle 1020 is similar to the needle 103 with a difference that the single-filament needle 1020 includes only a single filament 1021. The filament 1021 may be configured similarly to the filaments 206a, 206b. The single-filament needle 1020 with the filament 1021 deployed may be operable to produce a lesion 1022 that is a flattened version (e.g., thinner in a direction perpendicular to the central longitudinal axis 223--the left to right direction as illustrated in FIG. 11C) of a lesion that may be produced by the needle 103 with its filaments 206a, 206b deployed. The capability to produce such a lesion shape may be beneficial when it is desirable to have a relatively large lesion in a particular direction (e.g., to compensate for the variability of location of a target nerve) and a relatively small lesion width in another direction (e.g., to avoid a structure such as viscera or a patient's skin).

[0133] Where the needle is configured such that all of the filaments of the needle are deployed on a common side of a central plane of the needle (where the central longitudinal axis is disposed entirely within the central plane), the advancement of filaments may include advancing the filaments such that when the filaments are in their respective deployed positions, the distal ends of all of the filaments are disposed on a common side of the central plane. Such deployment may enable the needle to be used to create a lesion that is offset from the tip of the needle to the same side of the central plane as the deployed filament ends. The lesion created may also be positioned at least partially distal to the tip of the needle.

[0134] Where the needle is configured as shown in FIG. 8, the advancement of filaments may include advancing the filaments such that when the filaments are in their respective deployed positions, each filament distal end defines a vertex of a polygon whose centroid is offset from a central longitudinal axis of the needle. Such deployment may enable the needle to be used to create a lesion that is offset from the tip of the needle toward the centroid. The lesion created may also be positioned at least partially distal to the tip of the needle.

[0135] The advancement of the filaments may be achieved using any of the mechanisms discussed above. For example, in the embodiment of FIG. 2A, rotating the

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actuator 216 relative to the hub 104 may cause the filaments to advance to the deployed position. The advancement of the filaments may be performed such that each of the plurality of filaments passes through a surface of the needle that is parallel to the central longitudinal axis of the needle. In an embodiment, the filaments of the needle may be advanced to a position that is an intermediate position between the retracted position and the fully deployed position. The degree of deployment may be based on the desired lesion size and/or the accuracy of the placement of needle. For example, the same needle may be used in two different procedures where the variability of the location of a target nerve is greater in the first procedure than it is in the second procedure. In such situation, the greater deployment of the filaments may be used in the first procedure, whereas in the second procedure, a smaller degree of deployment may be used since a smaller lesion may suffice to ensure that the target nerve has been lesioned. In another example, after placement of the needle during a procedure, the position of the needle may be determined to be slightly offset from a target position. In such a case, the filaments may be deployed to a greater degree than would have been required if the needle were placed exactly on target. In such a case, the greater degree of deployment may be used to compensate for the needle positioning inaccuracy. In such a case, needle repositioning and possible associated trauma may be avoided.

[0136] After advancing the filaments to the deployed position, their positions may be confirmed using the imaging system (e.g., using a fluoroscope). Furthermore, proper positioning may be verified by using the needle to stimulate the target nerve. An electrical signal (e.g., up to about 2 volts applied at about 2 Hz) may be applied to the needle and the physician may observe any related patient movement (e.g., muscle fasciculation in the territory supplied by the nerve). In another example, an electrical signal (e.g., up to about 1 volt applied at about 50 Hz) may be applied to the needle and the patient may indicate if they feel any associated sensations and their locations to assist in verifying correct needle positioning. Such stimulation (either physician-observed or patient reported) may be used to stimulate a targeted nerve to determine if the deployed position is adequate to achieve denervation of the targeted nerve. In this regard, it is desirable for the stimulation to affect the targeted nerve.

[0137] Such stimulation may be used to attempt to stimulate a nerve that is not targeted for denervation (e.g., a nerve where no denervation is desired) to determine the position of the needle relative to such a non-targeted nerve. In this regard, if the stimulation signal does not stimulate the non-targeted nerve, it may be assumed that the position of the needle relative to the non-targeted nerve is such that the application of RF energy to the needle will not result in significant damage to the non-targeted nerve. And if the stimulation does stimulate the non-targeted nerve, the needle may be repositioned to avoid damaging the non-targeted nerve. In this regard, it is desirable for the stimulation not to affect the non-targeted nerve.

[0138] After correct needle positioning has been verified (e.g., by imaging and/or patient response), an anesthetic may be injected through the needle.

[0139] After the filaments have been advanced to the desired position, the next step may be to apply RF energy to the needle using the interconnected RF generator. In embodiments that use a separate RF probe to deliver RF energy, the RF probe may be inserted into a lumen of the needle prior to application of the RF energy. Additionally, when using such a configuration, the application of RF energy may include applying RF energy to the RF probe and conducting the RF energy away from the probe by the tip and/or filaments.

[0140] The resultant RF energy emanating from the tip and filaments may generate heat that ablates the target nerve. Such ablation may be achieved by creating a lesion that includes the target nerve. It is desired that the target nerve be completely ablated to prevent incomplete neurotomy which may result in dysesthesia and patient discomfort. In an exemplary embodiment, a lesion with a maximum cross dimension of 8-10 mm may be created. Larger or smaller lesions may be created by varying filament characteristics (e.g., filament advancement distance) and/or RF energy levels. The created lesion may be offset from the central longitudinal axis of the needle. The center of the lesion may be positioned distal to the tip of the needle. Of note, since the RF energy is emanating from the tip and filaments, a particularly sized lesion may be created with a lower peak temperature (the maximum temperature experienced in the patient) than would be possible if a needle without filaments were to be used to create the same-sized lesion. For example, a particular lesion may be achieved with the needle with deployed filaments where the peak temperature is

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about 55-60° C., whereas creation of the same lesion using a needle without filaments could require a peak temperature of about 80° C. Such lower temperatures required by the needle with deployed filaments may result in greater patient safety.

[0141] Before, during, and after the application of RF energy, a temperature sensor (e.g., thermocouple) at or near the tip of the needle may be used to monitor the temperature at or near the tip. Such readings may be used as control signals (e.g., a feedback loop) to control the application of RF energy to the needle. If it is desired to ablate additional target nerves or to ablate an additional volume to ensure ablation of the original target nerve, the spinal RF neurotomy procedure may continue.

[0142] Where the particular needle is configured to create lesions offset from the central longitudinal axis of the needle, and the additional target nerve or target volume is within a volume that may be lesioned using the needle in its current position but in a different rotational orientation, the procedure may continue as follows. First, after the initial RF energy application, the filaments may be retracted into the needle. Once retracted, the needle may be rotated, and the filaments redeployed. Next, the reoriented needle may be used to at least partially ablate the additional target nerve or target volume. Such retargeting of ablation volumes without repositioning (e.g., without withdrawing the needle from the patient and reinserting), may result in reduced patient trauma as compared to known spinal RF neurotomy procedures which may require removal and reinsertion of a needle to achieve lesioning of the second target volume. Moreover, such retargeting of ablation volumes without repositioning may result in the ability to create uniquely shaped lesions from a single insertion position. Such shaped lesions may include, for example, lesions that are in the shape of two or more intersecting spheres. The steps of retracting the filaments, rotating the needle, redeploying the filaments, and applying RF energy may be repeated a plurality of times.

[0143] Where the additional target nerve or target volume is not within a volume that may be lesioned using the needle in its current position, the needle may be repositioned. Such repositioning may include partially or fully removing the needle from the patient and then repositioning the needle and repeating the above-described steps.

[0144] At any point where no additional lesioning is desired, the filaments of the needle may be retracted, and the needle may be removed from the patient. After removal of

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the needle, a sterile bandage may be placed over the needle insertion site or sites. The patient may then be held for observation and recovery from the effects of any sedative that may have been administered.

[0145] Examples of specific spinal RF neurotomy procedures will now be described. Generally, steps unique to each procedure will be discussed while steps common to any spinal RF neurotomy procedure (e.g., site preparation, needle removal) will not be further discussed. Each of the procedures is described as being performed with the needle 103 of FIGS. 2A-6. It will be appreciated that the variations in needle configuration discussed above may be used in these procedures. For example, to increase the offset of the created lesion relative to the central longitudinal axis, curved (e.g., FIG. 10) and/or partially insulated filaments may be used that may create a lesion with a greater offset from the central longitudinal axis than the embodiment of FIG. 2A-6.

[0146] 1. Lumbar RF Neurotomy of a Medial Branch Nerve Proximate a Lumbar Facet Joint.

[0147] This process may include using a needle that enables the creation of lesions which are offset from the central longitudinal axis of the needle. The procedure will be described as being performed on the L5 vertebra 1101 using FIG. 12 and the needle 103 of FIG. 2A. It should be understood that other embodiments of needles described herein may be used in the procedure.

[0148] The lumbar RF neurotomy process may include positioning the tip 201 of the needle 103 (e.g., using fluoroscopic navigation) such that it is in contact with, or proximate to the groove 1102 between the transverse 1103 and superior articular 1104 processes of the targeted lumbar vertebra 1101. Such positioning is shown in FIG. 12. By contacting the lumbar vertebra 1101, a positive determination of the position of the needle 103 may be made. By way of example, such positioning may be performed such that the needle 103 is within 30° of being perpendicular to the lumber vertebra 1101 at the point of contact with the lumbar vertebra 1101, or at the point of the lumbar vertebra 1101 closest to the tip 201 of the needle 103. Optionally, from such a position, the needle 103 may be retracted a predetermined amount (e.g., between about 3 mm and 5 mm) as measured by

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markers 224 on the needle 103, as determined using the collar about the elongated member 203 discussed above, and/or by fluoroscopic navigation.

[0149] The process may include rotating the needle 103 such that the midpoint 502 is oriented toward the superior articular process 1104 and a medial branch nerve 1105 that is positioned along a lateral face 1106 of the superior articular process 1104. Next, the filaments 206a, 206b may be advanced to the deployed position (as shown in FIG. 12). The position of the needle 103 and deployed filaments 206a, 206b may be verified using fluoroscopy and/or patient stimulation. The RF probe 401 may then be inserted into the lumen 222 such that RF energy emanating from the probe 103 will be conducted by the tip 201 and filaments 206a, 206b to the target medial branch nerve 1105 and away from the intermediate branch of the posterior primary ramus.

[0150] Next, RF energy may be applied to the RF probe 401. The RF energy emanating from the needle 103 may be preferentially biased toward the target medial branch nerve 1105. The lesion created by such a procedure may, for example, have a maximum cross dimension of 8-10 mm, and may ablate a corresponding portion of the medial branch nerve 1105, thus denervating the facet joint.

[0151] In a variation, the needle may be operable to create a generally symmetric lesion relative to its central longitudinal axis. In such a variation the sequence of steps may include insert needle, deploy filaments, and apply RF energy.

[0152] In another variation, the needle may be inserted so it is positioned along the length of a portion of the nerve (as illustrated by needle 103'). Such positioning is similar to known methods of RF neurotomy performed with needles without filaments. After positioning the needle, the filaments may be deployed and a lesion may be created. As noted above, a needle with deployable filaments that is capable of producing a lesion equivalent to that of a needle without deployable filaments may be smaller in diameter than the needle without deployable filaments. Accordingly, although the positioning of needle 103' may be similar to known processes, the process utilizing the needle with deployable filaments may cause less trauma and be safer than procedures using a needle without deployable filaments due to the smaller size of the needle with deployable filaments. Moreover, as discussed above, the peak temperatures required to produce the desired lesion volume may be less when

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using the needle with deployable filaments as compared to the needle without deployable filaments, further contributing to patient safety. Furthermore, the filaments of needle 103' may be partially or fully deployed to achieve a desired lesion location, shape and/or size.

[0153] It is noted that the illustrated deployment of needle 103 with the filaments 206a, 206b deployed may be used to create a lesion that approximates a lesion that would be created with the a prior art (non filament) needle placed in the position of needle 103' (e.g., parallel to the target nerve 1105). Moreover, the placement of needle 103 generally perpendicular to the surface of the L5 vertebra 1101 may be less difficult to achieve than the parallel placement of the needle 103'.

[0154] 2. Sacroiliac Joint (SIJ) RF Neurotomy of the Posterior Rami.

[0155] This process may include using a needle that enables the creation of lesions which are offset from the central longitudinal axis of the needle. The procedure will be described as being performed on the posterior rami 1201 of the SIJ referencing FIG. 13 and using the needle 103 of FIGS. 2A-6. It should be understood that other embodiments of needles described herein may be used in the procedure.

[0156] As part of the SIJ RF neurotomy process, it may be desirable to create a series of lesions in a series of lesion target volumes 1203a-1203h lateral to the sacral foramina 1211, 1212, 1213 of a side of the sacrum 1200 to ablate posterior rami 1201 that are responsible for relaying nociceptive signals from the SIJ. Since the exact positions of the rami 1201 may not be known, lesioning such a series of target volumes 1203a-1203h may accommodate the variations in rami 1201 positions. The series of target volumes 1203 may be in the form of one or more interconnected individual target volumes, such as target volumes 1203a and 1203b. In addition, the process may include an additional lesion 1208 between the L5 vertebra 1209 and the sacrum 1200.

[0157] The SIJ RF neurotomy process may include positioning the tip 201 of the needle 103 (e.g., using fluoroscopic navigation) such that it is in contact with, or proximate to, and in lateral relation to the S1 posterior sacral foraminal aperture (PSFA) 1211 at a first point 1204 that is at the intersection of the two target volumes 1203a and 1203b. Such positioning may be performed such that the needle 103 is oriented within 30° of being perpendicular to the sacrum 1200 at the point of contact (or at the point of the sacrum 1200

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closest to the tip 201 of the needle 103). By contacting the sacrum 1200, a positive determination of the position of the needle 103 may be made. Optionally, from such a position, the needle 103 may be retracted a predetermined amount (e.g., between 3 mm and 5 mm) as measured by markers 224 on the needle 103, as determined using the collar about the elongated member 203 discussed above, and/or by fluoroscopic navigation. For example, a contralateral posterior oblique view may be obtained to ascertain that the tip 201 has not entered the spinal canal. For example, a fluoroscopic view may be obtained looking down the length of the needle 103 to verify that the needle 103 is properly offset from the S1 PSFA 1211 and/or a fluoroscopic view may be obtained looking perpendicular to the central longitudinal axis 223 of the needle 103 to verify that the needle is not below the surface of the scrum (e.g., disposed within the S1 PSFA 1211). Additionally, an electrical signal may be applied to the needle 103 to stimulate nerves proximate to the tip 201 to verify correct needle 103 placement.

[0158] The process may include rotating the needle 103 such that the midpoint 502 is oriented toward the first target volume 1203a in the direction of arrow 1205a. Next, the filaments 206a, 206b may be advanced to the deployed position. The position of the needle 103 and deployed filaments 206a, 206b may be verified using fluoroscopy and/or stimulation. The RF probe 401 may then be inserted into the lumen 222 such that RF energy emanating from the needle 103 will be conducted by the tip 201 and filaments 206a, 206b to the first target volume 1203a. Next, RF energy may be applied to the RF probe 401. The RF energy emanating from the needle 103 may be preferentially biased toward the first target volume 1203a. The lesion created by such an application of RF energy may, for example, have a maximum cross dimension of 8-10 mm, and may ablate a corresponding portion of the rami 1201.

[0159] Next, the filaments 206a, 206b may be retracted and the needle 103 may be rotated approximately 180 degrees such that the midpoint 502 is oriented toward the second target volume 1203b in the direction of arrow 1205b. Optionally, some lateral repositioning of the needle may performed (e.g. without any needle pull back or with a small amount of needle pull back and reinsertion). Next, the filaments 206a, 206b may be advanced to the deployed position. The position of the needle 103 and deployed filaments 206a, 206b

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may be verified using fluoroscopy and/or stimulation. Next, RF energy may be applied to the RF probe 401 to create a lesion corresponding to the second target volume 1203b.

[0160] In this regard, with a single insertion of the needle 103, two interconnected lesions (which may also be considered to be a single oblong lesion) may be created. Thus, as compared to known methods where an RF probe must be repositioned prior to each application of RF energy, the number of probe repositioning steps may be greatly reduced, thus reducing patient trauma and procedure duration. In this regard, a continuous region of lesioning may be achieved disposed about the S1 PSFA 1211 such that the lesion occupies a volume surrounding the S1 PSFA 1211 from about the 2:30 clock position to about the 5:30 clock position (as viewed in FIG. 13). Such lesioning may help to achieve denervation of the posterior rami proximate to the S1 PSFA 1211.

[0161] The above procedure may be repeated as appropriate to create lesions corresponding to the entire series of target volumes 1203a-1203h, thus denervating the SIJ. In this regard, a similar continuous region of lesioning may be achieved disposed about the S2 PSFA 1212 and a region of lesioning from about the 12:00 clock position to about the 3:00 clock position (as viewed in FIG. 13) relative to the S3 PSFA may be achieved disposed about the S3 PSFA 1213. Furthermore, a lesion 1208 may be created at the base of the superior articular process of the L5 1209 dorsal ramus in the grove between the superior articular process and the body of the sacrum. The needle 103 may be inserted generally perpendicular to the plane of FIG. 13 to produce lesion 1208.

[0162] In a variation of the above procedure, three or more lesions may be created with a needle in a single position. For example, a needle positioned at a point 1106 proximate to three target volumes 1203c, 1203d, and 1203e, may be operable to create lesions at each of the three target volumes 1203c, 1203d, and 1203e, thus further reducing the number of needle repositionings.

[0163] In another variation, each individual lesion corresponding to the series of target volumes 1203 may be created using a needle with deployable filaments where the needle is repositioned prior to each application of RF energy. In such a variation the sequence of steps may be insert needle, deploy filaments, apply RF energy, retract filaments, reposition needle, and repeat as appropriate to create each desired lesion. Such a procedure may be

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conducted using a needle capable of producing a lesion symmetric to a central longitudinal axis of the needle (e.g., the needle of FIG. 9).

[0164] 3. Thoracic RF Neurotomy of a Medial Branch Nerve.

[0165] This process may include using a needle that enables the creation of lesions which are offset from the central longitudinal axis of the needle. Successful treatment of thoracic z-joint pain using radiofrequency ablation of relevant medial branch nerves is challenging owing to the inconsistent medial branch location in the intertransverse space, especially levels T5-T8. A conventional RF cannula must be positioned at multiple locations within the intertransverse space to achieve the sufficient tissue ablation for successful medial branch neurotomy. The procedure will be described as being performed on an intertransverse space between adjacent ones 1301, 1302 of the T5 to T8 thoracic vertebrae using FIG. 14 and the needle 103 of FIGS. 2A-6. It should be understood that other embodiments of needles described herein may be used in the procedure.

[0166] The process may include obtaining an optimized segmental anteroposterior image at target level defined by meticulous counting from T1 and T12. This may be followed by obtaining an image that is ipsalateral oblique 8-15 degrees off sagittal plane of the spine to visualize costotransverse joint lucency clearly. This allows improved visualization of superior-lateral transverse process (especially in osteopenic patients). This angle aids in directing the probe to a thoracic anatomic safe zone medial to the lung, minimizing risk of pneumothorax.

[0167] The skin entry site for the needle 103 may be over the most inferior aspect of transverse process slightly medial to costotransverse joint. Inserting the needle 103 may include navigating the device over transverse process over bone to touch superior transverse process slightly medial to costotransverse joint. The process may include checking anteroposterior imaging to demonstrate active tip 201 of the needle 103 is at the superolateral corner of the transverse process. The process may also include checking a contralateral oblique (e.g., +/-15 degrees) image view to demonstrate the target transverse process in an elongate fashion. This view is useful for demonstrating the tip 201 of the needle 103 in relationship to the superolateral margin of the transverse process subadjacent to the targeted

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medial branch nerve. The process may include retracting the active tip 201 slightly (e.g., 1 mm to 3 mm).

[0168] The process may include rotating the needle 103 such that the midpoint 502 is oriented toward the intertransverse space between the vertebrae 1301, 1302 and the medial branch nerve 1303 that is positioned therein. Next, the filaments 206a, 206b may be advanced ventral into the intertransverse space between the vertebrae 1301, 1302 to the deployed position. The position of the needle 103 and deployed filaments 206a, 206b may be verified using fluoroscopy (e.g., using lateral imaging). The RF probe 401 may then be inserted into the lumen 222 such that RF energy emanating from the probe 103 will be conducted by the tip 201 and filaments 206a, 206b to the target medial branch nerve 1303. Stimulation (e.g., motor and/or sensory) may be performed to verify positioning. Next, RF energy may be applied to the RF probe 401. The RF energy emanating from the needle 103 may be preferentially biased toward the volume between the vertebrae 1301, 1302. The lesion created by such a procedure may, for example, have a maximum cross dimension of 8-10 mm, and may ablate a corresponding portion of the medial branch nerve 1303.

[0169] It is noted that thoracic RF neurotomy performed on other thoracic vertebrae may require different sized lesions. For example, thoracic RF neurotomy performed on the T3-T4 vertebrae may require a smaller lesion volume than the above-described procedure, and thoracic RF neurotomy performed on the T1-T2 vertebrae may require a still smaller lesion volume. As described herein, the deployment of the filaments of the needle 103 may be varied to achieve such desired target lesion volumes.

[0170] 4. Cervical Medial Branch RF Neurotomy.

[0171] Embodiments of needles described herein (e.g., the needle 103 of FIG. 2A) are capable of creating a volume of tissue ablation necessary for complete denervation of the cervical zygapophyseal joints, including the C2/3 cervical zygapophyseal joint (z-joint). Tissue ablation for cervical z-joint using embodiments of needles described herein may be accomplished using a single placement and single heating cycle. Such single placement and single heating cycle may avoid unnecessary tissue damage from multiple placements of a conventional probe, and unintended injury to collateral tissue caused by excessive lesioning. The zone of ablation created by various embodiments of the device is designed to provide

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sufficient, and necessary tissue coagulation for a successful procedure, and thus may be expected to improve the outcomes of patients undergoing this spinal radiofrequency neurotomy.

[0172] A cervical medial branch RF neurotomy procedure will be described as being performed on the third occipital nerve at the C2/3 z-joint using the needle 103 as shown in FIG. 15. In FIG. 15, the needle 103 is positioned between the C2 1401 and C3 1402 vertebrae.

[0173] In a first step, the patient may be placed in a prone position on a radiolucent table suited to performing fluoroscopically guided spinal procedures. Sedation may be administered. The patient's head may be rotated away from the targeted side. Sterile skin prep and draping may be performed using standard well-described surgical techniques.

[0174] For Third Occipital Nerve (TON) ablation (C2/3 joint innervation) the lateral aspect of the C2/3 Z-joint is located under either parasagittal or alternatively, ipsilateral oblique rotation of less than/equal to 30 degrees of obliquity relative to the true sagittal plane of the cervical spine. The skin entry point may be infiltrated with local anesthetic. Then the tip 201 of the needle 103 is moved over the most lateral aspect of bone of the articular pillar at the juncture of the C2/3 z-joint to a first position contacting bone proximate to the most posterior and lateral aspect of the z-joint complex

[0175] Once boney contact is made, the needle 103 may be retracted a predetermined distance (e.g., 1-3 mm) and the filaments are deployed towards the lateral aspect of the C2/3 z-joint. The needle 103 may be rotated about a central longitudinal axis prior to filament deployment to ensure that deployment will occur in the desired direction.

[0176] Multiplanar fluoroscopic imaging may then be employed to verify that the tip and filaments are positioned as desired. For example, it may be verified that the filaments are positioned straddling the lateral joint lucency, and posterior to the C2/3 neural foramen. Useful imaging angles include anterior-posterior (AP), lateral, and contralateral oblique (Sluijter) views. To further verify adequate positioning of the needle 103, motor stimulation may be performed by delivering a voltage (of up to 2 volts) at 2 Hz to the tip 201 and filaments. Furthermore, sensory stimulation may be performed at appropriate voltage (e.g., 0.4 to 1 volt) and frequency (e.g., 50 Hz).

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[0177] After position verification, RF energy may be applied to the tip and the plurality of filaments to generate heat that ablates a portion of the third occipital nerve. After lesioning, the device may be removed. For levels below the C2/3 z-joint, the procedure may be similar than as described above with respect to the third occipital nerve, with the exception that the initial boney contact target is at the waist of inflection point of the articular pillar.

[0178] Similar to the above procedures, other spinal RF procedures may benefit from the asymmetrical application of RF energy from embodiments of probes described herein. Such asymmetry may, for example, be used to project RF energy in a desired direction and/or limit the projection of RF energy in undesired directions. The configuration of the filaments may be selected for a particular application to produce a desired size, shape and location (relative to the needle tip) of a lesion within the patient. The location of the lesion may be offset distally and/or laterally from the tip of the needle as required for a particular application.

[0179] It will be appreciated that the delivery of RF energy to tissue in the anatomy is practiced for a multitude of reasons and embodiments of needles described herein may be adapted (modified or scaled) for use in other medical procedures. For example, embodiments of needles described herein could be used to deliver RF energy as a means to cauterize "feeder vessels," such as in bleeding ulcers and/or in orthopedic applications. Further, embodiments of needles described herein could also be adapted to procedures such as cardiac ablation, in which cardiac tissue is destroyed in an effort to restore a normal electrical rhythm in the hart. This application could further benefit from the ability of embodiments of needles described herein to deliver fluid through a lumen since, for example, emerging procedures in cardiac therapy require the ability to deliver stem cells, vascular endothelial growth factor (VEGF), or other growth factors to cardiac tissue. The ability to steer embodiments of the needle (previously discussed) may provide significant benefit to the in the field of cardiovascular drug delivery.

[0180] While various embodiments of the present invention have been described in detail, it is apparent that further modifications and adaptations of the invention will occur to those skilled in the art. However, it is to be expressly understood that such modifications and adaptations are within the spirit and scope of the present invention.

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WHAT IS CLAIMED IS:

1. A needle for insertion into a patient during an RF ablation procedure, the needle comprising:

a hub;

an elongate member fixed to the hub;

a tip fixed to the elongate member at a distal end of the needle, wherein the tip is shaped to pierce tissue of the patient;

a plurality of filaments disposed within at least a portion of the elongate member;

an actuator interconnected to the plurality of filaments, wherein movement of the actuator relative to the hub moves the plurality relative to the tip; and

a lumen within the elongate member, wherein the lumen and the tip are configured to accept an RF probe such that an electrode of an inserted RF probe, the tip, and the first and second filaments are operable to form a single monopolar RF electrode.

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ABSTRACT

Methods and systems for spinal radio frequency neurotomy. Systems include needles capable of applying RF energy to target volumes within a patient. Such target volumes may contain target medial branch nerves along vertebrae or rami proximate the sacrum. Such procedures may be used to ablate or cauterize a portion of the targeted nerve, thus blocking the ability of the nerve to transmit signals to the central nervous system. Disclosed needles may be operable to asymmetrically, relative to a central longitudinal axis of the needle, apply RF energy. Such asymmetry facilitates procedures where a tip of the needle is placed proximate to anatomical structures for location verification. Then RF energy may be applied in a selectable direction relative to the needle tip to ablate volumes that include the targeted medial branch nerves or rami, thus denervating facet joints or the sacroiliac joint, respectively, to relieve pain in a patient.

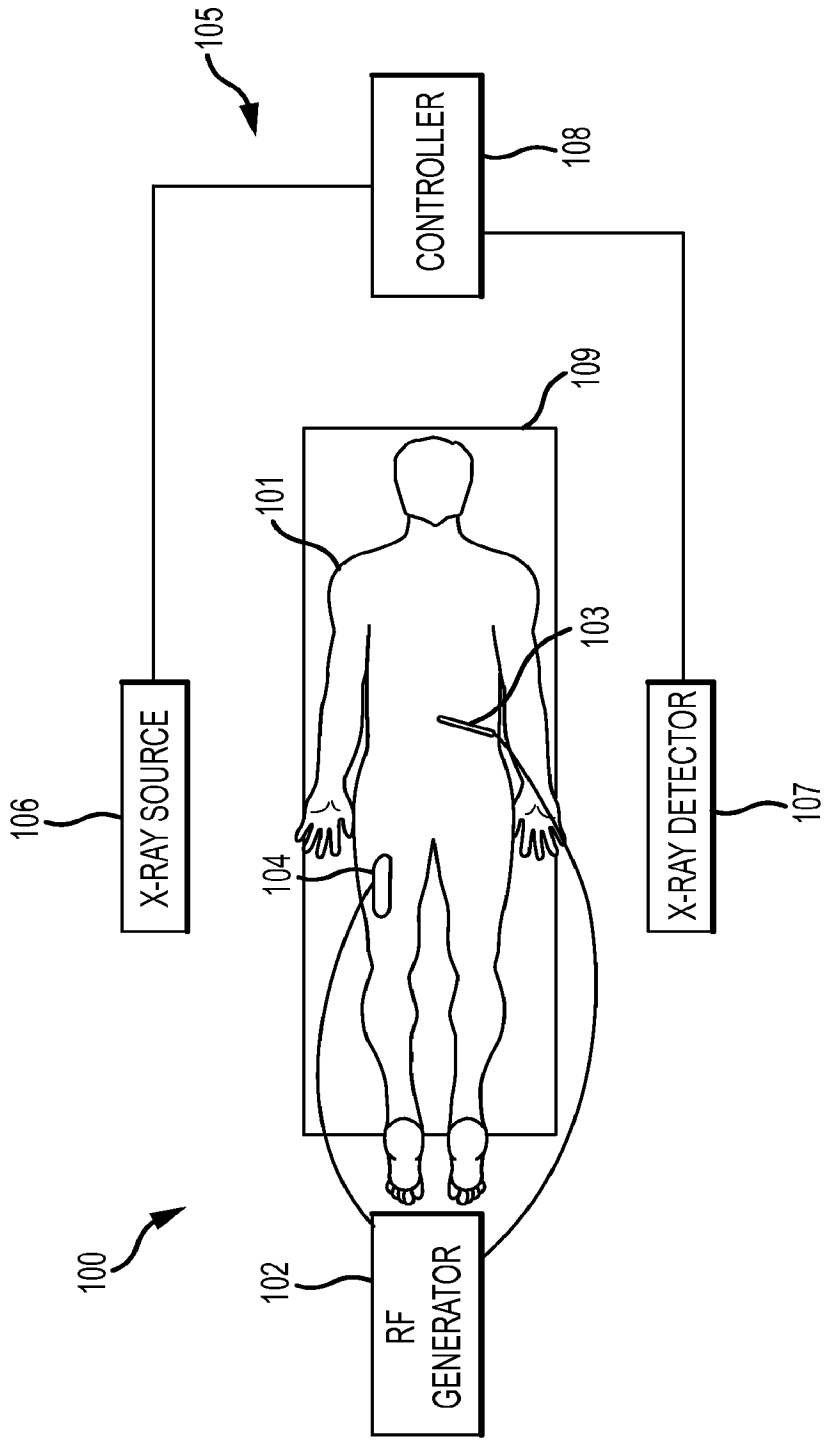


FIG.1

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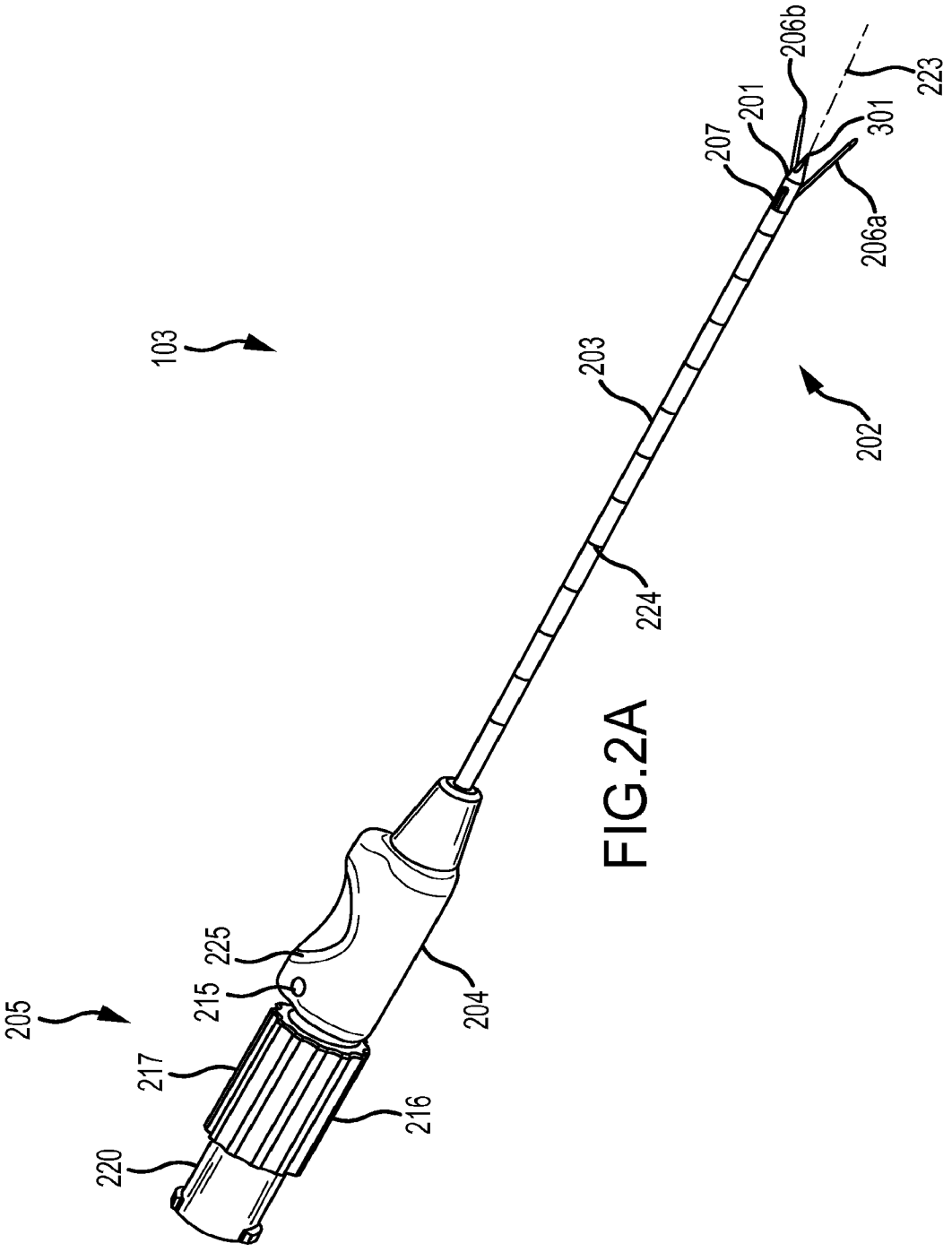


FIG.2A

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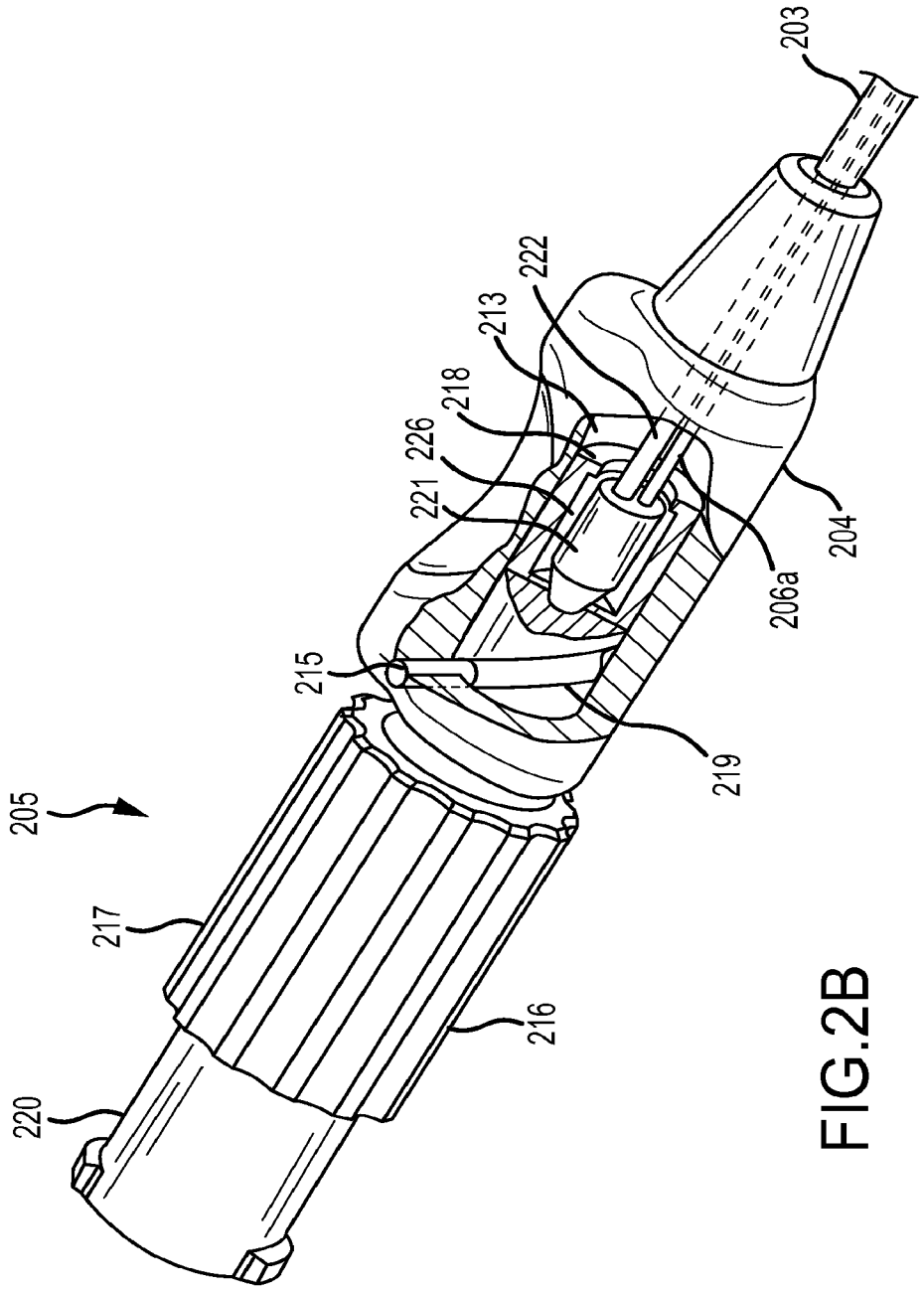


FIG.2B

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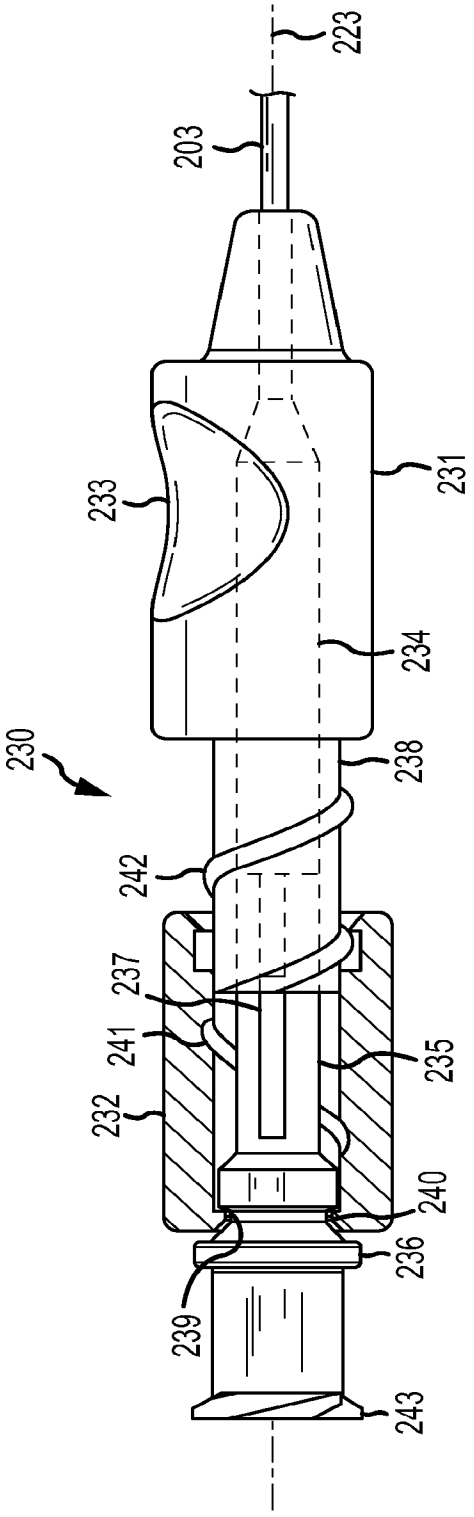


FIG.2C

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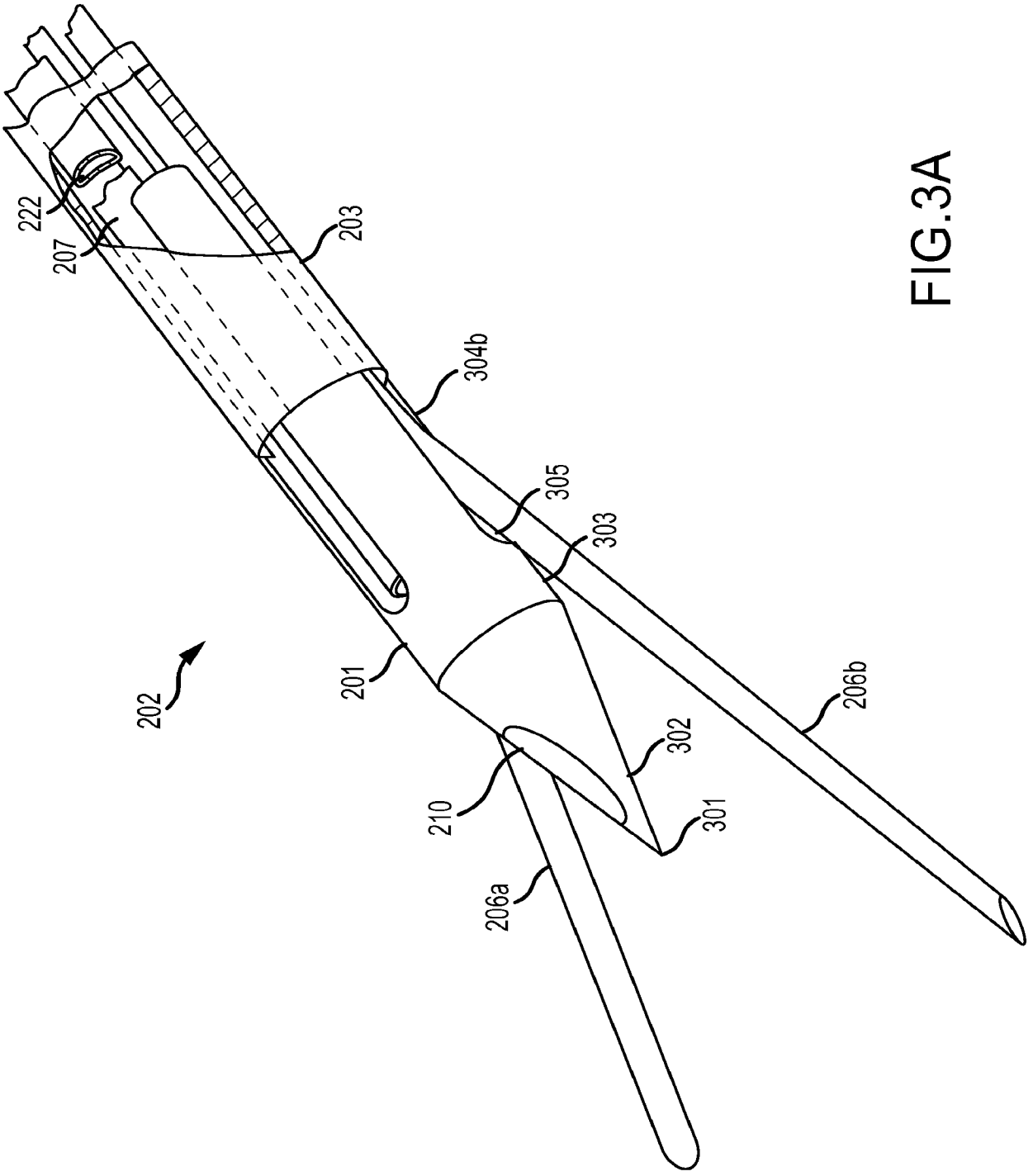


FIG.3A

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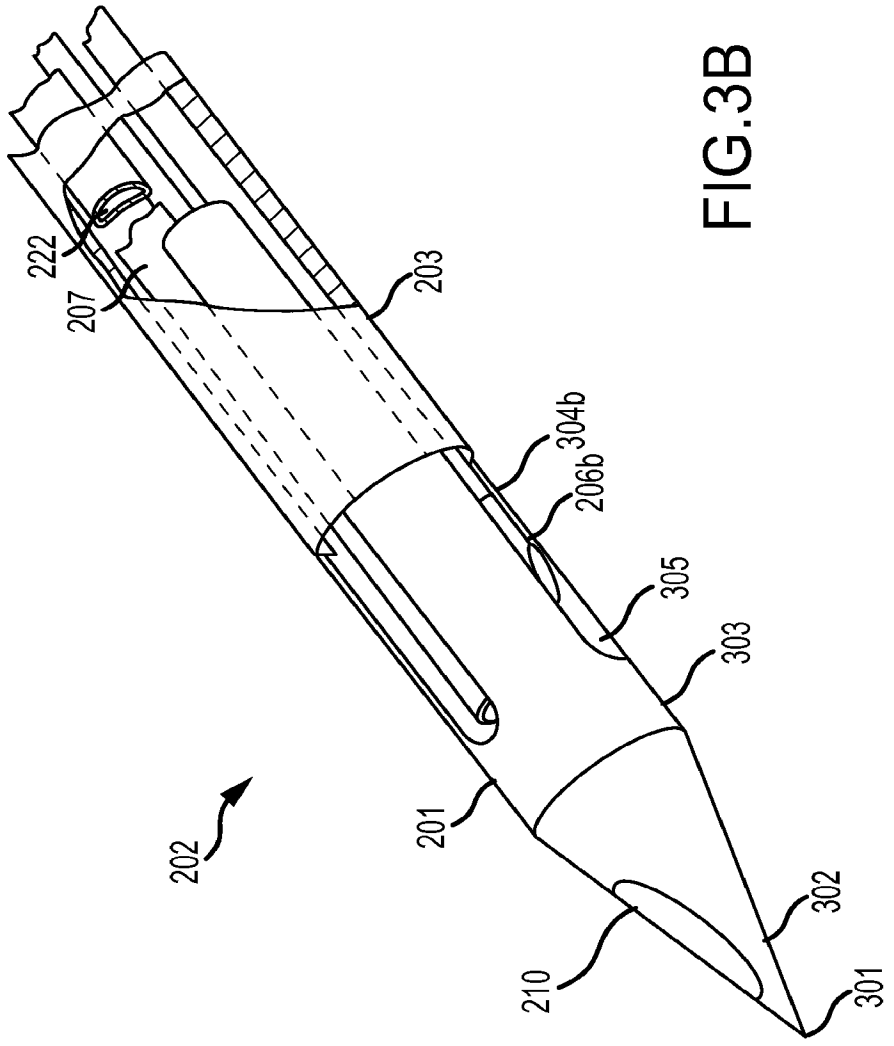


FIG.3B

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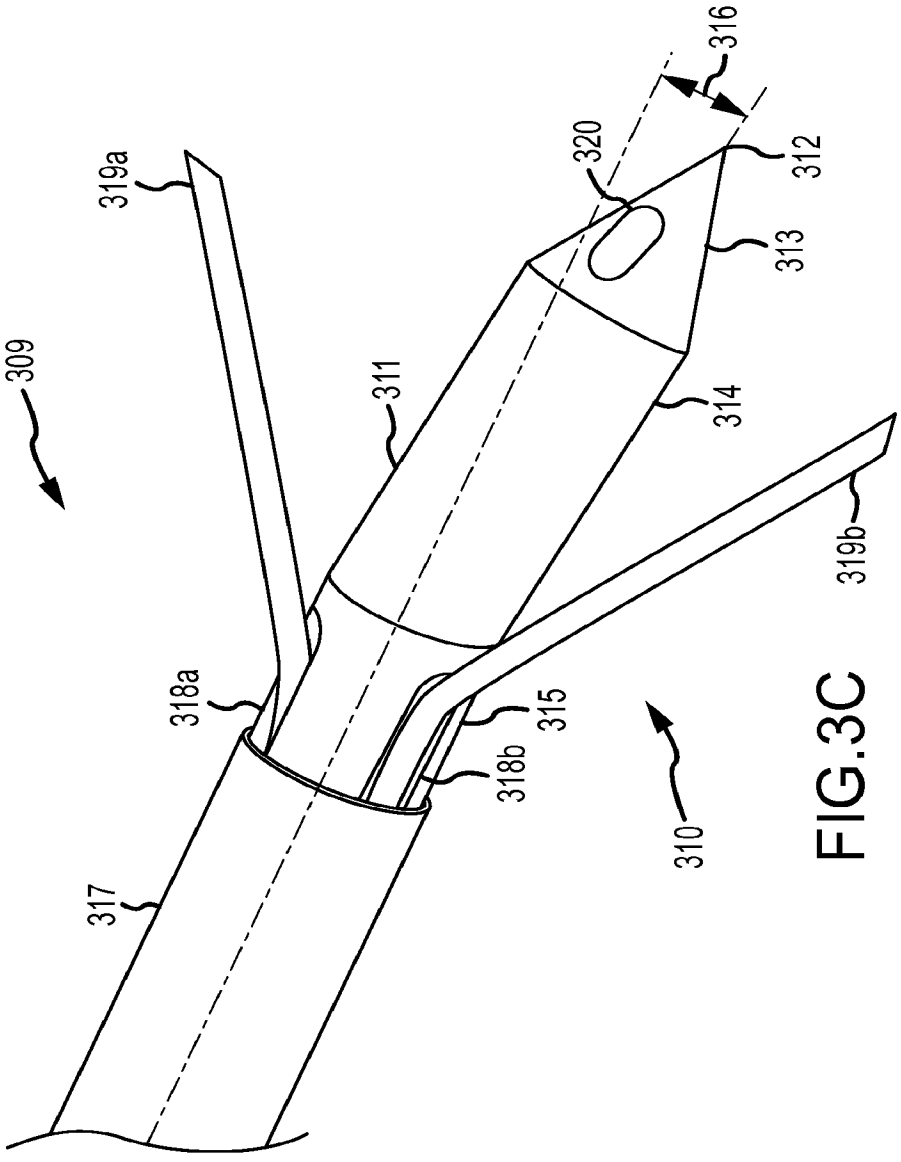


FIG.3C

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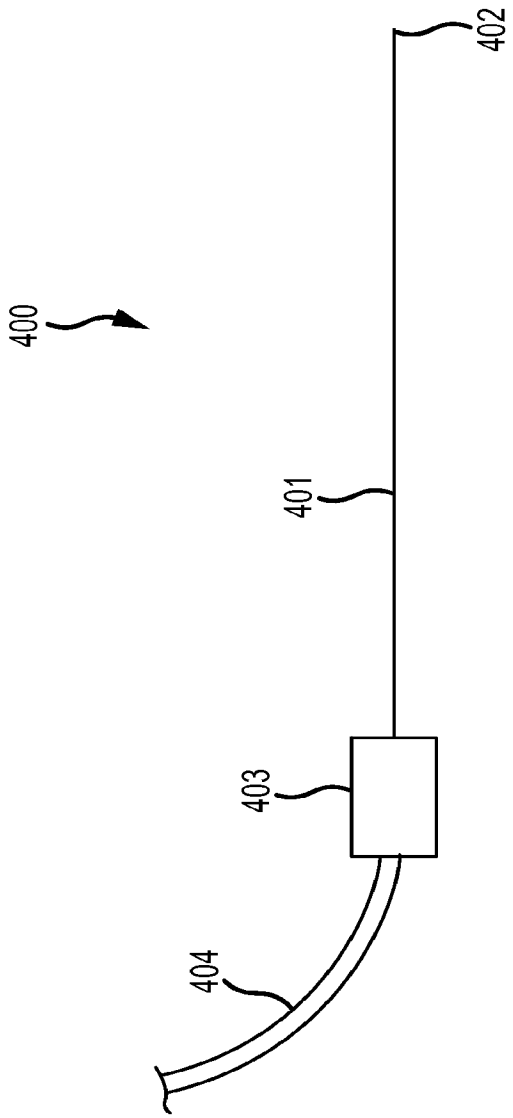


FIG.4

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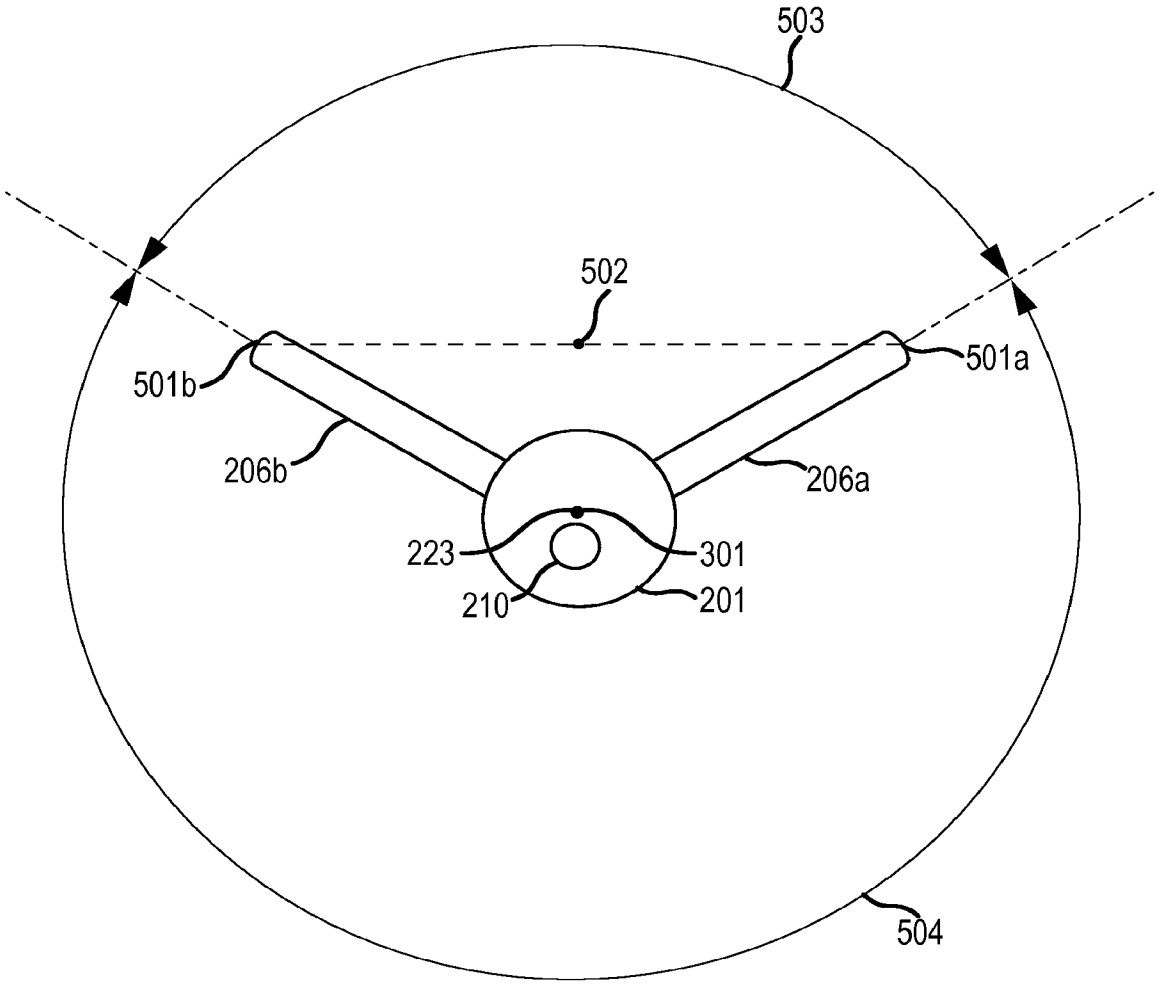


FIG.5

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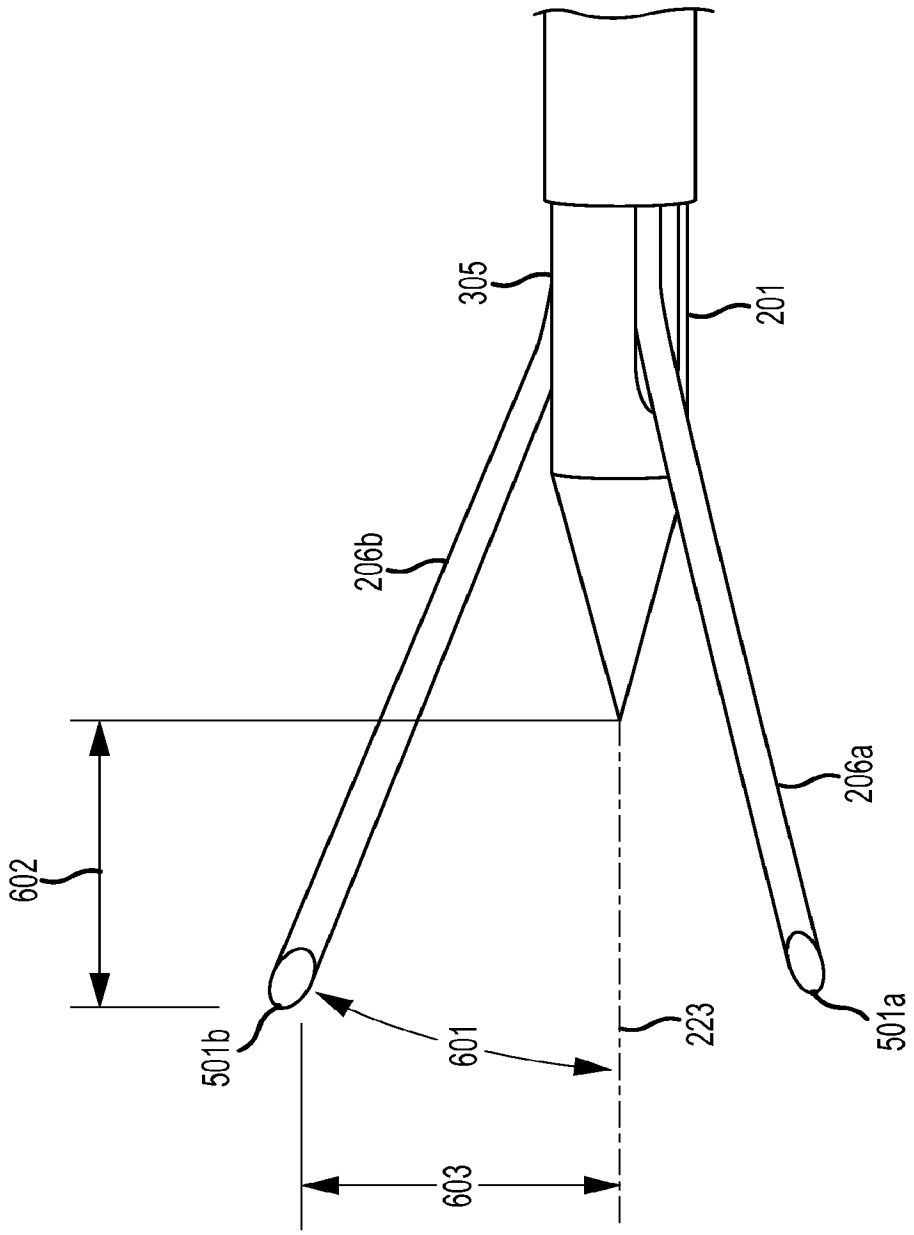


FIG.6

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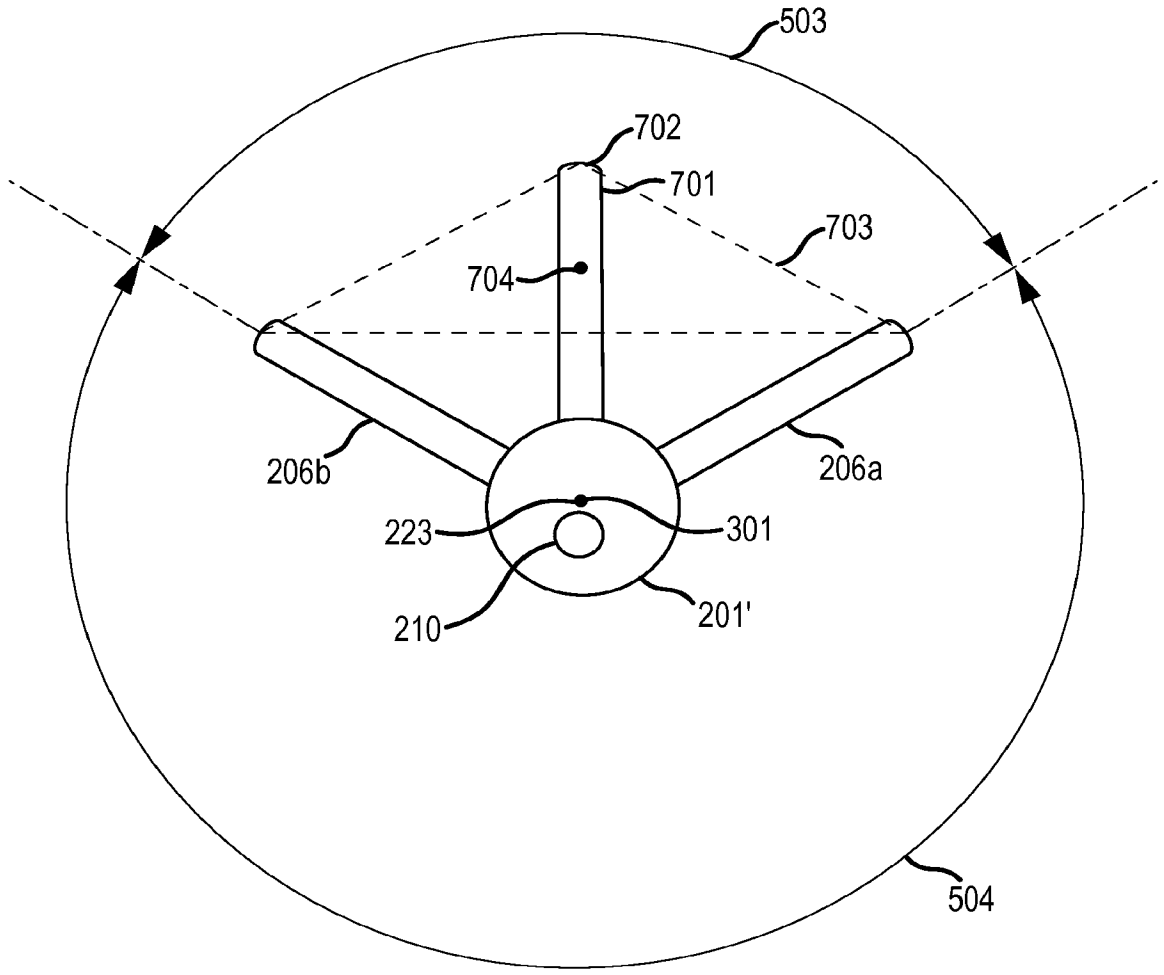


FIG.7

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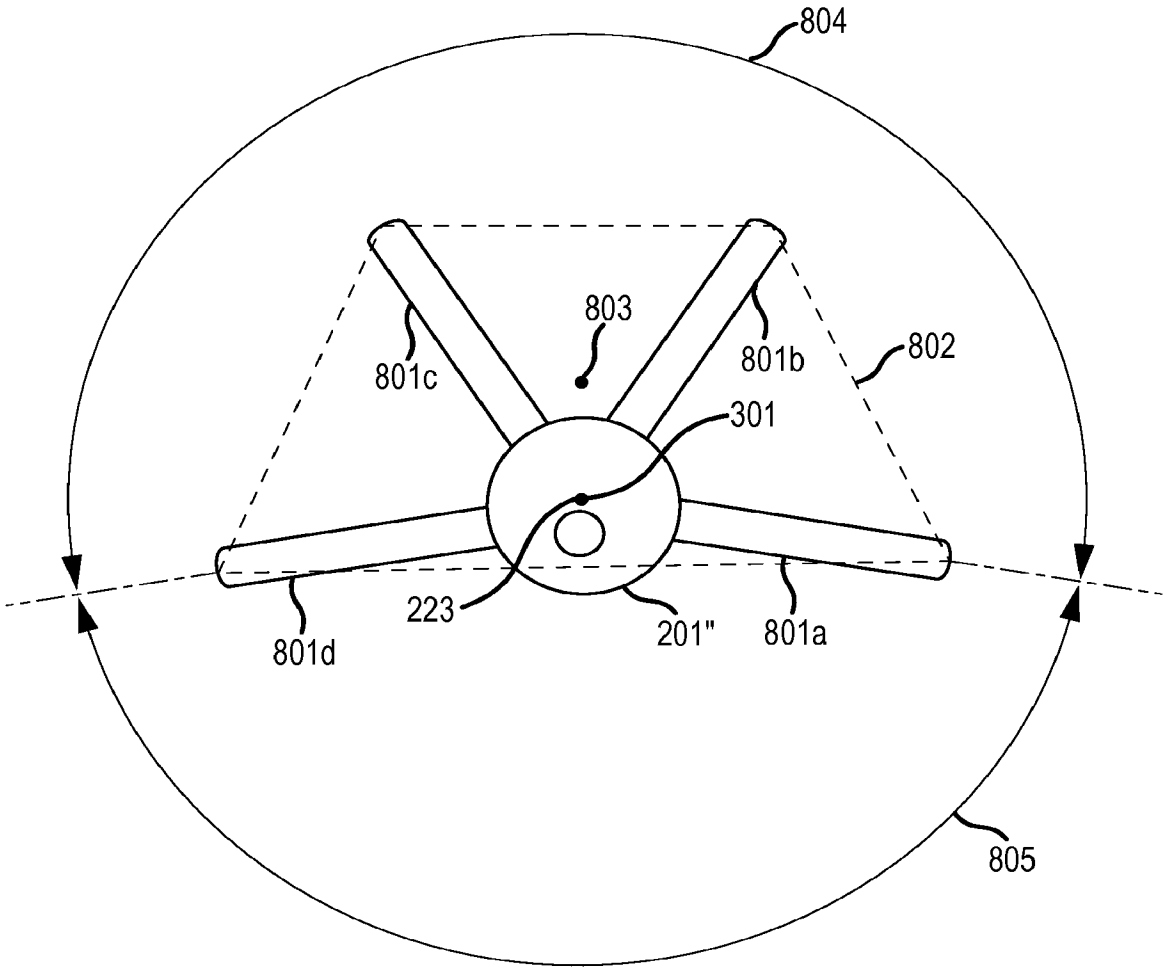


FIG.8

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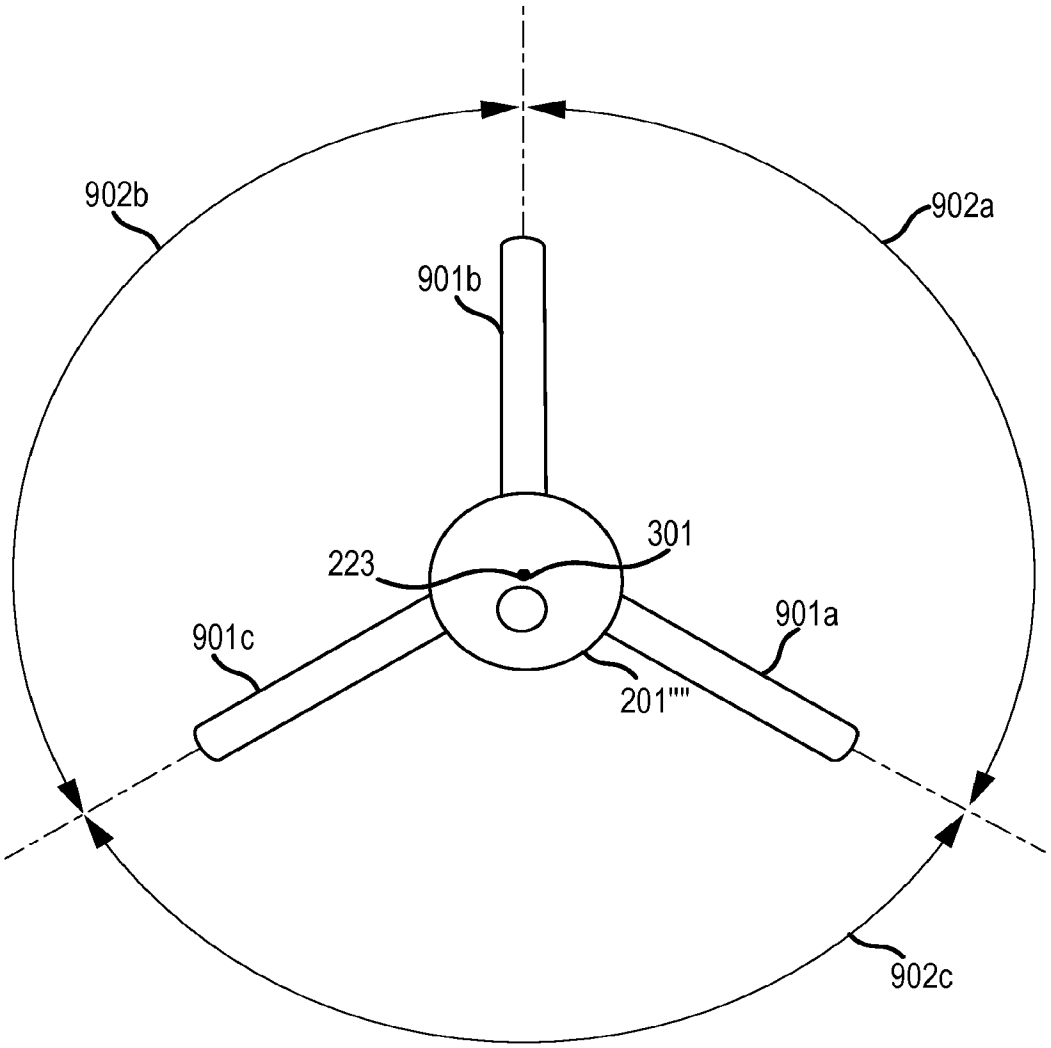


FIG.9

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Avanos v. Stratus
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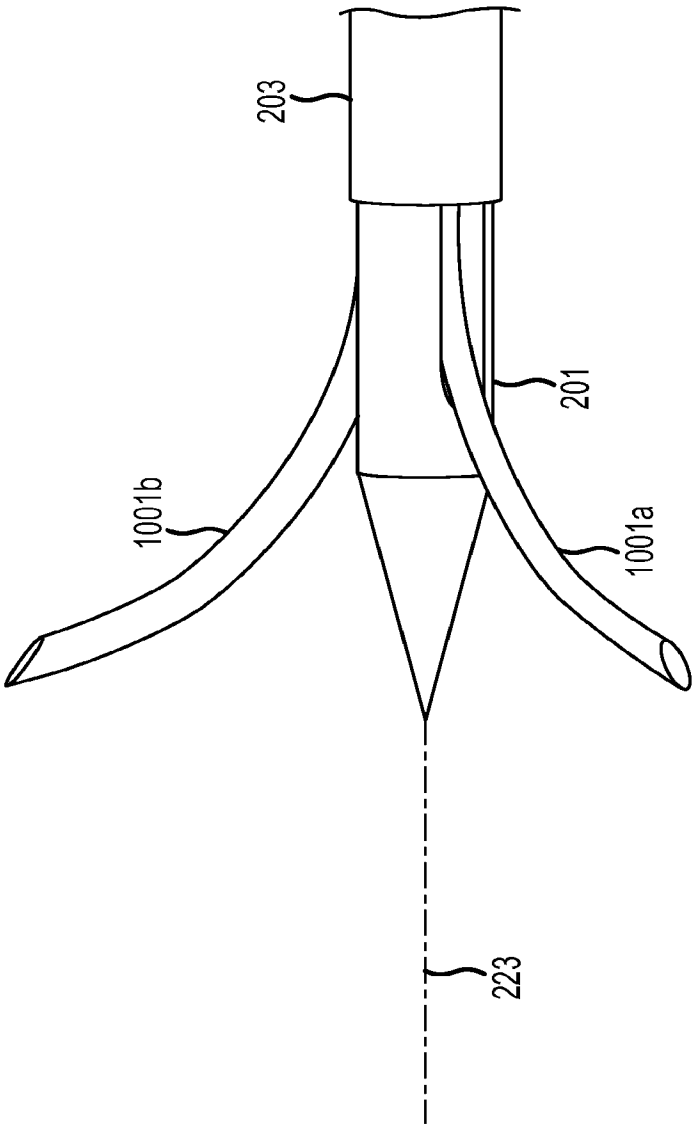


FIG.10

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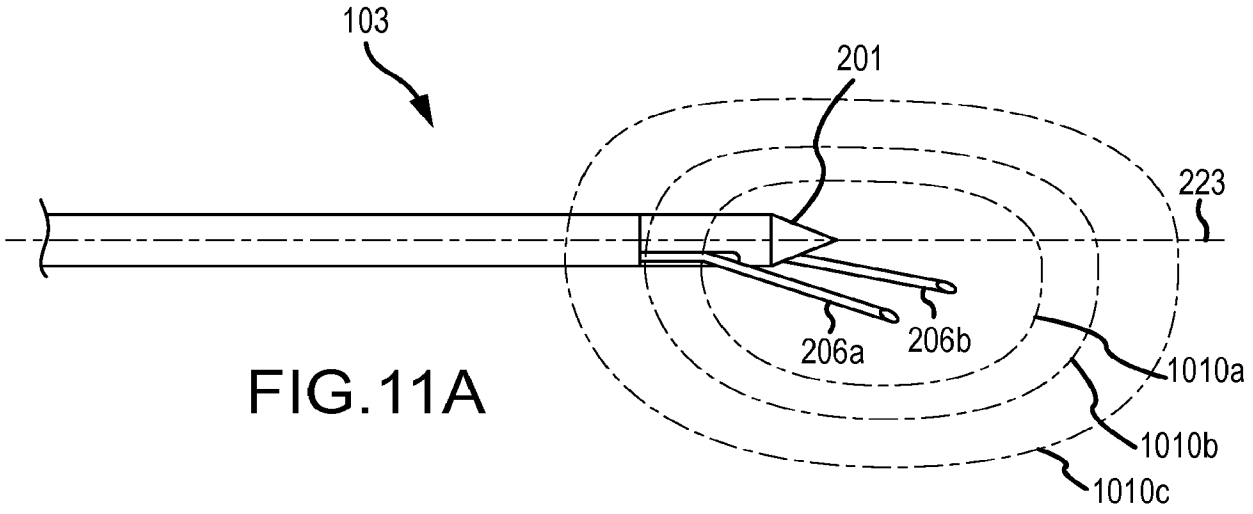


FIG.11A

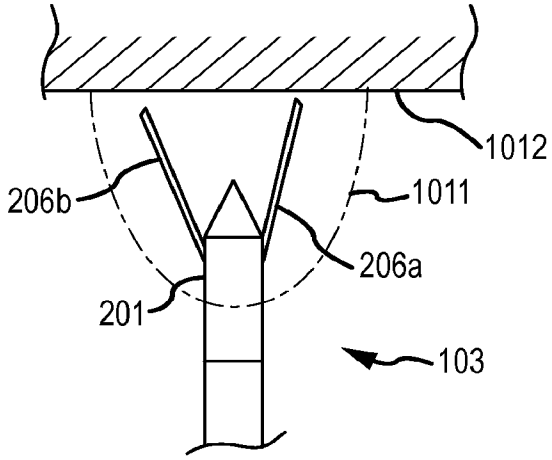


FIG.11B

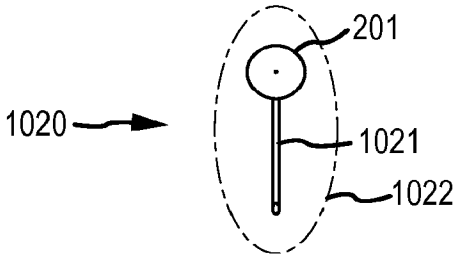


FIG.11C

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Avanos v. Stratus
Stratus Ex. 2013

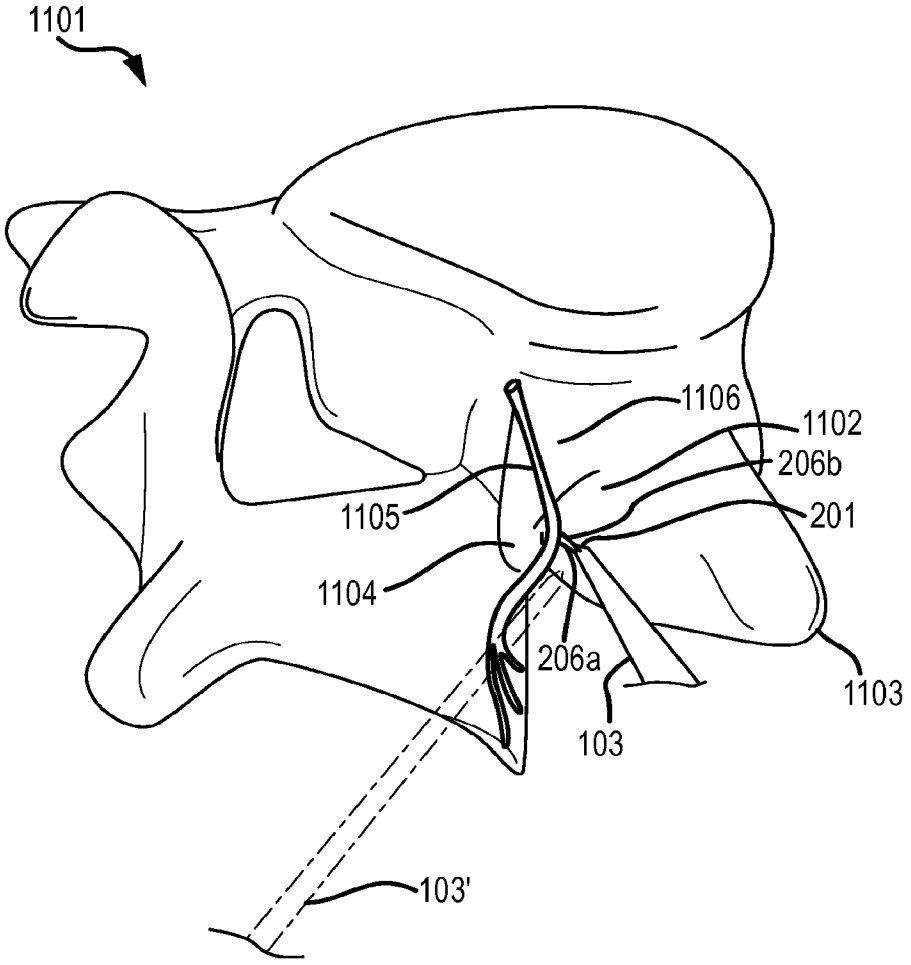


FIG.12

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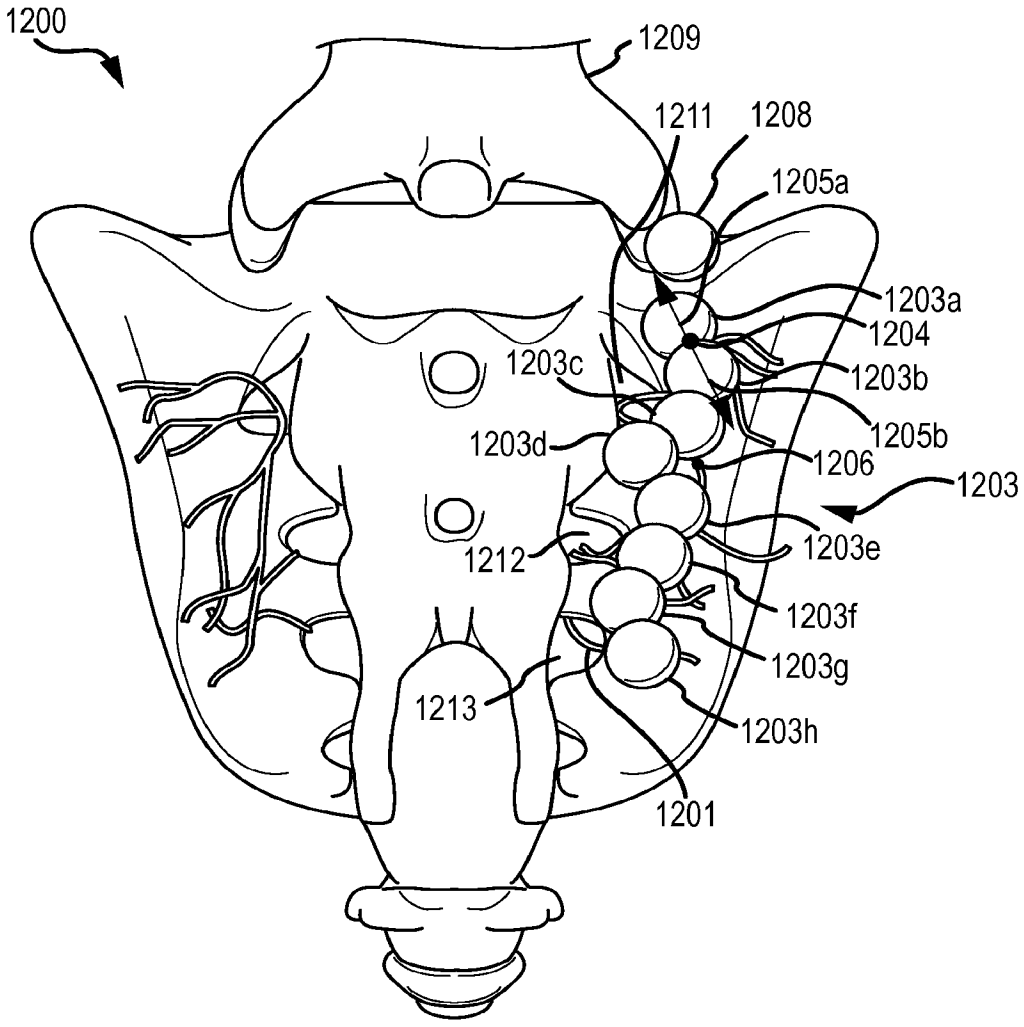

1200
1209
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1205a
1203a
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1203c
1203b
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1203f
1203g
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1203h
1201

FIG.13

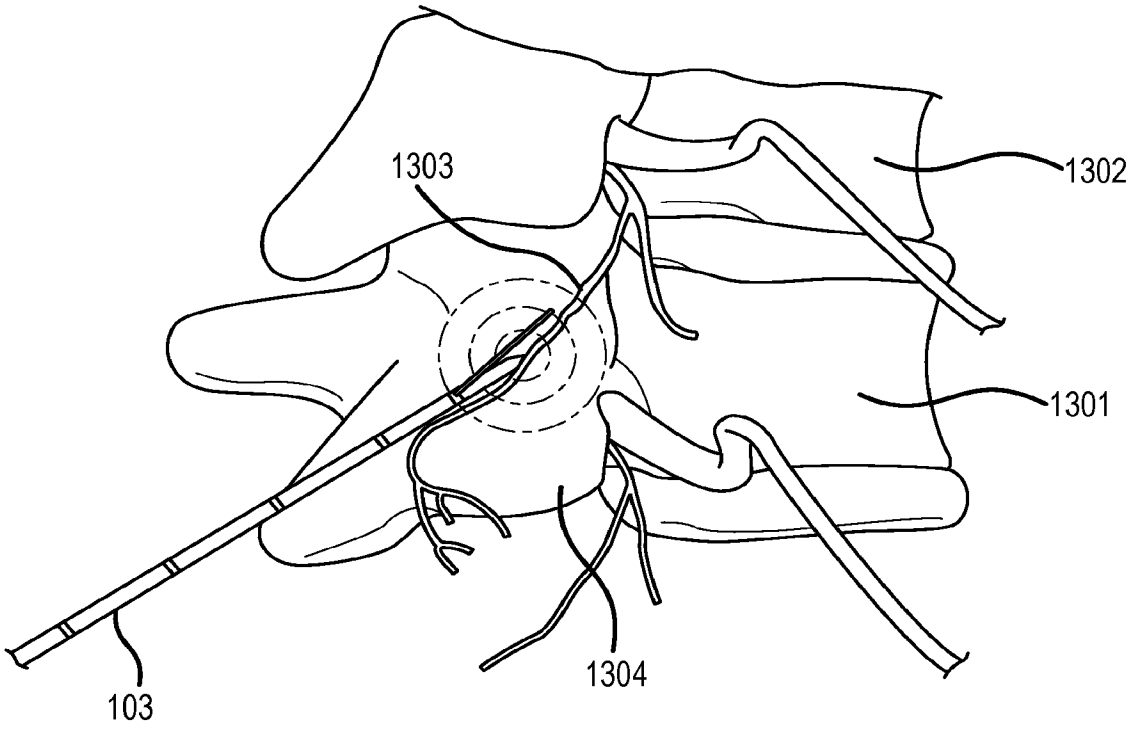


FIG.14

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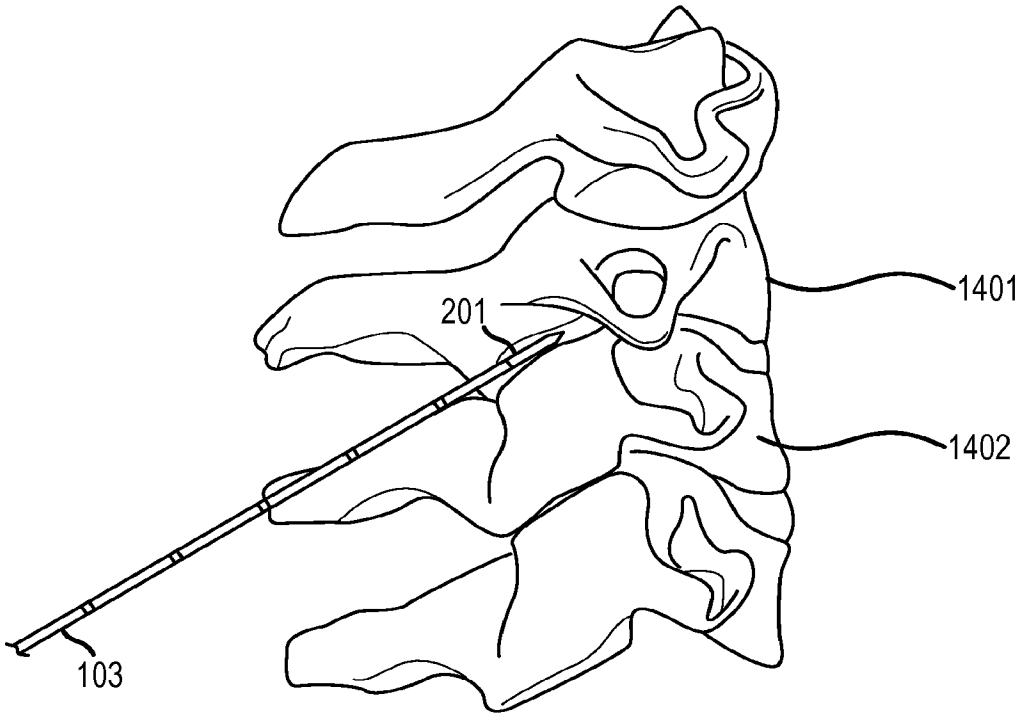


FIG.15

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 17/126,675

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	80		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	350		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	400		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*	x 50 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1 minus 3 =	*	x 240 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	830		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
17/126,675	12/18/2020		830	NBUS.001C1C1C1	20	1

CONFIRMATION NO. 1065

148468
Med Venture Management, LLC
6030 W. Harold Gatty Dr.
Salt Lake City, UT 84116

FILING RECEIPT

OC000000122378018

Date Mailed: 01/01/2021

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Robert E. Wright, Clayton, AUSTRALIA;
Scott A. Brandt, Denver, CO;

Applicant(s)

Stratus Medical, LLC, Magnolia, TX;

Assignment For Published Patent Application

Stratus Medical, LLC, Magnolia, TX

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 16/933,995 07/20/2020
which is a CON of 15/098,673 04/14/2016 PAT 10736688
which is a CON of 12/940,974 11/05/2010 ABN
which claims benefit of 61/347,351 05/21/2010
and claims benefit of 61/280,557 11/05/2009

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 12/31/2020
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/126,675**
Projected Publication Date: 04/08/2021
Non-Publication Request: No
Early Publication Request: No
**** SMALL ENTITY ****
Title

METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/126,675	12/18/2020	Robert E. Wright	NBUS.001C1C1C1

CONFIRMATION NO. 1065

148468
Med Venture Management, LLC
6030 W. Harold Gatty Dr.
Salt Lake City, UT 84116

PUBLICATION NOTICE

OC000000124727186

Title:METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

Publication No.US-2021-0100609-A1
Publication Date:04/08/2021

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently https://portal.uspto.gov/pair/PublicPair. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/126,675	12/18/2020	Robert E. Wright	NBUS.001C1C1C1	1065

148468 7590 12/22/2022

Med Venture Management, LLC
299 S. Main Street
Suite 2300
Salt Lake City, UT 84111

EXAMINER
KIM, EUN HWA

ART UNIT	PAPER NUMBER
3794	

NOTIFICATION DATE	DELIVERY MODE
12/22/2022	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

acharlton@mvhg.legal
dhiggs@mvhg.legal

Office Action Summary	Application No. 17/126,675	Applicant(s) Wright et al.	
	Examiner EUNHWA KIM	Art Unit 3794	AIA (FITF) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 12/18/2020.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 2-21 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 2-21 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

1. This action is pursuant to the claims filed on December 18, 2020. Claims 2-21 are pending. A first action on the merits of claims 2-21 is as follows.

Notice of Pre-AIA or AIA Status

2. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

Claim Rejections - 35 USC § 112

3. The following is a quotation of 35 U.S.C. 112(b):

> (b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 14-16 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention.

5. Claim 14, ln. 8 recites "the elongate member". However, there is insufficient antecedent basis for said limitation.

6. Claims 15 & 16 are rejected by virtue of their dependency on claim 14.

7. Appropriate correction is required.

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Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102 of this title, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103 are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. **Claims 1-4, 6-10, 13-21 are rejected under 35 U.S.C. 103 as being unpatentable over Mowery (U.S. PGPub. No. 2006/0200121), and further in view of Young et al. (hereinafter 'Young', U.S. 2006/0095029).**

11. **In regards to independent claim 2 and 3,** Mowry discloses a method of performing spinal RF neurotomy in a patient ([0028]-[0029], [0037]);

a. moving a tip of a needle to a first position proximate to a target nerve along the spine of the patient ([0075], [0107]-[0112]: inserting stylet 20 through skin, muscle, fat to a target site including nerve fibers running along a spinal column);

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b. after achieving the first position, advancing a plurality of filaments relative to the tip to a deployed position ([0113]-[0015]: once the stylet has reached its desired target tissue site, tines 120 & 121 are withdrawn from the stylet to provide a desired lesioning affect);

c. after the advancing step, applying RF energy to the plurality of filaments where said applying generates heat that ablates a portion of the target nerve ([0158]: once the VIPER 10 has been deployed to the target tissue site, energy is delivered to develop the desired lesion).

12. However, Mowry fails to disclose that applying RF energy to the needle tip.

13. Young teaches applying RF energy between a plurality of filaments in during a bipolar RF ablation configuration as also disclosed by Mowry (Mowry, [0016]: bipolar RF energy delivery between tine(s) 120 and 121 as shown in Fig. 10 & 12; Young, [0042]: bipolar RF energy delivery between electrodes 26 advancing from cannula 12 in Fig. 3). Alternatively, Young teaches providing a return electrode on a tip of a needle (cannula 12 which is in the form of a needle with internal stylet comprises an electrode 90 in Fig. 4, [0050]) so that the two plurality of filaments (electrodes 26) operate as active electrodes ([0042]). Given that Young also discloses the use of two active electrodes and a single electrode ([0016]: tines 120 are used as active electrodes while tine 121 disposed in between the tines 120 is the return electrode) and further selectively deploying the tines to obtain a desired area of spinal nerve tissue ablation (Mowry, [0133]), it would have been obvious to one of ordinary skill in the art before the effective filing date of the invention to one of the plurality of filaments which operate as the return electrode of Mowry and provide a return electrode along the needle tip as taught by Young, thereby arriving at the claimed invention. Doing so is merely one of several possibilities

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(1: two filaments used for bipolar arrangement; 2: two filaments plus another filament for bipolar arrangement; 3) two filament plus a separate return electrode nearby the filaments, such as on a shaft used to deploy the filaments) from which one of ordinary skill in the art would select to provide a variety of different geometric spinal nerve tissue ablation zone (Mowry, [0134], Young, [0052]-[0053]).

14. **In regard to claim 4,** Mowry/Young combination further discloses wherein the target nerve is medical branch nerve ([0015]).

15. **In regards to claim 6,** Mowry/Young combination further comprises piercing skin of the patient with the tip of the needle (([0075], [0107]-[0112]).

16. **In regards to claim 7-10,** Mowry/Young combination further discloses imaging the tip of the needle during the moving step and repositioning the tip of the needle in response to the imaging step ([0022], [0028], [0145], [0146], [0152]-[0156]: a repetitive pattern of directing and repositioning the needle using fluoroscopic X-ray imaging is required to position the needle relative to the target nerve).

17. **In regards to claim 13,** Mowry/Young combination further discloses wherein advancement of a distal end of each of the plurality of filaments relative to the tip is along a curved path (Fig. 11 illustrates the curved path of the tines 120 and 121).

18. **In regards to claim 14-16,** Mowry/Young combination further discloses wherein the plurality of filaments only consists of first and second filaments (the modified device comprises of two tines used as active electrodes and a return electrode disposed on the needle tip). Furthermore, a midpoint between the distal end of the first and second filament is offset from a central longitudinal axis of an elongate member of the needle by about 2 mm (since the distal tip of the tines 120 are distal to and offset from the needle 20 as shown in exemplary Figs. 11 and

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13, the midpoint between the tines is also offset from the tip of the needle 20; [0178] explains varying the curve of the tine and since the entire length of the stylet is 10 mm, [0093], it would have been an obvious modification for the midpoint to be offset by 'about' 2 mm).

19. **In regards to claim 17-21,** Mowry/Young combination discloses varying the deployment distances of the plurality of filaments by 0 mm, 2 mm, 4 mm, 6 mm, 8 mm, and 10 mm from the needle tip as shown in Fig. 9. Note that shorter deployment distances such as about 2 mm, the central longitudinal axis of the needle and the distal end of the plurality of filaments are disposed on a common side of a central plane (a plane perpendicular to the central longitudinal axis of the needle). In this arrangement, the distal ends of the filaments are marginally offset from the distal tip (29) of the needle where the distal ends of the filaments and the distal tip of the needle define vertices of a polygon, and a centroid of the polygon is to some extent offset from the central axis of the needle.

20. **Claim 5 is rejected under 35 U.S.C. 103 as being unpatentable over Mowery and Young as applied to claim 2 above, and further in view of Godara et al. (hereinafter 'Godara', U.S. PGPub. No. 2006/0106376).**

21. **In regards to claim 5,** Mowery/Young combination discloses the invention substantially as claimed in claim 2 and discussed above. While Mowery/Young combination discloses a method of inserting the needle and the filaments to sacroiliac region to apply RF energy to the sacral nerve in the sacroiliac joint ([0196]-[2000]), it is silent as to the sacral nerve being a posterior rami proximate the sacrum.

22. Godara teaches a method of introducing an RF ablation device (e.g. catheter, cannula, electrosurgical probe) into the sacroiliac region to ablate sacroiliac sacral nerve of sacral posterior rami ([0047]). Given that Mowery/Young combination does not specifically explain

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which particular portion of the sacral nerve is being ablated, it would have been obvious to one of ordinary skill in the art before the effective filing date of the invention to apply RF energy to the posterior rami proximate the sacrum as taught by Godara as doing so provides a predictable result of alleviating pain, stiffness, and tingling emanating from the sacroiliac region (Mowery, [0196], Gondara, [0011]).

23. **Claims 11 & 12 are rejected under 35 U.S.C. 103 as being unpatentable over Mowery and Young as applied to claim 2 above, and further in view of Elliot (U.S. PGPub. No. 2004/0199179).**

24. **In regards to claim 11 and 12,** Mowery/Young combination discloses the invention substantially as claimed in claim 2 and discussed above. Mowery/Young combination does not explicitly disclose rotating the needle about a central longitudinal axis of the needle to position the tip in a predetermined orientation relative to the target nerve, wherein said rotating occurs after the moving step and prior to the advancing step.

25. Elliot teaches that during insertion and placement of an RF ablation device (100 in Fig. 1) comprising a needle (needle 108) proximate a target tissue, the needle is manipulated in any direction including rotating a tip of the needle before advancing a plurality of filaments (filaments 132, [0048]). Therefore, it would have been an obvious before the effective filing date of the invention to modify the method steps of Mowery/Young combination and incorporate the method step of rotating the needle to a position the needle tip at a predetermined orientation relative to the target tissue and taught by Elliot, as doing so would ensue a predictable result of properly orienting the needle tip to the target tissue.

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Double Patenting

26. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP § 2146 *et seq.* for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or

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PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

27. Claims 2-5 rejected on the ground of nonstatutory double patenting as being unpatentable over claims 51-52 of U.S. Patent No. 10,925,664. Although the claims at issue are not identical, they are not patentably distinct from each other because the claimed invention of Patent '664 anticipates the method claims of genus claims of the instant application. Patent '664 discloses a method of moving a tip of a needle proximate to a target nerve (claim 26/21), advancing a plurality of filaments (claim 21), and applying RF energy to the needle tip and the plurality of filaments (claim 21). Note that Patent '664 claims the specific nerve as claimed in claims 26 and 27.

Conclusion

28. Any inquiry concerning this communication or earlier communications from the examiner should be directed to EUNHWA KIM whose telephone number is (571)270-1265. The examiner can normally be reached 9AM-5:30PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, JOSEPH STOKLOSA can be reached on (571) 272-1213. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/EUN HWA KIM/
Primary Examiner, Art Unit 3794
12/16/2022

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	Examiner EUNHWA KIM	Art Unit 3794	Page 1 of 1

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Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/126,675	Wright et al.
	Examiner	Art Unit
	EUNHWA KIM	3794

CPC - Searched*		
Symbol	Date	Examiner
A61B2018/0044,00577,1253,1467; A61B18/1477	12/16/2022	EK

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Inventor and Assignee	12/16/2022	EK
CPC based text search	12/16/2022	EK

Interference Search			
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/EUN HWA KIM/ Primary Examiner, Art Unit 3794	

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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	5986	606/41,44.ccls.	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 10:14 AM
L2	501	((ROBERT) near2 (WRIGHT)).INV.	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 11:32 AM
L3	110	((ROBERT) near2 (WRIGHT)).INV.	(EPO; JPO; DERWENT)	OR	ON	ON	2014/01/29 11:33 AM
L4	22	((SCOTT) near2 (BRANDT)).INV.	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 11:33 AM
L5	3	((SCOTT) near2 (BRANDT)).INV.	(EPO; JPO; DERWENT)	OR	ON	ON	2014/01/29 11:33 AM
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L11	4	US-1234567-$.DID. OR US-5507802-$.DID. OR US-7270661-$.DID. OR US-20070287996-$.DID.	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 11:38 AM
L12	20	(US-20040260282-$ or US-20050101950-$ or US-20060189972-$).did. or (US-2994324-$ or US-5599346-$ or US-5683384-$ or US-5728143-$ or US-5735847-$ or US-5782827-$ or US-5800484-$ or US-5810804-$ or US-5863290-$ or US-5913855-$ or US-5925042-$ or US-5928229-$ or US-5951547-$ or US-6053937-$ or US-6092528-$ or US-6254598-$ or US-6958062-$).did.	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 12:00 PM
L13	379	L10 or L11 L12	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 12:00 PM
L14	20	L13 and L12	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 12:19 PM
L15	379	L13 L12	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 12:19 PM

L16	23	L15 and (detent)	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 12:19 PM
L17	100218	"606"/$.ccls.	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 12:21 PM
L18	136	neurotomy	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 12:21 PM
L19	5	"7108696".pn. "7357798".pn. "20090221998".pgnr. "20060217705".pgnr. "200620200121".pgnr. "20090024124".pgnr.	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 12:46 PM
L20	88	US-8292822-$.DID. OR US-5540778-$.DID. OR US-5672375-$.DID. OR US-3918455-$.DID. OR US-4341094-$.DID. OR US-5232442-$.DID. OR US-5304141-$.DID. OR US-5379900-$.DID. OR US-5562685-$.DID. OR US-5709692-$.DID. OR US-20050059964-$.DID. OR US-5226912-$.DID. OR US-5269808-$.DID. OR US-5425746-$.DID. OR US-5437726-$.DID. OR US-5569302-$.DID. OR US-5250247-$.DID. OR US-5507777-$.DID. OR US-5649962-$.DID. OR US-5374278-$.DID. OR US-5639506-$.DID. OR US-5643628-$.DID. OR US-5891247-$.DID. OR US-6031018-$.DID. OR US-6053086-$.DID. OR US-4124153-$.DID. OR US-4282637-$.DID. OR US-4457128-$.DID. OR US-4501133-$.DID. OR US-4907741-$.DID. OR US-5503092-$.DID. OR US-5532657-$.DID. OR US-5648003-$.DID. OR US-5683025-$.DID. OR US-5891166-$.DID. OR US-5897044-$.DID. OR US-5954242-$.DID. OR US-5991957-$.DID. OR US-6035916-$.DID. OR US-6051180-$.DID. OR US-6126676-$.DID. OR US-6270464-$.DID. OR US-6402770-$.DID. OR US-6536482-$.DID. OR	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	ON	ON	2014/02/11 12:24 PM

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L21	75	US-5769822-$.DID. OR US-20050288759-$.DID. OR US-4998661-$.DID. OR US-5934275-$.DID. OR US-5133738-$.DID. OR US-5226912-$.DID. OR US-5503092-$.DID. OR US-6536482-$.DID. OR US-20060106405-$.DID. OR US-6803013-$.DID. OR US-20020176734-$.DID. OR US-20070215543-$.DID. OR US-5749846-$.DID. OR US-8206300-$.DID. OR US-8414509-$.DID. OR US-20050004563-$.DID. OR US-20050222565-$.DID. OR US-20050283148-$.DID. OR US-20090131790-$.DID. OR US-3840011-$.DID. OR US-4191054-$.DID. OR US-4269387-$.DID. OR US-4553687-$.DID. OR US-4710176-$.DID. OR US-4755173-$.DID. OR US-4808168-$.DID. OR US-4832690-$.DID. OR US-4833824-$.DID. OR US-5112311-$.DID. OR US-5154698-$.DID. OR US-5239773-$.DID. OR US-5265606-$.DID. OR US-5487739-$.DID. OR US-5542268-$.DID. OR US-5607003-$.DID. OR US-5687739-$.DID. OR US-5713872-$.DID. OR US-5743882-$.DID.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	ON	ON	2014/02/11 12:24 PM
L22	50	("20110213356" "20110288540" "5540778" "5672375" "3918455" "4341094" "5232442" "5304141" "5379900" "5562685" "5709692" "20050059964" "5226912" "5269808" "5425746" "5437726"	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/11 12:26 PM

		"5569302" "5250247" "5507777" "5649962" "5374278" "5639506" "5643628" "5891247" "6031018" "6053086" "4124153" "4282637" "4457128" "4501133" "4907741" "5503092" "5532657" "5648003" "5683025" "5891166" "5897044" "5954242" "5991957" "6035916" "6051180" "6126676" "6270464" "6402770" "6536482" "6699205" "6730042" "6739024" "7761964" "8292822").pn.					
L23	85	L20 L21 L22	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/11 12:26 PM
L24	85	L20 L21 L22	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/11 12:26 PM
L25	1	"20090221998"	(DERWENT)	OR	ON	ON	2014/02/11 12:39 PM
L26	259590	a61b2018/0016, "00166", "00196", "00208", "00273", "00279", "0091", "00434", "0044", "1425", "143", "1432", "1465" "1475".cpc.	(DERWENT)	OR	ON	ON	2014/02/11 12:56 PM
L27	891	a61b2018/0016,00166,00196,00208,00273,00279,0091,00434,0044,1425,143,1432,1465,1475.cpc.	(DERWENT)	OR	ON	ON	2014/02/11 12:58 PM
L28	5217	a61b2018/0016,00166,00196,00208,00273,00279,0091,00434,0044,1425,143,1432,1465,1475.cpc.	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/11 12:58 PM
L29	3226	L28 and @py<"2009"	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/11 01:00 PM
L30	3	"7108696".pn. "7357798".pn. "20060217705".pgnr. "7108696".pn.	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 09:58 AM
L31	3	"7108696".pn. "7357798".pn. "20060217705".pgnr.	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 09:59 AM
L32	2	"7270661".pn. "5507802.pn" "20070287996".pgnr.	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 10:01 AM

L33	3	"7270661".pn. "5507802".pn. "20070287996".pgnr.	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 10:02 AM
L34	50	(actuator actuate actuating) same (helical adj track thread) same (filament electrode) same (hub)	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 10:34 AM
L35	12	(actuator actuate actuating) same (helical adj track thread) same (filament electrode) same (hub) same (advanced advancing deployed deploying deploy retracted retracting retract)	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 10:38 AM
L37	316	(actuator actuate actuating) same (helical adj track thread) same (advanced advancing deployed deploying deploy retracted retracting retract) near3 (filament stylet anchor element)	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 10:41 AM
L38	274031	("600" "606" "607").CLAS.	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 10:45 AM
L39	13082	L38 and filament	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 10:45 AM
L40	3630	L39 and (actuate actuator actuating)	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 10:46 AM
L41	6	L39 and (hub with thread) and (actuat$3 with thread)	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 10:47 AM
L42	2598	L39 and (rotate rotat$4) same (deployment deploy retract retract$4 advance advancing)	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 11:33 AM
L43	251	L39 and (rotate rotat$4) same (deployment deploy retract retract$4 advance advancing) same (filament)	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 11:34 AM
L44	1	"5964756".pn.	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 11:55 AM
L45	110	L39 and (rotate rotat$4) with (actuate actuating actuated) and (deployment deploy retract retract$4 advance advancing) same (filament)	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 12:00 PM
L46	52	(US-20040260282-$ or	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12

		US-20050101950-$ or US-20060189972-$ or US-20060206133-$ or US-20060206132-$ or US-20060206131-$ or US-20090221998-$ or US-20090024124-$ or US-20060217705-$ or US-20010018586-$ or US-20010031941-$ or US-20060206130-$ or US-20060206129-$ or US-20060206111-$ or US-20070016183-$ or US-20070077230-$ or US-20080161804-$ or US-20070287996-$ or US-20090105640-$ or US-20060229645-$).did. or (US-2994324-$ or US-5599346-$ or US-5683384-$ or US-5728143-$ or US-5735847-$ or US-5782827-$ or US-5800484-$ or US-5810804-$ or US-5863290-$ or US-5913855-$ or US-5925042-$ or US-5928229-$ or US-5951547-$ or US-6053937-$ or US-6092528-$ or US-6254598-$ or US-6958062-$ or US-6132425-$ or US-6129726-$ or US-5672173-$ or US-7108696-$ or US-7357798-$ or US-5687739-$ or US-5749846-$ or US-2022065-$ or US-5995875-$).did. or (US-6123084-$ or US-6245070-$ or US-7198625-$ or US-7270661-$ or US-5507802-$ or US-6638275-$).did.					02:02 PM
L47	49	L46 and (filament antenna electrode)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:04 PM
L48	37500	L46 and (filament antenna electrode) and (single near2 wire) or ("same" near2 wire)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:05 PM

L49	3	L46 and (filament antenna electrode) and ((single near2 wire) or ("same" near2 wire))	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:05 PM
L50	4674	L38 and (filament antenna electrode) and ((single near2 wire) or ("same" near2 wire))	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:06 PM
L51	1425	L38 and (filament antenna electrode) with ((single near2 wire) or ("same" near2 wire))	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:07 PM
L52	2	L38 and (filament antenna electrode) with ((single near2 wire) or ("same" near2 wire)) with (actuator actuating actuate)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:07 PM
L53	4	L38 and (filament antenna electrode) with ((single near2 wire) or ("same" near2 wire)) same (actuator actuating actuate)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:07 PM
L54	92	L38 and (filament antenna electrode) with ((single near2 wire) or ("same" near2 wire)) same2 (actuator actuating actuate)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:08 PM
L55	504	L38 and (filament antenna electrode) with (form$3 made built) with (single near2 wire)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:09 PM
L56	258	L38 and (filament antenna electrode) with (form$3 made built) with (single near2 wire) same (control$4 deploy$4 retract$4 advanc$4)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:09 PM
L57	17	US-6379353-$.DID. OR US-6888919-$.DID. OR US-20020077627-$.DID. OR US-20040024300-$.DID. OR US-20040096033-$.DID. OR US-20040158239-$.DID. OR US-20050261570-$.DID. OR WO-9903397-$.DID. OR WO-0222019-$.DID. OR WO-2005036124-$.DID.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	ON	ON	2014/02/12 02:23 PM

L58	0	("2010/0256625").URPN.	(USPAT)	OR	ON	ON	2014/02/12 02:23 PM
L59	331	(filament antenna electrode array) with (form$3 made built) with (single near2 wire) same (control$4 deploy$4 retract$4 advanc$4)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:31 PM
L60	258	L38 and(sylet filament antenna electrode array) with (form$3 made built) with (single near2 wire) same (control$4 deploy$4 retract$4 advanc$4)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:31 PM
L61	258	L38 and(stylet filament antenna electrode array) with (form$3 made built) with (single near2 wire) same (control$4 deploy$4 retract$4 advanc$4)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:32 PM
L62	258	L38 and(stylet filament antenna electrode array) with (form$3 made built) with (single near2 wire) same (control$4 deploy$4 retract$4 advanc$4)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/12 02:32 PM
L63	1332	(filament electrode) with (form$3 made built) with (single near2 wire)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/12 02:33 PM
L64	495	(filament electrode) with (form$3 made built) with (single near2 wire) and L38	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/12 02:34 PM
L65	237	L64 not L59	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/12 02:34 PM
L66	0	"606"/$.clas. and (helical) near2 (track thread) with (detents) same (deploy$4 retract$4 advanc$4)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/12 02:56 PM
L67	0	"606"/$.clas. and (helical) near2 (track thread) same (detents) same (deploy$4 retract$4 advanc$4)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/12 02:56 PM
L68	0	"606"/$.clas. and (track thread) same (detent) same (deploy$4 retract$4 advanc$4)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/12 02:56 PM

L69	4757	(track thread) same (detent) same (deploy$4 retract$4 advanc$4)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/12 02:56 PM
L70	14	(track thread) same (detent) same (indicat$4 alert$4) with (deploy$4 retract$4 advanc$4) same (visual tactile audible)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/12 02:57 PM
L71	2	"20060264974".pgnr. "5827276".pn.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/12 04:33 PM
L72	1332	(filament electrode) with (form$3 made built) with (single near2 wire)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/14 12:00 PM
L73	2599	(filament electrode) with (form$3 made built) with (single near2 wire or "same" near2 wire)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/14 12:01 PM
L74	389	L73 and "606"/$.ccls.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/14 12:01 PM
L75	50	"606"/$.ccls. and (distal near2 (tip end)) near4 (insulat$4) with (partially partial "part of")	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/14 12:41 PM
L76	0	"606"/$.ccls. and (distal near2 (tip end)) with (insulat$4) with (partially partial "part of") same ("non-adhere" "adhere")	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/14 12:55 PM
L77	126	"606"/$.ccls. and (distal near2 (tip end)) with (insulat$4 insulate insulated) with (partially partial "part of")	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/14 12:56 PM
L78	76	L77 not L75	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/14 12:56 PM
L79	57	(US-20040260282-$ or US-20050101950-$ or US-20060189972-$ or US-20060206133-$ or US-20060206132-$ or US-20060206131-$ or US-20090221998-$ or US-20090024124-$ or US-20060217705-$ or US-20010018586-$ or US-20010031941-$ or US-20060206130-$ or US-20060206129-$ or	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/14 01:07 PM

		US-20060206111-$ or US-20070016183-$ or US-20070077230-$ or US-20080161804-$ or US-20070287996-$ or US-20090105640-$ or US-20060229645-$ or US-20060264974-$ or US-20020143302-$ or US-20040199179-$).did. or (US-2994324-$ or US-5599346-$ or US-5683384-$ or US-5728143-$ or US-5735847-$ or US-5782827-$ or US-5800484-$ or US-5810804-$ or US-5863290-$ or US-5913855-$ or US-5925042-$ or US-5928229-$ or US-5951547-$ or US-6053937-$ or US-6092528-$ or US-6254598-$ or US-6958062-$ or US-6132425-$ or US-6129726-$ or US-5672173-$ or US-7108696-$ or US-7357798-$ or US-5687739-$ or US-5749846-$ or US-2022065-$ or US-5995875-$).did. or (US-6123084-$ or US-6245070-$ or US-7198625-$ or US-7270661-$ or US-5507802-$ or US-6638275-$ or US-5827276-$ or US-5855576-$).did.					
L80	27	L79 and (distal near2 (tip end point)) with (insulat$4 insulate insulated)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/14 01:32 PM
L81	8	(tip) with (filament stylet tine) with (active adj electrode)	(US-PGPUB; USPAT)	OR	ON	ON	2014/06/16 03:31 PM
L82	587	("0164184" | "1366756" | "1735271" | "1814791" | "1889609" | "1932258" | "1943543" | "1952617" | "1983669" | "2050904" | "2056377" | "2196171"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2014/06/16 03:33 PM

		| "2888928" | "3035580" | "3460539" | "3595239" | "3601126" | "3614414" | "3648001" | "3685518" | "3699967" | "3707149" | "3801766" | "3815604" | "3845771" | "3847153" | "3885569" | "3898991" | "3901242" | "3902494" | "3903891" | "3920021" | "3920022" | "3923063" | "3929137" | "3939839" | "3945375" | "3963030" | "3964487" | "3970088" | "3974833" | "4011872" | "4016881" | "4024467" | "4033351" | "4040426" | "4043342" | "4051855" | "4060088" | "4069827" | "4074718" | "4092986" | "4114623" | "4116198" | "4119102" | "4126137" | "4154240" | "4189685" | "4200104" | "4202337" | "4204549" | "4210152" | "4228800" | "4248231" | "4271837" | "4281373" | "4301802" | "4326529" | "4346332" | "4376263" | "4381007" | "4416277" | "4418692" | "4429698" | "4448198" | "4474179" | "4476862" | "4492231" | "4494541" | "4512338" | "4517976" | "4524770" | "4532924" | "4534347" | "4548207" | "4559943" | "4559951" | "4562838" | "4565200" | "4567890" | "4580557" | "4590934" | "4593691" | "4617927" | "4657015" | "4658819" | "4658820" | "4669468" | "4674499" | "4681122" | "4682596" | "4688569" | "4696668" | "4706667" | "4709698" | "4712544" | "4727874" | "4735201" | "4769005" | "4781175" | "4799480" | "4800899" | "4802476" | "4805616" | "4813429" | "4820298" | "4823791" | "4827927" | "4832048" | "4850353" | "4860744" | "4878493" | "4886074" | "4919129" | "4920978").PN. OR ("4931047" | "4936281"					

		| "4936301" | "4936310" | "4936842" | "4943290" | "4950267" | "4955377" | "4966597" | "4967765" | "4969885" | "4976711" | "4994069" | "4998933" | "5007908" | "5009656" | "5013312" | "5019076" | "5035696" | "5037379" | "5047026" | "5047027" | "5057107" | "5062031" | "5071418" | "5080660" | "5083565" | "5085659" | "5088997" | "5098431" | "5099840" | "5108391" | "5108407" | "5117978" | "5122138" | "5133365" | "5158561" | "5167658" | "5167659" | "5171255" | "5171311" | "5178620" | "5190517" | "5195959" | "5196007" | "5197963" | "5201743" | "5207675" | "5217457" | "5217458" | "5217459" | "5221281" | "5244462" | "5249585" | "5250047" | "5258006" | "5259395" | "5261906" | "5267994" | "5267997" | "5277201" | "5277696" | "5281213" | "5281216" | "5282799" | "5282845" | "5290282" | "5290283" | "5300068" | "5300069" | "5300070" | "5304214" | "5306238" | "5318563" | "5320627" | "5330470" | "5330471" | "5334193" | "5334198" | "5336222" | "5342357" | "5342391" | "5344428" | "5352222" | "5354296" | "5366443" | "5370645" | "5370675" | "5372596" | "5382247" | "5383874" | "5383876" | "5383917" | "5383923" | "5395363" | "5395368" | "5403311" | "5419767" | "5422567" | "5423808" | "5423809" | "5423810" | "5423811" | "5431649" | "5437662" | "5438302" | "5441499" | "5443470" | "5454809" | "5462521" | "5472441" | "5472443" | "5480397" | "5480398" | "5496312" | "5496314" | "5505728" | "5505730"				

		| "5507743" | "5514129" | "5514130" | "5514131" | "5520684" | "5520685" | "5522815").PN. OR ("5531744" | "5536267" | "5540680" | "5540681" | "5540682" | "5540683" | "5540684" | "5540685" | "5542916" | "5542945" | "5545161" | "5545193" | "5549605" | "5554172" | "5555618" | "5556396" | "5556397" | "5558671" | "5562720" | "5569164" | "5569242" | "5569244" | "5569245" | "5575789" | "5578007" | "5582609" | "5582610" | "5584830" | "5591141" | "5599344" | "5599345" | "5599346" | "5599347" | "5599348" | "5599349" | "5603711" | "5603712" | "5607422" | "5609151" | "5609573" | "5611798" | "5620481" | "5624439" | "5626560" | "5626575" | "5626576" | "5626578" | "5628745" | "5628771" | "5630426" | "5633578" | "5634924" | "5672174" | "5683366" | "5693045" | "5697281" | "5697536" | "5697882" | "5697909" | "5700262" | "5766153" | "5810764" | "5843019" | "5860951" | "5871469" | "5873855" | "5888198" | "5891095" | "Re33925").PN. OR ("6015406").URPN.					
L83	67	("5800482" | "5807395").PN. OR ("6053937").URPN.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2014/10/01 03:55 PM
L84	1050	"606"/$.ccls. and (bipolar) and (stylet filament) and (trocar needle)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2014/10/01 03:56 PM
L85	752	"606"/29-41.ccls. and (bipolar) and (stylet filament) and (trocar needle)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2014/10/01 03:57 PM
L86	43	"606"/29-41.ccls. and (bipolar) same (stylet filament antenna) same (trocar needle)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2014/10/02 08:26 AM
L87	2	"7270661".pn.	(US-PGPUB; USPAT;	OR	ON	ON	2014/10/02

		"5507802".pn.	USOCR)				08:32 AM
L88	9	bevel with (stylet filament) and 606/41.ccls.	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/02 10:21 AM
L89	1	"20070287996".pgnr.	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/02 11:00 AM
L90	64	(insulat$6) near4 (point tip) with (needle trocar) and 606/41.ccls.	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/02 11:02 AM
L91	1518	(insulat$6) near4 (point tip end) and 606/41.ccls.	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/02 11:12 AM
L92	7	(partial$6) near2 (cover$4) with (insulat$6) near4 (point tip end) and 606/41.ccls.	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/02 11:12 AM
L93	1	"20070203486".pgnr.	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/09 10:21 AM
L94	522	bevel$4 with (filament tine)	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/09 10:28 AM
L95	45	bevel$4 with tip with (filament tine)	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/09 10:37 AM
L96	299	bevel$4 with tip with (filament tine stylet)	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/09 10:38 AM
L97	16	bevel$4 with tip with (filament tine stylet) and 606/41.ccls.	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/09 10:39 AM
L98	1	13/101009.app.	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/09 10:52 AM
L99	2	"20070203486"	(US-PGPUB; USPAT)	OR	ON	ON	2015/03/20 01:40 PM
L100	1	"13101009"	(US-PGPUB; USPAT)	OR	ON	ON	2015/03/20 05:00 PM
L101	0	(stylet filament antenna) with (retract$4) with (offset) with (angle)	(US-PGPUB; USPAT)	OR	ON	ON	2015/03/23 10:33 AM
L102	19	(stylet filament antenna) with (retract$4) with (offset)	(US-PGPUB; USPAT)	OR	ON	ON	2015/03/23 10:34 AM
L103	2309	(indicia indicat$4 marking marker) with (rotat$4) with (distal) near5 (tip end)	(US-PGPUB; USPAT)	OR	ON	ON	2015/03/23 10:47 AM
L104	11	(indicia indicat$4 marking marker) near5 (hub) with (rotat$4) with (distal) near5 (tip end)	(US-PGPUB; USPAT)	OR	ON	ON	2015/03/23 10:48 AM
L105	89	(indicia indicat$4 marking marker) near5 (hub handle) with (rotat$4) with (distal)	(US-PGPUB; USPAT)	OR	ON	ON	2015/03/23 11:32 AM

		near5 (tip end)					
L106	2	"20070203486"	(US-PGPUB; USPAT)	OR	ON	ON	2015/03/23 11:36 AM
L107	1	"13101009"	(US-PGPUB; USPAT)	OR	ON	ON	2015/03/23 12:41 PM
L108	9	("20010012956"|"20040059328"|"20040158239"|"20060084965"|"20070112340"|"20080161804"|"20080249392"|"20080269558"|"20110213356").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2015/03/23 12:43 PM
L109	106	("2001/0012956" | "2004/0059328" | "2004/0158239" | "2006/0084965" | "2007/0112340" | "2008/0161804" | "2008/0249392" | "2008/0269558" | "2011/0213356").URPN.	(USPAT)	OR	ON	ON	2015/03/23 12:43 PM
L110	167	("1653819" | "20010044596" | "20020010491" | "20020055731" | "20020077676" | "20020099323" | "20020138117" | "20020183735" | "20020183740" | "20020193831" | "20030009110" | "20030060856" | "20030088189" | "20030130711" | "20030170898" | "20030195406" | "20030208200" | "20030225360" | "20040019371" | "20040059328" | "20040059389" | "20040146877" | "20040153057" | "20040199159" | "20040243107" | "20040267189" | "20050043726" | "20050049541" | "20050165393" | "20050171523" | "20050171574" | "20050182462" | "20050261672" | "20050288730" |	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2015/03/23 12:44 PM

		"20060015147" | "20060025760" | "20060079883" | "20060121610" | "20060212078" | "20060217703" | "20060264752" | "20070016183" | "20070043345" | "20070118069" | "20070203486" | "20080052786" | "20080154259" | "20080167649" | "20090062792" | "20090228001" | "20090281477" | "20100049190" | "20100087813" | "20100130975" | "20100222677" | "20110202053" | "20120165813" | "20120310236" | "20130110106" | "4016886" | "4226246" | "4262672" | "4407943" | "4810963" | "4907601" | "4946793" | "5019034" | "5052391" | "5058605" | "5098843" | "5134070" | "5173158" | "5193537" | "5273525" | "5283194" | "5318563" | "5328451" | "5389069" | "5403311" | "5425752" | "5439440" | "5458625" | "5533999" | "5536240" | "5575811" | "5626146" | "5634899" | "5674267" | "5702359" | "5720921" | "5778894" | "5782882" | "5800378" | "5810762" | "5836905" | "5843026" | "5873849" | "5919142" | "5947889" | "5983131" | "5991697" | "5999847" | "6009347" | "6010613" | "6016452").PN. OR ("6041252" | "6055453" | "6068650" | "6085115" | "6090106" | "6102885" | "6106521" | "6109270" | "6122599" | "6132419" | "6159163" | "6208893" | "6210402" | "6212433" | "6216034" | "6219577" | "6241702" | "6261831"					

		| "6278895" | "6300108" | "6326177" | "6347247" | "6349233" | "6351674" | "6387671" | "6403348" | "6470211" | "6482619" | "6493592" | "6500173" | "6526320" | "6562604" | "6607529" | "6611706" | "6613211" | "6627421" | "6653091" | "6669691" | "6692493" | "6697669" | "6697670" | "6702808" | "6795728" | "6801804" | "6865416" | "6881213" | "6892099" | "6912417" | "6927049" | "6962587" | "6972014" | "6994706" | "7053063" | "7063698" | "7130697" | "7211083" | "7267676" | "7387626" | "7455675" | "7771401" | "8511317").PN. OR ("8753335").URPN.					
L111	273	L109 L110	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2015/03/23 12:45 PM
L112	2	L111 and (rotat$4) near3 (mechanism) with (advancement advanc$4 deploy$4 retract$4)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2015/03/23 12:46 PM
L113	3	L111 and (rotat$4) near3 (mechanism) same(advancement advanc$4 deploy$4 retract$4)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2015/03/23 12:46 PM
L114	628	((ROBERT) near2 (WRIGHT)).INV.	(US-PGPUB; USPAT)	OR	ON	ON	2018/09/10 08:23 PM
L115	25	((SCOTT) near2 (BRANDT)).INV.	(US-PGPUB; USPAT)	OR	ON	ON	2018/09/10 08:23 PM
L116	0	((("NIMBUS") near3 ("CONCEPTS") near3 ("LLC"))).AS,AANM.	(USPAT)	OR	OFF	OFF	2018/09/10 08:23 PM
L117	2	"20060084965"	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2018/09/10 08:25 PM
L118	66	("20040158239" | "20050080409" | "20050107781" | "20060217702" | "3174851" | "3351463" | "3753700" | "5472441" | "5507743" | "5536267" | "5827276" | "5855576" | "6090105").PN. OR ("7229438").URPN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2018/09/10 08:25 PM
L119	5060	(A61B18/1477 or	(US-PGPUB; USPAT;	OR	OFF	OFF	2018/09/10

		A61B2018/1467).cpc.	USOCR)				08:28 PM
L120	739	L119 and (stylet)	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2018/09/10 08:28 PM
L121	402	L119 and (stylet) and monopolar	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2018/09/10 08:28 PM
L122	109	L119 and (stylet filaments) with actuat$4	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2018/09/10 08:41 PM
L123	2	"13101009"	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2018/09/10 08:43 PM
L124	8841	(A61B2018/1253 or A61B2018/00577).cpc.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2018/09/10 08:51 PM
L125	1129	L124 and (stylet filament)	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2018/09/10 08:51 PM
L126	1	"5364351".pn.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2018/09/10 09:18 PM
L127	175	("5672173" | "5697536" | "5814066" | "5827276" | "6033401" | "6241725" | "6264651" | "6302898" | "6478793" | "6562059" | "6602248").PN. OR ("7108696").URPN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2019/08/29 10:26 AM
L128	451	("3987795" | "3991770" | "4033351" | "4043342" | "4121592" | "4237898" | "4289135" | "4303636" | "4346715" | "4411266" | "4565200" | "4574782" | "4586490" | "4660571" | "4763671" | "4800899" | "4838265" | "4907589" | "4920978" | "4931047" | "4940064" | "4945912" | "4976680" | "4976711" | "5003991" | "5009656" | "5013312" | "5015227" | "5026959" | "5047027" | "5057107" | "5059199" | "5067952" | "5071419" | "5078717" | "5080660" | "5084045" | "5085659" | "5100423" | "5115818" | "5125928" | "5128147" | "5183455" | "5190539" | "5197466" | "5197963" | "5205289" | "5207675" | "5215103" | "5217458" | "5246438" | "5251645" | "5252922" | "5267994" | "5277696" | "5281213" | "5290286" | "5300068" | "5304214" | "5336222" | "5365926" | "5385544" | "5397339" | "5403311" | "5411025").PN. OR	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2019/08/29 10:52 AM

		("5599346").URPN.					
L129	451	("3987795" | "3991770" | "4033351" | "4043342" | "4121592" | "4237898" | "4289135" | "4303636" | "4346715" | "4411266" | "4565200" | "4574782" | "4586490" | "4660571" | "4763671" | "4800899" | "4838265" | "4907589" | "4920978" | "4931047" | "4940064" | "4945912" | "4976680" | "4976711" | "5003991" | "5009656" | "5013312" | "5015227" | "5026959" | "5047027" | "5057107" | "5059199" | "5067952" | "5071419" | "5078717" | "5080660" | "5084045" | "5085659" | "5100423" | "5115818" | "5125928" | "5128147" | "5183455" | "5190539" | "5197466" | "5197963" | "5205289" | "5207675" | "5215103" | "5217458" | "5246438" | "5251645" | "5252922" | "5267994" | "5277696" | "5281213" | "5290286" | "5300068" | "5304214" | "5336222" | "5365926" | "5385544" | "5397339" | "5403311" | "5411025").PN. OR ("5599346").URPN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2019/08/29 11:15 AM
L130	2	"5599346".pn.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	OFF	OFF	2019/08/29 11:57 AM
L131	219	("2006/0095029").URPN.	(USPAT)	OR	OFF	OFF	2019/08/30 08:26 AM
L132	198	L131 and deploy$4	(USPAT)	OR	OFF	OFF	2019/08/30 08:26 AM
L133	65	L131 and deploy$4 same (thread$4 helical$4 track$4)	(USPAT)	OR	OFF	OFF	2019/08/30 08:27 AM
L134	63	(US-20040260282-$ or US-20050101950-$ or US-20060189972-$ or US-20060206133-$ or US-20060206132-$ or US-20060206131-$ or US-20090221998-$ or US-20090024124-$ or US-20060217705-$ or US-20010018586-$ or US-20010031941-$ or	(US-PGPUB; USPAT)	OR	OFF	OFF	2019/08/30 10:21 AM

		US-20060206130-$ or US-20060206129-$ or US-20060206111-$ or US-20070016183-$ or US-20070077230-$ or US-20080161804-$ or US-20070287996-$ or US-20090105640-$ or US-20060229645-$ or US-20060264974-$ or US-20020143302-$ or US-20040199179-$ or US-20060095029-$ or US-20040015161-$ or US-20050085804-$).did. or (US-20060084965-$).did. or (US-2994324-$ or US-5599346-$ or US-5683384-$ or US-5728143-$ or US-5735847-$ or US-5782827-$ or US-5800484-$ or US-5810804-$ or US-5863290-$ or US-5913855-$ or US-5925042-$ or US-5928229-$ or US-5951547-$ or US-6053937-$ or US-6092528-$ or US-6254598-$ or US-6958062-$ or US-6132425-$ or US-6129726-$ or US-5672173-$ or US-7108696-$ or US-7357798-$ or US-5687739-$ or US-5749846-$ or US-2022065-$ or US-5995875-$).did. or (US-6123084-$ or US-6245070-$ or US-7198625-$ or US-7270661-$ or US-5507802-$ or US-6638275-$ or US-5827276-$ or US-5855576-$ or US-6015406-$ or US-8753335-$).did.					
L135	205	(a61b18/$5.cpc. a61b2018/$5.cpc.) and (hypotube) with (needle cannula)	(US-PGPUB; USPAT)	OR	OFF	OFF	2019/08/30 11:01 AM

L136	136	(a61b18/$5.cpc. a61b2018/$5.cpc.) and (tube) near5 conduct$4 near10 (cannula needle trocar)	(US-PGPUB; USPAT)	OR	OFF	OFF	2019/08/30 11:16 AM
L137	1	"15098673"	(US-PGPUB; USPAT)	OR	OFF	OFF	2019/08/30 11:21 AM
L138	2	"20080294162"	(US-PGPUB; USPAT)	OR	OFF	OFF	2019/08/30 11:28 AM
L139	1	"6878147".pn.	(US-PGPUB; USPAT)	OR	OFF	OFF	2019/08/30 11:30 AM
L140	1	"15225945"	(US-PGPUB; USPAT)	OR	OFF	OFF	2019/08/30 11:34 AM
L141	2427	(a61b18/$5.cpc. a61b2018/$5.cpc.) and conduct$4 near10 (cannula needle trocar)	(US-PGPUB; USPAT)	OR	OFF	OFF	2019/08/30 11:45 AM
L142	272	(a61b18/$5.cpc. a61b2018/$5.cpc.) and conduct$4 near5 inner near10 (cannula needle trocar)	(US-PGPUB; USPAT)	OR	OFF	OFF	2019/08/30 11:46 AM
L143	8	"5599346".pn. "20060095029"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	OFF	OFF	2019/08/30 12:58 PM
L144	659	((ROBERT) near2 (WRIGHT)).INV.	(US-PGPUB; USPAT)	OR	ON	ON	2019/08/30 01:00 PM
L145	120	((ROBERT) near2 (WRIGHT)).INV.	(EPO; JPO; DERWENT)	OR	ON	ON	2019/08/30 01:00 PM
L146	26	((SCOTT) near2 (BRANDT)).INV.	(US-PGPUB; USPAT)	OR	ON	ON	2019/08/30 01:00 PM
L147	5	((SCOTT) near2 (BRANDT)).INV.	(EPO; JPO; DERWENT)	OR	ON	ON	2019/08/30 01:00 PM
L148	1	"7918852".pn.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	OFF	OFF	2020/03/16 02:34 PM
L149	86	("20020019596" | "20020065541" | "20040116793" | "3946738" | "3964487" | "3980085" | "4003380" | "4043342" | "4116198" | "4126137" | "4188927" | "4214804" | "4245649" | "4474179" | "4476862" | "4483338" | "4565200" | "4590934" | "4651734" | "4655226" | "4674499" | "4685459" | "4727874" | "4844063" | "4907585" | "4907589" | "4955377" | "4966597" | "5007908" | "5009656" | "5019076" | "5267997" | "5342357" |	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/03/16 04:44 PM

		"5383874" | "5403311" | "5433739" | "5651780" | "5697281" | "5697536" | "5697882" | "5697909" | "5827280" | "5843019" | "5888198" | "5891095" | "5902272" | "6004319" | "6056746" | "6066134" | "6106524" | "6146380" | "6149620" | "6159194" | "6193715" | "6312408" | "6312428" | "6379350" | "6416508" | "6506189" | "6582441" | "6632220" | "6837884").PN. OR ("7918852").URPN.					
L150	788	("4813429" | "4907589" | "5191883" | "5281213" | "5281218").PN. OR ("5433739").URPN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/03/16 05:11 PM
L151	4	"20040158239"	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/03/16 06:05 PM
L152	6	"20070112340" "20080161804" "20080249392"	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/03/16 06:06 PM
L153	130	(behl.in. epstein.in.) and 606/$5.ccls.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/03/16 07:17 PM
L154	16	"11429921" "11173928"	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/03/16 07:19 PM
L155	2	"20020095080"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	OFF	OFF	2020/03/16 10:54 PM
L156	673	((ROBERT) near2 (WRIGHT)).INV.	(US-PGPUB; USPAT)	OR	ON	ON	2020/03/17 01:53 PM
L157	26	((SCOTT) near2 (BRANDT)).INV.	(US-PGPUB; USPAT)	OR	ON	ON	2020/03/17 01:53 PM
L158	15	(US-15796806-$ | US-55503426-$ | US-5961471-$ | US-6245064-$ | US-6424861-$ | US-7051569-$ | US-7111502-$ | US-7182509-$ | US-7204122-$ | US-7297123-$ | US-7344679-$ | US-7395103-$ | US-7574902-$ | US-7762718-$ | US-7905134-$ | US-7908906-$ | US-8020433-$).DID.	(US-PGPUB; USPAT)	OR	ON	ON	2020/03/17 02:31 PM
L159	1	"15098673"	(US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	OFF	2020/04/06 06:41 PM

			JPO)				
L160	673	((ROBERT) near2 (WRIGHT)).INV.	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 06:46 PM
L161	26	((SCOTT) near2 (BRANDT)).INV.	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 06:46 PM
L162	695	L160 L161	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 06:46 PM
L163	47	L162 and filaments	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 06:47 PM
L164	4	((("STRATUS") near3 ("MEDICAL") near3 ("LLC"))).AS,AANM.	(USPAT)	OR	ON	ON	2022/12/14 03:53 PM
L165	1059	((("WRIGHT") near3 ("Robert")) OR (("BRANDT") near3 ("Scott"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/12/14 05:49 PM
L166	53	165 AND (cannula needle)	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/12/14 05:50 PM
L167	6927	a61b18/1477.cpc.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/12/14 05:53 PM
L168	4858	a61b18/1477.cpc. AND (cannula needle)	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/12/14 05:53 PM
L169	1642	a61b18/1477.cpc. AND (cannula needle) AND (spine spline filament arm leg)	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/12/14 05:53 PM
L170	518	a61b18/1477.cpc. AND (cannula needle) AND (deploy$4 advanc$4 introduc$4 insert$4) near10 (spine spline filament arm leg)	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/12/14 05:54 PM
L171	75	((US-20080161804-A1 OR US-20060264974-A1 OR US-20060229645-A1 OR US-20090105640-A1 OR US-20070287996-A1 OR US-20020143302-A1 OR US-20070077230-A1 OR US-20070016183-A1 OR US-20060206111-A1 OR US-20060206129-A1 OR US-20060206130-A1 OR US-20010031941-A1 OR US-20010018586-A1 OR US-20070006215-A1 OR US-	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/12/15 09:13 AM

		20110230874-A1 OR US-20070112340-A1 OR US-20040158239-A1 OR US-20060224223-A1 OR US-20060084965-A1 OR US-20050085804-A1 OR US-20040015161-A1 OR US-20060095029-A1 OR US-20040199179-A1 OR US-20050101950-A1 OR US-20040260282-A1 OR US-20090024124-A1 OR US-20060217705-A1 OR US-20090221998-A1 OR US-20060206131-A1 OR US-20060206132-A1 OR US-20060206133-A1 OR US-20060189972-A1 OR US-20050060006-A1 OR US-20110060314-A1).did. AND PGPB.dbnm.) OR ((US-5855576-A OR US-5827276-A OR US-6638275-B1 OR US-5507802-A OR US-7270661-B2 OR US-7198625-B1 OR US-7918852-B2 OR US-7627380-B2 OR US-5571147-A OR US-4907589-A OR US-5433739-A OR US-6245070-B1 OR US-8753335-B2 OR US-6015406-A OR US-5913855-A OR US-6254598-B1 OR US-6092528-A OR US-6053937-A OR US-5951547-A OR US-5928229-A OR US-5925042-A OR US-6958062-B1 OR US-5863290-A OR US-5810804-A OR US-5800484-A OR US-5782827-A OR US-5735847-A OR US-5728143-A OR US-5683384-A OR US-5599346-A OR US-					

		6123084-A OR US-5995875-A OR US-2022065-A OR US-5749846-A OR US-5687739-A OR US-7357798-B2 OR US-7108696-B2 OR US-2994324-A OR US-5672173-A OR US-6129726-A OR US-6132425-A).did. AND USPT.dbnm.)					
L172	0	a61b18/0044.cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/12/15 11:08 AM
L173	1587	a61b2018/0044.cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/12/15 11:08 AM
L174	662	a61b2018/0044.cpc. AND needle	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA,	OR	ON	ON	2022/12/15 11:08 AM

			VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L175	270	a61b2018/0044.cpc. AND (energy) WITH (stylet needle)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/12/15 01:53 PM
L176	77	((US-20080161804-A1 OR US-20060264974-A1 OR US-20060229645-A1 OR US-20090105640-A1 OR US-20070287996-A1 OR US-20020143302-A1 OR US-20070077230-A1 OR US-20070016183-A1 OR US-20060206111-A1 OR US-20060206129-A1 OR US-20060206130-A1 OR US-20010031941-A1 OR US-20010018586-A1 OR US-20070006215-A1 OR US-20110230874-A1 OR US-20070112340-A1 OR US-20040158239-A1 OR US-20060224223-A1 OR US-20060084965-A1 OR US-20050085804-A1 OR US-20040015161-A1 OR US-20060095029-A1 OR US-20040199179-A1 OR US-20050101950-A1 OR US-20040260282-A1 OR US-20090024124-A1 OR US-20060217705-A1 OR US-20090221998-A1 OR US-20060206131-	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/12/15 01:58 PM

		A1 OR US-20060206132-A1 OR US-20060206133-A1 OR US-20060189972-A1 OR US-20050060006-A1 OR US-20110060314-A1 OR US-20170049503-A1 OR US-20060200121-A1).did. AND PGPB.dbnm.) OR ((US-5855576-A OR US-5827276-A OR US-6638275-B1 OR US-5507802-A OR US-7270661-B2 OR US-7198625-B1 OR US-7918852-B2 OR US-7627380-B2 OR US-5571147-A OR US-4907589-A OR US-5433739-A OR US-6245070-B1 OR US-8753335-B2 OR US-6015406-A OR US-5913855-A OR US-6254598-B1 OR US-6092528-A OR US-6053937-A OR US-5951547-A OR US-5928229-A OR US-5925042-A OR US-6958062-B1 OR US-5863290-A OR US-5810804-A OR US-5800484-A OR US-5782827-A OR US-5735847-A OR US-5728143-A OR US-5683384-A OR US-5599346-A OR US-6123084-A OR US-5995875-A OR US-2022065-A OR US-5749846-A OR US-5687739-A OR US-7357798-B2 OR US-7108696-B2 OR US-2994324-A OR US-5672173-A OR US-6129726-A OR US-6132425-A).did. AND USPT.dbnm.)					
L177	23	176 AND nerve	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA,	OR	ON	ON	2022/12/15 01:58 PM

			EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L178	77	((US-20080161804-A1 OR US-20060264974-A1 OR US-20060229645-A1 OR US-20090105640-A1 OR US-20070287996-A1 OR US-20020143302-A1 OR US-20070077230-A1 OR US-20070016183-A1 OR US-20060206111-A1 OR US-20060206129-A1 OR US-20060206130-A1 OR US-20010031941-A1 OR US-20010018586-A1 OR US-20070006215-A1 OR US-20110230874-A1 OR US-20070112340-A1 OR US-20040158239-A1 OR US-20060224223-A1 OR US-20060084965-A1 OR US-20050085804-A1 OR US-20040015161-A1 OR US-20060095029-A1 OR US-20040199179-A1 OR US-20050101950-A1 OR US-20040260282-A1 OR US-20090024124-A1 OR US-20060217705-A1 OR US-20090221998-A1 OR US-20060206131-A1 OR US-20060206132-A1 OR US-20060206133-A1 OR US-20060189972-A1 OR US-20050060006-A1 OR US-20110060314-A1 OR US-20170049503-A1 OR US-	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/12/15 02:02 PM

		20060200121-A1).did. AND PGPB.dbnm.) OR ((US-5855576-A OR US-5827276-A OR US-6638275-B1 OR US-5507802-A OR US-7270661-B2 OR US-7198625-B1 OR US-7918852-B2 OR US-7627380-B2 OR US-5571147-A OR US-4907589-A OR US-5433739-A OR US-6245070-B1 OR US-8753335-B2 OR US-6015406-A OR US-5913855-A OR US-6254598-B1 OR US-6092528-A OR US-6053937-A OR US-5951547-A OR US-5928229-A OR US-5925042-A OR US-6958062-B1 OR US-5863290-A OR US-5810804-A OR US-5800484-A OR US-5782827-A OR US-5735847-A OR US-5728143-A OR US-5683384-A OR US-5599346-A OR US-6123084-A OR US-5995875-A OR US-2022065-A OR US-5749846-A OR US-5687739-A OR US-7357798-B2 OR US-7108696-B2 OR US-2994324-A OR US-5672173-A OR US-6129726-A OR US-6132425-A).did. AND USPT.dbnm.)					
L179	28	"20060084965" "20060095029" "5599346".pn.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO;	OR	ON	ON	2022/12/15 02:05 PM

			JPO; DERWENT; IBM_TDB)				
L180	77	((US-20080161804-A1 OR US-20060264974-A1 OR US-20060229645-A1 OR US-20090105640-A1 OR US-20070287996-A1 OR US-20020143302-A1 OR US-20070077230-A1 OR US-20070016183-A1 OR US-20060206111-A1 OR US-20060206129-A1 OR US-20060206130-A1 OR US-20010031941-A1 OR US-20010018586-A1 OR US-20070006215-A1 OR US-20110230874-A1 OR US-20070112340-A1 OR US-20040158239-A1 OR US-20060224223-A1 OR US-20060084965-A1 OR US-20050085804-A1 OR US-20040015161-A1 OR US-20060095029-A1 OR US-20040199179-A1 OR US-20050101950-A1 OR US-20040260282-A1 OR US-20090024124-A1 OR US-20060217705-A1 OR US-20090221998-A1 OR US-20060206131-A1 OR US-20060206132-A1 OR US-20060206133-A1 OR US-20060189972-A1 OR US-20050060006-A1 OR US-20110060314-A1 OR US-20170049503-A1 OR US-20060200121-A1).did. AND PGPB.dbnm.) OR ((US-5855576-A OR US-5827276-A OR US-6638275-B1 OR US-5507802-A OR US-7270661-B2 OR US-7198625-B1 OR US-7918852-B2 OR US-	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/12/16 09:56 AM

		7627380-B2 OR US-5571147-A OR US-4907589-A OR US-5433739-A OR US-6245070-B1 OR US-8753335-B2 OR US-6015406-A OR US-5913855-A OR US-6254598-B1 OR US-6092528-A OR US-6053937-A OR US-5951547-A OR US-5928229-A OR US-5925042-A OR US-6958062-B1 OR US-5863290-A OR US-5810804-A OR US-5800484-A OR US-5782827-A OR US-5735847-A OR US-5728143-A OR US-5683384-A OR US-5599346-A OR US-6123084-A OR US-5995875-A OR US-2022065-A OR US-5749846-A OR US-5687739-A OR US-7357798-B2 OR US-7108696-B2 OR US-2994324-A OR US-5672173-A OR US-6129726-A OR US-6132425-A).did. AND USPT.dbnm.)					
L181	16	180 AND (rotat$4) near5 (cannula needle stylet)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/12/16 09:56 AM
L182	34	173 AND (posterior ADJ rami)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB,	OR	ON	ON	2022/12/16 12:34 PM

			HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L183	4	"10736688".pn. "10925664".pn.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/12/16 01:22 PM
L184	25	"20060200121" "20060095029" "20060106376" "20040199179"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/12/16 01:52 PM

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N164	207705	(filaments probe).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 06:47 PM
N165	462	(filaments and probe).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 06:47 PM
N166	88	(filaments and probe and electrode).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 06:47 PM
N167	70	(filaments and probe).clm. and (a61b18/$5.cpc.	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 06:50 PM

		a61b2018/$5.cpc.)					
N168	2	"20060084965"	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 06:59 PM
N169	4	"20070006215" "7108696".pn. "6989004".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 07:06 PM
N170	46	("20020022864"|"20020133148"|"20030199862"|"20040064137"|"20070010809"|"20070213703"|"20080249523"|"20090306604"|"20100076340"|"20110184403"|"20130096549"|"20170065334"|"5383917"|"5486161"|"5749846"|"5893847"|"6045532"|"6105581"|"6210406"|"6216043"|"6221071"|"6287304"|"6461314"|"6471695"|"6699242"|"6740080"|"6752804"|"6962587"|"6989004"|"7229438"|"7318822"|"7344533"|"7393351"|"7399299"|"7416549"|"7419487"|"7458971"|"7678107"|"7846157"|"7896871"|"8262574"|"8512330"|"8518037"|"8753335"|"9402560"|"9675406").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 07:12 PM

Doc Code: ECOMM.AUTH/ECOMM.WTDW
Doc Description: Internet Communications Authorization/Internet Communications Authorization Withdrawal

PTO/SB/439 (11-15)

AUTHORIZATION FOR INTERNET COMMUNICATIONS IN A PATENT APPLICATION OR REQUEST TO WITHDRAW AUTHORIZATION FOR INTERNET COMMUNICATIONS		
	Application No.	17/126,675
	Filing Date	December 18, 2020
	First Named Inventor	Robert E. Wright
	Art Unit	3794
	Examiner Name	Eun Hwa Kim
	Practitioner Docket No.	NBUS.001US1C1C1C1

To: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I. To authorize permission for Internet Communications.

☒ Recognizing that Internet communications are not secure, I hereby authorize the USPTO to communicate with the undersigned and practitioners in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via video conferencing, instant messaging, or electronic mail. I understand that a copy of these communications will be made of record in the application file. (MPEP 502.03)

II. To withdraw authorization for Internet Communications.

☐ The authorization given on _____, to the USPTO to communicate with the undersigned and any practitioner in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via Internet communications such as video conferencing, instant messaging, or electronic mail is hereby withdrawn. I understand that the withdrawal is effective when approved rather than when received.

I am the

☐ applicant.

☐ attorney or agent of record. Registration number _____.

☒ attorney or agent acting under 37 CFR 1.34. Registration number 55,265.

/Daniel C. Higgs/ — Signature

June 5, 2023 — Date

Daniel C. Higgs — Typed or printed name

801.703.1961 — Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Juristic entities must be represented by a patent practitioner (see 37 CFR 1.31, which is applicable to any paper filed on or after September 16, 2012, that is presented on behalf of a juristic entity, regardless of application filing date). Submit multiple forms if more than one signature is required, see below*.

☐ * Total of _____ forms are submitted.

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Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/126,675	**06/05/2023 10:50:05 AM ET**	**NBUS.001C1C1C1**

Title of Invention

METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	1065	FILED BY	Daniel Higgs
PATENT CENTER #	62206405	FILING DATE	12/18/2020
CUSTOMER #	148468	FIRST NAMED INVENTOR	Robert E. Wright
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
NBUS001US1C1C1C1_SB439.pdf	2	Internet Communications Authorization	200 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
NBUS001US1C1C1C1_SB439.pdf	905DF26AD972C7DC685EDB8CCFC4694E716D2A984E6E9C679AE13244CBBD3E9D800122C2685A48B74AE36DC2625A7F30DABA46168A9D4F10AFB99240BB165434

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized

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by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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PTO/AIA/80 (07-17)
Approved for use through 03/31/2021. OMB 0651-0035
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Under the Paperwork Reduction Act of 1995, no person is required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

[X] Practitioners associated with Customer Number: 148468

OR

[ ] Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

[X] The address associated with Customer Number: 148468

OR

[ ]

Firm or individual name		
Address		
City	State	Zip
Country		
Telephone	Email	

Assignee name and address: Stratus Medical, LLC
32303 FM-2978, Magnolia, Texas 77354

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee.

Signature	Date 2/17/2021
Name Bret Boudousquie	Telephone (385) 707-3029
Title Chief Executive Officer	

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 18 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/126,675	**06/06/2023 05:58:17 PM ET**	**NBUS.001C1C1C1**

Title of Invention

METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	1065	FILED BY	Daniel Higgs
PATENT CENTER #	62219965	FILING DATE	12/18/2020
CUSTOMER #	148468	FIRST NAMED INVENTOR	Robert E. Wright
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
NBUS001C1C1C1_3_73_c.pdf	3	Assignee showing of ownership per 37 CFR 3.73	189 KB
NBUS001C1C1C1_POA.pdf	2	Power of Attorney	488 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
NBUS001C1C1C1_3_73_c.pdf	1C2C3F49B23327B45A90CAE88C2211290E08858FE01C03CFA4BE1FCBB7CB66BBAC5E1D0ECCDD8DD8A5D19D73796501DE761C3D4240B76953281F72C35E0EF728

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NBUS001C1C1C1_POA.pdf 3B6D43D727F53E3CC05AA131923C67044BD4E22BC5A7EEBB
80372223B931110F5B50D8FF7A709C67EB4A1F78127DC69D9D
F3A884488A8787499243CC015F2AFE

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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New International Application Filed with the USPTO as a Receiving Office

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PTO/AIA/96 (08-12)
Approved for use through 11/30/2020. OMB 0651-0031
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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Stratus Medical, LLC

Application No./Patent No.: 17/126,675 Filed/Issue Date: December 18, 2020

Titled: METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

Stratus Medical, LLC, a Utah limited liability company

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Robert E. Wright and Scott A. Brandt To: Nimbus Concepts, LLC

   The document was recorded in the United States Patent and Trademark Office at
   Reel 063846, Frame 0305, or for which a copy thereof is attached.

2. From: Nimbus Concepts, LLC To: Biomerics, LLC

   The document was recorded in the United States Patent and Trademark Office at
   Reel 063846, Frame 0362, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450**.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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PTO/AIA/96 (08-12)
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STATEMENT UNDER 37 CFR 3.73(c)

3. From: Biomerics, LLC To: Stratus Medical, LLC

The document was recorded in the United States Patent and Trademark Office at
Reel 063846, Frame 0476, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Daniel C. Higgs/	June 6, 2023
Signature	Date
Daniel C. Higgs	55,265
Printed or Typed Name	Title or Registration Number

[Page 2 of 2]

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Avanos v. Stratus
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/126,675	12/18/2020	Robert E. Wright	NBUS.001C1C1C1	1065

148468 7590 06/13/2023

Med Venture Management, LLC
299 S. Main Street
Suite 2300
Salt Lake City, UT 84111

EXAMINER	
KIM, EUN HWA	

ART UNIT	PAPER NUMBER
3794	

NOTIFICATION DATE	DELIVERY MODE
06/13/2023	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

acharlton@mvhg.legal
dhiggs@mvhg.legal

Applicant-Initiated Interview Summary	**Application No.** 17/126,675	**Applicant(s)** Wright et al.		
	Examiner EUNHWA KIM	**Art Unit** 3794	**AIA (First Inventor to File) Status** No	**Page** 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	**Title**	**Type**
EUNHWA KIM	Primary Examiner	Video Conference
Dan Higgs	Attorney of Record	
Bret Boudousquie	Inventor	

Date of Interview: 07 June 2023

Issues Discussed:

Proposed Amendment(s)

An interview was conducted to discuss the proposed claim amendment to claim 2. An agreement was reached that the proposed claim amendment overcomes the rejection of record. There was a discussion that the preamble broadens the scope of the claimed method steps since it is no longer specific to spinal nerve RF neurotomy.

The applicant intends to file a formal submission and more time for search would be required.

☑ Attachment

/EUN HWA KIM/ Primary Examiner, Art Unit 3794	

Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04
Please further see:
MPEP 713.04
Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)
37 CFR § 1.2 Business to be transacted in writing

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

Kim, Eunhwa

From: Dan Higgs <dhiggs@mvhg.legal>
Sent: Monday, June 5, 2023 1:51 PM
To: Kim, Eunhwa
Cc: Bret Boudousquie
Subject: U.S. Patent Application No. 17/126,675 - Proposed Agenda for Examiner Interview

CAUTION: This email has originated from a source outside of USPTO. **PLEASE CONSIDER THE SOURCE** before responding, clicking on links, or opening attachments.

Dear Examiner Kim:

Thank you for scheduling an interview with Bret Boudousquie and me for this Wednesday, June 7, at 1:30 p.m. (EDT) in U.S. Patent Application No. 17/126,675. With an Internet authorization form now on file in the application, we look forward to conducting the interview via a web-based videoconference.

We propose the following agenda for the interview:

1. Reintroduction to Bret Boudousquie
2. Demonstration of an illustrative embodiment of the claimed invention and discussion of the same
3. Discussion of the patent references cited in the Office Action
4. Discussion of the following proposed amended version of claim 2:

> A method ~~of performing spinal RF neurotomy in a patient, the method~~ comprising:
> moving a tip of a needle to a ~~first~~ position proximate to a target nerve within a patient, the needle comprising an elongate member and a filament in a retracted position, the tip of the needle being electrically conductive and positioned at a distal end of the elongate member ~~along the spine of the patient~~;
> ~~after achieving the first position,~~ advancing ~~a plurality of filaments~~ the filament relative to the tip of the needle from the retracted position to a deployed position; ~~and~~
> inserting a radiofrequency probe into the needle such that a distal end of the radiofrequency probe contacts the tip of the needle; and
> after the ~~advancing step~~ filament has been advanced to the deployed position and the radiofrequency probe has been inserted into the needle, applying ~~RF~~ radiofrequency energy to the radiofrequency probe such that the radiofrequency energy is conducted away from the distal end of the radiofrequency probe by the tip of the needle and the filament, with the radiofrequency probe, the tip of the needle, and the filament operating in combination as an active radiofrequency electrode to ablate at least ~~plurality of filaments, wherein said applying generates heat that ablates~~ a portion of the target nerve.

Please let me know if you have any questions. We look forward to our upcoming discussion.

Best regards,

Dan

Dan Higgs
Chief IP Counsel
(801) 703-1961

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	Filing Date	December 18, 2020
	First Named Inventor	Robert E. Wright
	Art Unit	3794
	Examiner Name	Eun Hwa Kim
	Attorney Docket Number	NBUS.001C1C1C1

U.S. PATENTS						
Examiner Initial*	Cite No.	Patent Number	Kind Code[1]	Issue Date	Inventor (37 C.F.R. § 1.98(b)(1))	Relevant Passages or Figures
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	2	RE40,279		04-29-2008	Sluijter et al.	
	3	RE40,388		06-17-2008	Gines	
	4	4011872		03-15-1977	Kamiya	
	5	4206761		06-10-1980	Cosman	
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	7	4281667		08-04-1981	Cosman	
	8	4353371		10-12-1982	Cosman	
	9	4375220		03-01-1983	Matvias	
	10	4378809		04-05-1983	Cosman	
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	45	5342292		08-30-1994	Nita et al.	
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	77	5662111		09-02-1997	Cosman	
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	173	6419653		07-16-2002	Edwards et al.	
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	180	6451018		09-17-2002	Lands et al.	
	181	6454765		09-24-2002	Leveen et al.	
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	202	6610054		08-26-2003	Edwards et al.	
	203	6622731		09-23-2003	Daniel et al.	
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	222	6706152		03-16-2004	Burazin et al.	
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	224	6743226		06-01-2004	Cosman et al.	
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	241	6958062		10-25-2005	Gough et al.	
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	673	CANADIAN INTELLECTUAL PROPERTY OFFICE, Requisition in Canadian Patent Application No. 2,799,505, dated January 29, 2021, 4 pages.	☐
	674	CANADIAN INTELLECTUAL PROPERTY OFFICE, Commissioner's Notice – Application Found Allowable in Canadian Patent Application No. 2,799,505, dated January 13, 2022, 1 page.	☐
	675	EUROPEAN PATENT OFFICE, Extended European Search Report in European Patent Application No. 18215729.7, dated September 9, 2019, 7 pages.	☐
	676	EUROPEAN PATENT OFFICE, Intention to Grant in European Patent Application No. 18215729.7, dated May 16, 2023, 205 pages.	☐
	677	EUROPEAN PATENT OFFICE, Extended European Search Report in European Patent Application No. 20181799.6, dated October 20, 2020, 8 pages.	☐
	678	INTELLECTUAL PROPERTY INDIA, Examination Report in Indian Patent Application No. 202018025757, dated June 30, 2021, 5 pages.	☐
	679	UNITED STATES PATENT AND TRADEMARK OFFICE, Applicant-Initiated Interview Summary in U.S. Patent Application No. 16/933,811 dated November 20, 2020, 3 pages.	☐
	680	UNITED STATES PATENT AND TRADEMARK OFFICE, Notice of Allowance and Examiner-Initiated Interview Summary in U.S. Patent Application No. 16/933,811 dated February 16, 2021, 10 pages.	☐

EXAMINER SIGNATURE			
Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw a line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

IPR2024-01211
Avanos v. Stratus
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application Number	17/126,675
	Filing Date	December 18, 2020
	First Named Inventor	Robert E. Wright
	Art Unit	3794
	Examiner Name	Eun Hwa Kim
	Attorney Docket Number	NBUS.001C1C1C1

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ Applicant hereby states that each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. (37 CFR 1.97(e)(1))

OR

☐ Applicant hereby states that no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in § 1.56(c) more than three months prior to the filing of the information disclosure statement. (37 CFR 1.97(e)(2))

☐ See attached certification statement.

☒ A certification statement is not submitted herewith.

☒ The fee set forth in 37 CFR 1.17(p) is submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Daniel C. Higgs/	Date (YYYY-MM-DD)	2022-06-13
Name/Print	Daniel C. Higgs	Registration Number	55,265

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Europäisches Patentamt
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European Patent Office
80298 MUNICH
GERMANY

Questions about this communication ?
Contact Customer Services at www.epo.org/contact

Adamson Jones
BioCity Nottingham
Pennyfoot Street
Nottingham NG1 1GF
ROYAUME UNI

Date
19.09.19

Reference	Application No./Patent No.
7870/2804PEPDiv	18215729.7 - 1124
Applicant/Proprietor	
Biomerics, LLC	

Communication

The extended European search report is enclosed.

The extended European search report includes, pursuant to Rule 62 EPC, the European search report (R. 61 EPC) or the partial European search report/ declaration of no search (R. 63 EPC) and the European search opinion.

Copies of documents cited in the European search report are attached.

☑ 0 additional set(s) of copies of such documents is (are) enclosed as well.

The following have been approved:

☐ Abstract ☐ Title

☑ The Abstract was modified and the definitive text is attached to this communication.

The following figure(s) will be published together with the abstract: 2A

Refund of search fee
If applicable under Article 9 Rules relating to fees, a separate communication from the Receiving Section on the refund of the search fee will be sent later.

Should you wish to further prosecute this application in the examination phase, your attention is drawn to the provisions of Rule 70a EPC. An invitation to respond to the extended European search report will be issued once the date of publication of the European search report has been mentioned in the European Patent Bulletin (R. 69(1), R. 70(2) EPC).

Europäisches Patentamt • European Patent Office • Office européen des brevets

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The examination is being carried out on the **following application documents**

Description, Pages

1-74 as originally filed

Claims, Numbers

1-15 filed in electronic form on 12-04-2019

Drawings, Sheets

1/19-19/19 as originally filed

1 PRIOR ART

1.1 Reference is made to the following documents; the numbering will be adhered to in the rest of the procedure.

D1 US 2004/158239 A1 (BEHL ROBERT S [US] ET AL) 12 August 2004 (2004-08-12)

D2 US 2007/112340 A1 (THOMAS SIMON W [US] ET AL) 17 May 2007 (2007-05-17)

D3 US 2008/161804 A1 (RIOUX ROBERT F [US] ET AL) 3 July 2008 (2008-07-03)

D4 US 2008/249392 A1 (MEST ROBERT A [US]) 9 October 2008 (2008-10-09)

D5 US 2008/269558 A1 (YAHAGI NAOHISA [JP] ET AL) 30 October 2008 (2008-10-30)

2 ARTICLE 76 EPC

2.1 The present application is a divisional application in the sense of Article 76 EPC of the earlier European patent application No. 10 829 203.8 ("parent application").

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2.2 The amendments filed for the present divisional application introduce subject-matter which extends beyond the content of the parent application as filed, contrary to Article 76(1) EPC. The amendments concerned are:

2.2.1 The deletion of the feature "[a tip (201, 201', 201", 311)] fixed to the elongate member [at a distal end (202, 310) of the needle (103, 103', 309)]" from **claim 1**.
In the parent application as filed (see e.g. claim 1) the tip appears to be only disclosed as being fixed to the elongate member at a distal end of the needle. No support can be found for the deletion of this feature, resulting in the subject-matter of **claim 1** to extend beyond the content of the parent application as filed.

2.2.2 The deletion of the features "[wherein the slide member (236) includes one of a key and a mating key slot (237)] on an external surface thereof" and "[wherein the hub (204, 231) includes a corresponding other one of the key and mating key slot (237)] on an internal surface thereof" from **claim 2**.
In the parent application as filed (see e.g. claim 17) the one of a key and a mating key slot appears to be only disclosed as being included on an external surface of the slide member and the corresponding other one of the key and mating key slot appears to be only disclosed as being included on an internal surface of the hub. No support can be found for the deletion of these features, resulting in the subject-matter of **claim 2** to extend beyond the content of the parent application as filed.

2.2.3 The broadening of the feature "[while rotational motion of the actuator is not transmitted to] the slide member and the hub" to "[while rotational motion of the actuator is not transmitted to] either the slide member or the hub" in **claim 4**.
In the parent application as filed (see e.g. description on p. 28 (ll. 26-28)) the rotational motion of the actuator appears to be only disclosed as being not transmitted to the slide member and the hub. No support can be found for the broadening of this feature, resulting in the subject-matter of **claim 4** to extend beyond the content of the parent application as filed.

2.2.4 The deletion of the feature "[a projection of the hub (204, 231)] projecting from the proximal end of the hub" from **claim 5**.
In the parent application as filed (see e.g. description on p. 28 (ll. 7-10)) the projection of the hub appears to be only disclosed as projecting from the proximal end of the hub. No support can be found for the deletion of this feature, resulting in the subject-matter of **claim 5** to extend beyond the content of the parent application as filed.

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2.2.5 The deletion of the feature "a Luer fitting (220, 243) included in the slide member in fluid communication with the lumen (222)" from **claim 8**.
In the parent application as filed (see e.g. description on p. 29 (ll. 2-8)) the fitting appears to be only disclosed as a Luer fitting included in the slide member. No support can be found for the deletion of this feature, resulting in the subject-matter of **claim 8** to extend beyond the content of the parent application as filed.

2.2.6 The deletion of the feature "three equally distributed filaments" from **claim 12**.
In the parent application as filed (see e.g. description on p. 19 (ll. 7-16)) the three filaments appear to be only disclosed as being equally distributed. No support can be found for the deletion of this feature, resulting in the subject-matter of **claim 12** to extend beyond the content of the parent application as filed.

3 CLAIMS 1-15

3.1 Notwithstanding the objections mentioned in section 2, the applicant's attention is drawn to documents **D1-D5**, which appear to become relevant in the further proceedings once a set of claims is available that fulfills the requirements of Article 76 EPC.

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Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 18 21 5729

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2004/158239 A1 (BEHL ROBERT S [US] ET AL) 12 August 2004 (2004-08-12) * the whole document *	1-15	INV. A61B18/14
A	US 2007/112340 A1 (THOMAS SIMON W [US] ET AL) 17 May 2007 (2007-05-17) * the whole document *	1-15	
A	US 2008/161804 A1 (RIOUX ROBERT F [US] ET AL) 3 July 2008 (2008-07-03) * the whole document *	1-15	
A	US 2008/249392 A1 (MEST ROBERT A [US]) 9 October 2008 (2008-10-09) * the whole document *	1-15	
A	US 2008/269558 A1 (YAHAGI NAOHISA [JP] ET AL) 30 October 2008 (2008-10-30) * the whole document *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC) A61B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	6 September 2019	Smit, Jos

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

2

EPO FORM 1503 03.82 (P04C01)

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 18 21 5729

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

06-09-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004158239 A1	12-08-2004	AU 9265501 A	26-03-2002
		CA 2421795 A1	21-03-2002
		EP 1328206 A1	23-07-2003
		JP 4846964 B2	28-12-2011
		JP 2004508131 A	18-03-2004
		US 7387628 B1	17-06-2008
		US 2004158239 A1	12-08-2004
		US 2008255633 A1	16-10-2008
		US 2012016357 A1	19-01-2012
		US 2012271302 A1	25-10-2012
		WO 0222032 A1	21-03-2002
US 2007112340 A1	17-05-2007	AU 2003252067 A1	16-02-2004
		CA 2493731 A1	05-02-2004
		EP 1534160 A2	01-06-2005
		JP 4387303 B2	16-12-2009
		JP 2005533605 A	10-11-2005
		JP 2009297527 A	24-12-2009
		US 2003181897 A1	25-09-2003
		US 2007112340 A1	17-05-2007
		US 2012197247 A1	02-08-2012
		US 2013282006 A1	24-10-2013
		WO 2004010843 A2	05-02-2004
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		EP 2097029 A1	09-09-2009
		JP 2010514509 A	06-05-2010
		US 2008161804 A1	03-07-2008
		WO 2008083044 A1	10-07-2008
US 2008249392 A1	09-10-2008	DE 602004008852 T2	19-06-2008
		EP 1525855 A1	27-04-2005
		JP 4526920 B2	18-08-2010
		JP 2005137898 A	02-06-2005
		US 2005090728 A1	28-04-2005
		US 2006106377 A1	18-05-2006
		US 2008249392 A1	09-10-2008
US 2008269558 A1	30-10-2008	CN 101292900 A	29-10-2008
		CN 201168049 Y	24-12-2008
		EP 1985250 A2	29-10-2008
		JP 5048391 B2	17-10-2012
		JP 2008272204 A	13-11-2008
		KR 20080096436 A	30-10-2008
		US 2008269558 A1	30-10-2008

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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Information on Search Strategy - Pilot phase (see OJ 2015, A86)
The type of information contained in this sheet may change during the pilot for improving the usefulness of this new service.

Application Number
EP 18 21 5729

TITLE: SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

APPLICANT: Biomerics, LLC

IPC CLASSIFICATION: A61B18/14

EXAMINER: Smit, Jos

CONSULTED DATABASES: EPODOC, XFULL, WPI

CLASSIFICATION SYMBOLS DEFINING EXTENT OF THE SEARCH:

IPC:

CPC: A61B18/1477, A61B18/00

FI/F-TERMS:

KEYWORDS OR OTHER ELEMENTS FEATURING THE INVENTION:
RF ablation, needle, hub, elongate member, tip, plurality of filaments, actuator, slide member, rotation, retracted position, deployed position, lumen, RF probe, single monopolar RF electrode.

EPO FORM P04A42

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	Robert E. Wright	
Application No.:	17/126,675	Art Unit: 3794
Filing Date:	December 18, 2020	
Title:	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY	
Examiner:	Eun Hwa Kim	
Confirmation No.:	1065	
Customer No.:	148468	

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Submitted herewith is an equivalent of Form PTO/SB/08a that lists 680 references for consideration by the Examiner with respect to the above-identified patent application.

634 of the 680 Identified References Likely Already Considered by the Examiner

In view of MPEP § 609.02(II)(2), the Applicant notes that the Examiner likely has already considered 634 of the 680 references identified in the accompanying information disclosure statement with respect to the present application. In particular, the references identified below were considered by the Examiner in the parent of the

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present application—that is, in U.S. Patent Application No. 16/933,995, which issued as U.S. Patent No. 10,925,664:

- U.S. Patents: Reference Nos. 1-351
- U.S. Patent Application Publications: Reference Nos. 354-486
- Foreign Patent Documents: Reference Nos. 488-526
- Non-Patent Literature Documents: Reference Nos. 536-646

Further, as indicated in MPEP § 609.02(II)(2), "[t]he examiner will consider information which has been considered by the Office in a parent application . . . when examining: (A) a continuation application filed under 37 CFR 1.53(b)." The Applicant respectfully submits that the present application satisfies these necessary conditions with respect to reference numbers 1-351, 354-486, 488-526, and 536-646.

Copies of Some Foreign Patent and NPL Documents Not Submitted

Pursuant to 37 C.F.R. § 1.98(d), copies of Foreign Patent Document Cite Nos. 488-526 and Non-Patent Literature Document Cite Nos. 536-646 on the accompanying form are not submitted herewith, as these were previously properly submitted in information disclosure statements and considered by the Office in prior applications (specifically, U.S. Patent Application Nos. 16/933,995; 15/098,673; and 12/940,974) upon which the present application relies for an earlier effective filing date under 35 U.S.C. § 120.

Table of U.S. Patent Applications

The Applicant provides the following table to aid the Examiner during prosecution:

Attorney Docket No.	Application No.	Filing Date	Title
NBUS.001A	12/940,974	2010-11-05	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY
NBUS.001C1	15/098,673	2016-04-14	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY
NBUS.001C1C1	16/933,995 ***(the Parent Application)***	2020-07-20	METHODS FOR RADIO FREQUENCY NEUROTOMY
NBUS.001C1C1C1	*17/126,675* ***(the Present Application)***	2020-12-18	METHODS AND SYSTMES FOR SPINAL RADIO FREQUENCY NEUROTOMY
NBUS.004A	13/101,009	2011-05-04	SYSTEMS AND METHODS FOR TISSUE ABLATION
NBUS.004C1	15/092,945	2016-04-07	SYSTEMS AND METHODS FOR TISSUE ABLATION
NBUS.004C1C1	16/933,811	2020-07-20	NEEDLES AND SYSTEMS FOR RADIOFREQUENCY NEUROTOMY
NBUS.004C1C1C1	17/190,224	2021-03-02	DEVICES AND METHODS FOR RADIOFREQUENCY NEUROTOMY

Copies of these patent applications, including any pending claims, office actions, notices of allowance, and/or other communications, are available through one or more USPTO databases accessible by the Examiner. However, if the Examiner so requests, the Applicant will be happy to provide the Examiner with copies of any applications, pending claims, office actions, notices of allowance, communications, or any other documents, at any time.

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Stratus Ex. 2013

DATED this 13th day of June, 2023.

Respectfully submitted,

/Daniel C. Higgs/

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UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/126,675	06/13/2023 12:04:40 PM ET	NBUS.001C1C1C1

Title of Invention

METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	1065	FILED BY	Daniel Higgs
PATENT CENTER #	62256865	AUTHORIZED BY	-
CUSTOMER #	148468	FILING DATE	12/18/2020
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Robert E. Wright

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 0751	E20236CC07078419	Daniel Higgs

PRE-AUTHORIZED ACCOUNT	PRE-AUTHORIZED CATEGORY
602176	37 CFR 1.16 (National application filing, search, and examination fees); 37 CFR 1.17 (Patent application and reexamination processing fees); 37 CFR 1.19 (Document supply fees); 37 CFR 1.20 (Post Issuance fees); 37 CFR 1.21 (Miscellaneous fees and charges)

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
2806	SUBMISSION OF AN INFORMATION DISCLOSURE STATEMENT	104.00	1	104.00
			TOTAL AMOUNT:	$104.00

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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Avanos v. Stratus
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If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/126,675	**06/13/2023 12:04:40 PM ET**	**NBUS.001C1C1C1**

Title of Invention

METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	1065	FILED BY	Daniel Higgs
PATENT CENTER #	62256865	FILING DATE	12/18/2020
CUSTOMER #	148468	FIRST NAMED INVENTOR	Robert E. Wright
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 45

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
NBUS001C1C1C1_Comments.pdf	4	Transmittal Letter	124 KB
NBUS001C1C1C1_IDS1.pdf	26	Information Disclosure Statement (IDS) Form (SB08)	271 KB
Warning: This is not a USPTO supplied IDS fillable form. Data in the form cannot be automatically loaded to other USPTO systems.			
BR1120120101994.pdf	95	Foreign Reference	1440 KB
CA2778997C.pdf	79	Foreign Reference	5865 KB
CA2799505C.pdf	133	Foreign Reference	8371 KB

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BR1120120292633.pdf	157	Foreign Reference	16011 KB
IN338591.pdf	1	Foreign Reference	473 KB
IN371638.pdf	1	Foreign Reference	652 KB
EP3750501A1.pdf	79	Foreign Reference	1105 KB
EP2496166B1.pdf	44	Foreign Reference	2395 KB
EP3556308A1.pdf	51	Foreign Reference	2950 KB
Matheson_Amended_Defence_2021_04_07.pdf	4	Non Patent Literature	119 KB
Matheson_Interlocutory_Application_2021_05_28.pdf	5	Non Patent Literature	326 KB
Matheson_Affidavit_2021_05_28.pdf	40	Non Patent Literature	948 KB
Russo_Affidavit_2021_04_15.pdf	6	Non Patent Literature	150 KB
Hunter_Affidavit_2021_04_15.pdf	7	Non Patent Literature	140 KB
Nicholas_Order_2021_06_01.pdf	5	Non Patent Literature	212 KB
Darmos_Opposition_2021_06_11.pdf	4	Non Patent Literature	276 KB
Darmos_Reply_to_Amended_Defence_2021_06_18.pdf	3	Non Patent Literature	275 KB
Daniel_Affidavit_2021_07_14.pdf	16	Non Patent Literature	413 KB
Gavrilov_Affidavit_2021_07_	47	Non Patent Literature	7296 KB

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14.pdf			
Dimitriadis_Note_2021_08_12.pdf	3	Non Patent Literature	264 KB
Cochrane_Note_2021_08_12.pdf	5	Non Patent Literature	300 KB
Transcript_2021_08_13.pdf	26	Non Patent Literature	215 KB
Nicholas_Order_2021_08_16.pdf	5	Non Patent Literature	211 KB
Hunter_Affidavit_2021_09_10.pdf	61	Non Patent Literature	3490 KB
Russo_Affidavit_2021_09_10.pdf	61	Non Patent Literature	3496 KB
Vilims_Affidavit_2021_09_19.pdf	63	Non Patent Literature	3600 KB
Nicholas_Orders_2021_10_28.pdf	6	Non Patent Literature	181 KB
NBUS001AU1D1D1D1_Examination_Report.pdf	3	Non Patent Literature	146 KB
NBUS001AU1D1D1D1D1_Examination_Report.pdf	7	Non Patent Literature	326 KB
NBUS001AU1D1D1D1D1_Acceptance.pdf	27	Non Patent Literature	17020 KB
NBUS001BR1_Office Action.pdf	8	Non Patent Literature	179 KB
NBUS001BR1_NOA.pdf	4	Non Patent Literature	179 KB
NBUS004BR1_OA.pdf	7	Non Patent Literature	153 KB

NBUS004BR1_NOA.pdf	4	Non Patent Literature	179 KB
NBUS001CA1_NOA.pdf	1	Non Patent Literature	82 KB
NBUS004CA1_OA.pdf	4	Non Patent Literature	315 KB
NBUS004CA1_NOA.pdf	1	Non Patent Literature	1575 KB
NBUS004EP1D1_Search_Report.pdf	8	Non Patent Literature	231 KB
NBUS001EP1D1_Search_Report.pdf	7	Non Patent Literature	223 KB
NBUS001EP1D1_Intention_to_Grant.pdf	205	Non Patent Literature	7848 KB
NBUS004IN1_Examination_Report.pdf	5	Non Patent Literature	567 KB
NBUS004US1C1C1_Exr_Int_Sum.pdf	3	Non Patent Literature	107 KB
NBUS004US1C1C1_NOA_and_Exr_Int_Sum.pdf	10	Non Patent Literature	575 KB

Digest

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Matheson_Interlocutory_Application_2021_05_28.pdf	BBD7F771A333A26B4A139A98AE6F8769509EA5EB0463B9B63C24DF2A491FA421A29075498229D8305172DD52CECB7669CCF1B37F3F3C5723E9152186B15E2FB7
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Darmos_Opposition_2021_06_11.pdf	198B70225E1722F9814C7FDC2F6B307AF3BB4707129EF9B17BBABDAFEAB1A6F9CD8E7096A14BBDA7291F1337538970E1197E860F1847339E9BA3B270D90450F4
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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application Number	17/126,675
	Filing Date	December 18, 2020
	First Named Inventor	Robert E. Wright
	Art Unit	3794
	Examiner Name	Eun Hwa Kim
	Attorney Docket Number	NBUS.001C1C1C1

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Examiner Initial*	Cite No.	Patent Number	Kind Code[1]	Issue Date	Inventor (37 C.F.R. § 1.98(b)(1))	Relevant Passages or Figures
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application Number	17/126,675
	Filing Date	December 18, 2020
	First Named Inventor	Robert E. Wright
	Art Unit	3794
	Examiner Name	Eun Hwa Kim
	Attorney Docket Number	NBUS.001C1C1C1

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initial*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	630	IP AUSTRALIA, Examination Report No. 1 for Standard Patent Application for Australian Patent Application No. 2019200358, dated 20 April 2020, 3 pages.	☐
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application Number	17/126,675
	Filing Date	December 18, 2020
	First Named Inventor	Robert E. Wright
	Art Unit	3794
	Examiner Name	Eun Hwa Kim
	Attorney Docket Number	NBUS.001C1C1C1

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	650	MARC ANDREW RUSSO, Affidavit Submitted in Federal Court of Australia Case No. NSD 438 of 2019, dated April 15, 2021, 6 pages.	☐
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application Number	17/126,675
	Filing Date	December 18, 2020
	First Named Inventor	Robert E. Wright
	Art Unit	3794
	Examiner Name	Eun Hwa Kim
	Attorney Docket Number	NBUS.001C1C1C1

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EXAMINER SIGNATURE			
Examiner Signature		Date Considered	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application Number	17/126,675
	Filing Date	December 18, 2020
	First Named Inventor	Robert E. Wright
	Art Unit	3794
	Examiner Name	Eun Hwa Kim
	Attorney Docket Number	NBUS.001C1C1C1

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ Applicant hereby states that each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. (37 CFR 1.97(e)(1))

OR

☐ Applicant hereby states that no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in § 1.56(c) more than three months prior to the filing of the information disclosure statement. (37 CFR 1.97(e)(2))

☐ See attached certification statement.

☒ A certification statement is not submitted herewith.

☒ The fee set forth in 37 CFR 1.17(p) is submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Daniel C. Higgs/	Date (YYYY-MM-DD)	2023-06-13
Name/Print	Daniel C. Higgs	Registration Number	55,265

IPR2024-01211
Avanos v. Stratus
Stratus Ex. 2013

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/126,675	**06/13/2023 12:25:14 PM ET**	**NBUS.001C1C1C1**

Title of Invention

METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	1065	FILED BY	Daniel Higgs
PATENT CENTER #	62258755	FILING DATE	12/18/2020
CUSTOMER #	148468	FIRST NAMED INVENTOR	Robert E. Wright
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
NBUS001C1C1C1_Comments_Resubmission.pdf	2	Transmittal Letter	60 KB
NBUS001C1C1C1_IDS1_Resubmission.pdf	26	Information Disclosure Statement (IDS) Form (SB08)	271 KB

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National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

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IPR2024-01211
Avanos v. Stratus
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	Robert E. Wright	)	
Application No.:	17/126,675	)	Art Unit: 3794
Filing Date:	December 18, 2020	)	
Title:	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY	)	
Examiner:	Eun Hwa Kim	)	
Confirmation No.:	1065	)	
Customer No.:	148468	)	

RESUBMISSION OF FORM PTO/SB/08A EQUIVALENT

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P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Submitted herewith is replacement of the equivalent to the Form PTO/SB/08a that was filed moments ago. Immediately after filing was complete, it was determined that this form, as originally submitted, included a typographical error in the submission date (i.e., 2022-06-13 rather than 2023-06-13). Please replace the prior form with the form that is submitted herewith, to the extent necessary.

IPR2024-01211
Avanos v. Stratus
Stratus Ex. 2013

DATED this 13th day of June, 2023.

Respectfully submitted,

/Daniel C. Higgs/

Daniel C. Higgs
Attorney for Applicant
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Avanos v. Stratus
Stratus Ex. 2013

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/126,675	12/18/2020	Robert E. Wright	NBUS.001C1C1C1

CONFIRMATION NO. 1065

148468
Med Venture Management, LLC
299 S. Main Street
Suite 2300
Salt Lake City, UT 84111

POA ACCEPTANCE LETTER

OC000000058208826

Date Mailed: 06/14/2023

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/06/2023.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/hsarwari/

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/126,675	**06/14/2023 11:33:13 AM ET**	**NBUS.001C1C1C1**

Title of Invention

METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	1065	FILED BY	Daniel Higgs
PATENT CENTER #	62267500	FILING DATE	12/18/2020
CUSTOMER #	148468	FIRST NAMED INVENTOR	Robert E. Wright
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
petition-request.pdf	3	Terminal Disclaimer-Filed (Electronic)	48 KB
grantLetter.pdf	1	Terminal Disclaimer-Electronic-Approved	19 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
petition-request.pdf	97DE686B1F31112C4A12A775FA99AAE914E5D1370FFCAD4AF 9F86EA913A0436D9FCA52EE8ADBCB93203DD8A28CB18A49A

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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/126,675	06/14/2023 11:33:13 AM ET	NBUS.001C1C1C1

Title of Invention

METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	1065	FILED BY	Daniel Higgs
PATENT CENTER #	62267500	AUTHORIZED BY	-
CUSTOMER #	148468	FILING DATE	12/18/2020
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Robert E. Wright

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 0751	E20236DB33539822	Daniel Higgs

PRE-AUTHORIZED ACCOUNT	PRE-AUTHORIZED CATEGORY
602176	37 CFR 1.16 (National application filing, search, and examination fees); 37 CFR 1.17 (Patent application and reexamination processing fees); 37 CFR 1.19 (Document supply fees); 37 CFR 1.20 (Post Issuance fees); 37 CFR 1.21 (Miscellaneous fees and charges)

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
2814	STATUTORY DISCLAIMER, INCLUDING TERMINAL DISCLAIMER	170.00	1	170.00
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APPROVAL LETTER

APPLICATION #	FILING DATE	APPLICANT/PATENT UNDER REEXAMINATION
17/126,675	12/18/2020	Robert Wright

Title of Invention

METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

Electronic terminal disclaimer filed on 06/14/2023

☑ Approved

This patent is subject to a Terminal Disclaimer

Approved / Disapproved by: Electronic Terminal Disclaimer automatically approved

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TERMINAL DISCLAIMER TO OBVIATE A PROVISIONAL DOUBLE PATENTING REJECTION OVER A PENDING "REFERENCE" APPLICATION

APPLICATION #	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET #
17126675	12/18/2020	Robert Wright	NBUS.001C1C1C1

Title of Invention

METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

☑ Filing of terminal disclaimer does not obviate requirement for response under 37 CFR 1.111 to outstanding Office Action

☑ This electronic Terminal Disclaimer is not being used for a Joint Research Agreement.

Owner	Percent interest
STRATUS MEDICAL, LLC	100%
Total	100%

The owner(s) of percent interest listed above in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of any patent granted on pending reference Application Number(s)

Application #	Filing Date

as the term of any patent granted on said reference application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending reference application. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and any patent granted on the reference application are commonly owned. This agreement runs with any patent granted on the

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instant application and is binding upon the grantee, its successors or assigns.
In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term of any patent granted on said reference application, "as the term of any patent granted on said reference application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending reference application," in the event that any such patent granted on the pending reference application: expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321, has all claims canceled by a reexamination certificate, is reissued, or is in any manner terminated prior to the expiration of its full statutory term as shortened by any terminal disclaimer filed prior to its grant.

The owner(s) of percent interest listed above in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of prior patent number(s)

Patent #
10925664

as the term of said prior patent is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patent are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.
In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the prior patent, "as the term of said prior patent is presently shortened by any terminal disclaimer," in the event that said prior patent later:
- expires for failure to pay a maintenance fee;
- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
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Terminal disclaimer fee under 37 CFR 1.20(d) included with Electronic Terminal Disclaimer request.

Applicant claims the following entity status:
Small

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I hereby declare that all statements made herein of my own knowledge are true and that all statemnts made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I certify, in accordance with 37 CFR 1.4(d)(4) that I am: An attorney or agent registered to practice before the Patent and Trademark Office who is of record in this application

Signature	Name	Registration #
/Daniel C. Higgs/	Daniel Higgs	55265

* Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner). Form PTO/SB/96 may be used for making this certification. See MPEP 324.

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PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 17/126,675	Filing Date 12/18/2020	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $240 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	06/16/2023	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 28	Minus	** 20	= 8		x $40 =	320
	Independent (37 CFR 1.16(h))	* 1	Minus	*** 3	= 0		x $192 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	320

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/ZURIASHWORK ZENEBE/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/126,675	**06/16/2023 02:59:18 PM ET**	**NBUS.001C1C1C1**

Title of Invention

METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	1065	FILED BY	Daniel Higgs
PATENT CENTER #	62287291	AUTHORIZED BY	-
CUSTOMER #	148468	FILING DATE	12/18/2020
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Robert E. Wright

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 0751	E20236FF00208462	Daniel Higgs

PRE-AUTHORIZED ACCOUNT	PRE-AUTHORIZED CATEGORY
602176	37 CFR 1.16 (National application filing, search, and examination fees); 37 CFR 1.17 (Patent application and reexamination processing fees); 37 CFR 1.19 (Document supply fees); 37 CFR 1.20 (Post Issuance fees); 37 CFR 1.21 (Miscellaneous fees and charges)

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
2253	EXTENSION FOR RESPONSE WITHIN THIRD MONTH -	592.00	1	592.00
2202	EACH CLAIM IN EXCESS OF 20	40.00	8	320.00
			TOTAL AMOUNT:	**$912.00**

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as

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described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/126,675	**06/16/2023 02:59:18 PM ET**	**NBUS.001C1C1C1**

Title of Invention

METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

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CONFIRMATION #	1065	FILED BY	Daniel Higgs
PATENT CENTER #	62287291	FILING DATE	12/18/2020
CUSTOMER #	148468	FIRST NAMED INVENTOR	Robert E. Wright
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 5

DOCUMENT		PAGES	DESCRIPTION	SIZE (KB)
NBUS001C1C1C1_Extension.pdf		2	Extension of Time	351 KB
NBUS001C1C1C1_RTOA.pdf		13	-	121 KB
NBUS001C1C1C1_RTOA-A....pdf	(1-1)	1	Amendment/Request for Reconsideration-After Non-Final Rejection	80 KB
NBUS001C1C1C1_RTOA-CLM.pdf	(2-7)	6	Claims	90 KB
NBUS001C1C1C1_RTOA-INTRVIEW.APP.pdf	(8-9)	2	Applicant summary of interview with examiner	94 KB

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NBUS001C1C1C1_RTOA-REM.pdf	(10-13)	4	Applicant Arguments/Remarks Made in an Amendment	99 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
NBUS001C1C1C1_Extension.pdf	4A44BAB0D6DAED4FA8EA6CAAD9FCA8FF619AE939D3091A19CC27C3B129791576D8FF153599F4162E0C58D5DC038F0AEF1E7A041A21FB294FA699C96683C70BEF
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NBUS001C1C1C1_RTOA-REM.pdf	80C6E27C208D3F1330CDF07B33BC5F7E3FD006CE6B1A1C36A5C88B7DFE4118072B1B848BB36F75FE202592EAB7A529F19D81ABA73767B5857A88CE3F93100C27

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New Applications Under 35 U.S.C. 111

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National Stage of an International Application under 35 U.S.C. 371

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New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	Robert E. Wright	)	
Application No.:	17/126,675	)	Art Unit: 3794
Filing Date:	December 18, 2020	)	
Title:	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY	)	
Examiner:	Eun Hwa Kim	)	
Confirmation No.:	1065	)	
Customer No.:	148468	)	

AMENDMENT AND RESPONSE TO OFFICE ACTION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Responsive to the Office Action dated December 22, 2022, in the above-identified application, the Applicant respectfully requests reconsideration of the pending claims in view of the amendments and remarks herein.

Amendments to the Claims begin on page 2.

Summary of the Interview begins on page 8.

Remarks begin on page 10.

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Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Cancelled)

2. (Currently Amended) A method of performing spinal ~~RF~~ radiofrequency neurotomy in a patient, the method comprising:

moving a tip of a needle to a ~~first~~ position proximate to a target nerve within the patient, the needle comprising an elongate member and a filament in a retracted position, the tip of the needle being electrically conductive and positioned at a distal end of the elongate member ~~along the spine of the patient~~;

~~after achieving the first position,~~ advancing ~~a plurality of filaments~~ the filament relative to the tip of the needle from the retracted position to a deployed position; ~~and~~

inserting a radiofrequency probe into the needle such that a distal end of the radiofrequency probe contacts the tip of the needle; and

after the ~~advancing step~~ filament has been advanced to the deployed position and the radiofrequency probe has been inserted into the needle, applying ~~RF~~ radiofrequency energy to the radiofrequency probe such that the radiofrequency energy is conducted away from the distal end of the radiofrequency probe by the tip of the needle and the filament, with the radiofrequency probe, the tip of the needle, and the filament operating in combination as an active radiofrequency electrode to ablate at least ~~plurality of filaments, wherein said applying generates heat that ablates~~ a portion of the target nerve.

3. (Currently Amended) ~~A method of performing spinal RF neurotomy in a patient as recited in~~ The method of Claim 2, wherein said inserting the radiofrequency probe into the needle takes place after said advancing the filament relative to the tip of the needle ~~the first position is proximate to the target nerve~~.

4. (Currently Amended) ~~A method of performing spinal RF neurotomy in a patient as recited in~~ The method of Claim 2, wherein the target nerve is a medial branch nerve.

5. (Currently Amended) ~~A method of performing spinal RF neurotomy in a patient as recited in~~ The method of Claim 2, wherein the target nerve is a posterior rami proximate the sacrum.

6. (Currently Amended) ~~A method of performing spinal RF neurotomy in a patient as recited in~~ The method of Claim 2, further comprising piercing skin of the patient with the tip of the needle.

7. (Currently Amended) ~~A method of performing spinal RF neurotomy in a patient as recited in~~ The method of Claim 2, wherein said moving the tip of the needle comprises advancing the needle through tissue of the patient ~~further comprising: imaging the tip of the needle during the moving step~~.

8. (Currently Amended) ~~A method of performing spinal RF neurotomy in a patient as recited in~~ The method of Claim 2, further comprising imaging the tip of the needle to verify the position of the tip of the needle relative to the target nerve.

9. (Currently Amended) ~~A method of performing spinal RF neurotomy in a patient as recited in~~ The method of Claim 8, further comprising:

repositioning the tip of the needle in response to ~~the~~ said imaging ~~step~~ and prior to said moving ~~the advancing step~~.

10. (Currently Amended) ~~A method of performing spinal RF neurotomy in a patient as recited in Claim 8, wherein the imaging is fluoroscopic~~ The method of Claim 2, wherein said advancing the filament comprises deflecting the filament radially outwardly relative to a central longitudinal axis of the needle.

11. (Currently Amended) ~~A method of performing spinal RF neurotomy in a patient as recited in~~ The method of Claim 2, further comprising:

rotating the needle about a central longitudinal axis of the needle to position the tip of the needle in a predetermined orientation relative to the target nerve.

12. (Currently Amended) ~~A method of performing spinal RF neurotomy in a patient as recited in~~ The method of Claim 11, wherein said rotating occurs after ~~the~~ said moving ~~step~~ and prior to ~~the~~ said advancing ~~step~~.

13. (Currently Amended) ~~A method of performing spinal RF neurotomy in a patient as recited in~~ The method of Claim 2, wherein ~~advancement of~~ said advancing comprises moving a distal end of the filament ~~each of the plurality of filaments relative to the tip is~~ along a curved path.

14. (Currently Amended) ~~A method of performing spinal RF neurotomy in a patient as recited in~~ The method of Claim 2, wherein the filament is one of ~~plurality of filaments consists of~~ a first filament and a second filament, wherein the needle contains no filaments other than the ~~plurality of~~ first and second filaments, and wherein ~~the~~ said advancing ~~step~~ comprises:

advancing the ~~plurality of~~ first and second filaments such that ~~when the first and second filaments are in their respective deployed positions,~~ a midpoint

between a distal end of the first filament and a distal end of the second filament is offset from a central longitudinal axis of the needle ~~elongate member~~.

15. (Currently Amended) ~~A method of performing spinal RF neurotomy in a patient as recited in~~ The method of Claim 14, wherein in the deployed position, the distal ends ~~of all~~ of the first and second filaments are positioned distally to the tip.

16. (Cancelled)

17. (Currently Amended) ~~A method of performing spinal RF neurotomy in a patient as recited in~~ The method of Claim 2, wherein the filament is one of a plurality of filaments ~~a central longitudinal axis of the needle is disposed entirely within a central plane of the needle, wherein the advancing step comprises: advancing the plurality of filaments such that when the plurality of filaments are in their respective deployed positions, the distal ends of all of the filaments are disposed on a common side of the central plane~~.

18. (Currently Amended) ~~A method of performing spinal RF neurotomy in a patient as recited in~~ The method of Claim 17, wherein in the deployed position, the distal ~~ends of all of the filaments are positioned~~ end of the filament is positioned distally to the tip of the needle.

19. (Cancelled)

20. (Cancelled)

21. (Cancelled)

22. (New) The method of Claim 2, wherein:

the filament is one of a plurality of filaments; and

in said applying radiofrequency energy to the radiofrequency probe, the radiofrequency energy is conducted away from the distal end of the radiofrequency probe by the tip of the needle and the plurality of filaments such that the radiofrequency probe, the tip of the needle, and the plurality of filaments operate in combination as the active radiofrequency electrode.

23. (New) The method of Claim 22, wherein the needle further comprises a return electrode, and wherein the method further comprises operating the active radiofrequency electrode and the return electrode in a bipolar mode in which a circuit comprises the active radiofrequency electrode and the return electrode.

24. (New) The method of Claim 22, further comprising:

attaching a return electrode pad to the patient; and

operating the active radiofrequency electrode in a monopolar mode in which a circuit comprises the active radiofrequency electrode and the return electrode pad.

25. (New) The method of Claim 2, further comprising advancing the needle such that the tip of the needle is in contact with bone.

26. (New) The method of Claim 2, wherein the target nerve is positioned along the spine of the patient.

27. (New) The method of Claim 2, wherein the tip comprises a channel, and wherein said inserting the radiofrequency probe into the needle comprises inserting the distal end of the radiofrequency probe into the channel.

28. (New) The method of Claim 2, wherein:

the needle comprises a connector configured to couple with a fluid source; and

said inserting the radiofrequency probe into the needle comprises inserting the radiofrequency probe through the connector.

29. (New) The method of Claim 28, wherein the connector comprises a Luer fitting, and wherein the method further comprises delivering fluid into the needle through the Luer fitting and from the needle into the patient at a distal end of the needle.

30. (New) The method of Claim 29, wherein said delivering fluid takes place before said inserting the radiofrequency probe into the needle.

31. (New) The method of Claim 2, wherein:

the tip of the needle defines a filament slot that comprises a transition region, and

said advancing the filament relative to the tip of the needle comprises advancing the filament distally within the filament slot and deflecting outwardly the filament via the transition region.

32. (New) The method of Claim 2, wherein the filament is at least partially disposed within the elongate member when in the retracted position.

33. (New) The method of Claim 2, wherein the tip comprises an element formed separately from and attached to the elongate member.

Summary of the Interview

The Applicant thanks Examiner Eun Hwa Kim for the courtesy extended to Bret Boudousquie and Daniel C. Higgs in the web-based videoconference interview ("the Interview") conducted on June 7, 2023. The Applicant agrees with the substance of the Applicant-Initiated Interview Summary that issued with respect to the Interview on June 13, 2023.

Exhibit/Demonstration

A needle consistent with embodiments of the disclosure of the present application was briefly shown and discussed.

Claims Discussed

Claim 2 as amended herein was discussed.

References Discussed

The references discussed in the interview are as follows: U.S. Patent Application Publication No. 2006/0200121 of Mowery, U.S. Patent Application Publication No. 2006/0095029 of Young, U.S. Patent Application Publication No. 2006/0106376 of Godara et al., and U.S. Patent Application Publication No. 2004/0199179 of Elliott.

Principal Proposed Amendments

The amendments to claim 2 presented herein were discussed.

Principal Arguments

The Applicant argued that claim 2, as amended herein, is patentable over the references cited in the Office Action for at least the reason that these reference fail to teach or render obvious each and every limitation of the amended claim, *e.g.*, in combination with the other recited limitations.

Other Pertinent Matters Discussed

None.

Results

The Applicant thanks Examiner Kim for the productive discussion of the Office Action and the proposed amendments to claim 2. Agreement was reached that the amendments presented herein overcome the rejections of record.

Remarks

This paper is submitted in response to the Office Action mailed December 22, 2022. Claims 2-21 were pending in the Application and stand rejected. By this paper, claims 2-15, 17, and 18 are amended and claims 16 and 19-21 are cancelled without prejudice or disclaimer. New claims 22-33 are added. Accordingly, after entry of this paper, claims 2-15, 17, 18, and 22-33 will be pending in the Application. The Applicant respectfully submits that all amendments are fully supported by the Application, as originally filed, and that none of the amendments add new matter to the Application.

Information Disclosure Statement

On June 13, 2023, the Applicant filed an information disclosure statement in the present application listing 680 references for consideration by the Examiner. As noted in that filing, the Applicant believes the Examiner likely has already considered 634 of the 680 references with respect to the present application, as these references were previously submitted in and considered with respect to the parent of the present application—namely, U.S. Patent Application No. 16/933,995. (MPEP § 609.02(II)(2).)

Claim Rejections – 35 U.S.C. § 112

Claims 14-16 stand rejected under 35 U.S.C. § 112(b) based on the recitation of "the elongate member" in claim 14. By this amendment, the term "elongate member" has been deleted from claim 14. The Applicant thus respectfully requests that the rejection of claims 14-16 under 35 U.S.C. § 112(b) be withdrawn.

Claim Rejections – 35 U.S.C. § 103

Claims 1-4, 6-10, and 13-21 stand rejected under 35 U.S.C. § 103 as allegedly being unpatentable over U.S. Patent Application Publication No. 2006/0200121 of Mowery ("Mowery") in view of U.S. Patent Application Publication No. 2006/0095029 of Young ("Young"); claim 5 stands rejected under 35 U.S.C. § 103 as allegedly being

unpatentable over Mowery and Young, and further in view of U.S. Patent Application Publication No. 2006/0106376 of Godara et al. ("Godara"); and claims 11 and 12 stand rejected under 35 U.S.C. § 103 as allegedly being unpatentable over Mowery and Young, and further in view of U.S. Patent Application Publication No. 2004/0199179 of Elliott ("Elliott").

The Applicant respectfully traverses these rejections and does not acquiesce to the interpretations of claim language, characterizations of the teachings of the cited references, or propriety of any of the reference combination set forth in the Office Action. The Applicant reserves the right to pursue one or more of the rejected claims in one or more future applications.

In order to expedite prosecution of the present application, however, the Applicant has amended independent claim 2. The cited references cannot render obvious amended claim 2, or any claim depending therefrom, for at least the reasons that they fail to fairly suggest each of the recited limitations of these claims and any modification of the references to arrive at the limitations of amended claim 2 would impermissibly render these references unsatisfactory for their intended purposes and change the principle of operation of the devices disclosed therein.

Claim 2

As amended, independent 2 recites (emphases added):

> 2. A method of performing spinal radiofrequency neurotomy in a patient, the method comprising:
>
> moving a tip of a needle to a position proximate to a target nerve within the patient, the needle comprising an elongate member and a filament in a retracted position in which the filament is at least partially disposed within the elongate member, the tip of the needle being electrically conductive and positioned at a distal end of the elongate member;

advancing the filament relative to the tip of the needle from the retracted position to a deployed position;

inserting a radiofrequency probe into the needle such that a distal end of the radiofrequency probe contacts the tip of the needle; and

applying radiofrequency energy to the radiofrequency probe such that the radiofrequency energy is conducted away from the distal end of the radiofrequency probe by the tip of the needle and the filament, wherein the radiofrequency probe, the tip of the needle, and the filament operate in combination as an active radiofrequency electrode and said applying generates heat within the patient that ablates at least a portion of the target nerve.

In the Interview conducted on June 7, 2023, discussed previously herein, it was agreed that each of the references cited in the Office Action fails to disclose or render obvious at least the elements of amended claim 2 emphasized above in bold font, *e.g.*, in combination with the other recited elements. Accordingly, the Applicant respectfully submits that amended claim 2 is patentable over all references cited in the Office Action and respectfully requests that the rejection of this claim under 35 U.S.C. § 103 be withdrawn.

Claims 3-21

As previously noted, claims 16 and 19-21 have been cancelled, thereby mooting the rejection of these claims under 35 U.S.C. § 103. Each of claims 3-15, 17, and 18 depends from claim 2. Thus, for at least the reasons discussed above with respect to claim 2, the Applicant respectfully submits that claims 3-15, 17, and 18 are patentable over the references cited in the Office Action and respectfully requests that the rejection of these claims under 35 U.S.C. § 103 be withdrawn.

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New Claims 22-33

New claims 22-33 depend from amended claim 2. The Applicant thus respectfully submits that new claims 22-32 are patentable over the cited references for at least the reasons discussed above with respect to amended claim 2.

Double Patenting

Claims 2-5 stand rejected on the ground of nonstatutory double patenting as allegedly being unpatentable over claims 51 and 52 of U.S. Patent No. 10,925,664 ("the '664 Patent"). The Applicant has previously submitted a Terminal Disclaimer with respect to the '664 Patent, thereby mooting this claim rejection.

Conclusion

In view of the foregoing amendments and remarks, the Applicant submits that the Application is in condition for allowance and thus requests the issuance of a Notice of Allowance. Please contact the undersigned attorney in the event that any remaining impediment to the prompt allowance of this application is found that could be clarified by a telephonic interview or may be overcome by an Examiner's Amendment.

DATED this 16th day of June, 2023.

Respectfully submitted,

/Daniel C. Higgs/

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Attorney for Applicant
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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional): NBUS.001C1C1C1

Application Number: 17/126,675

Filed: December 18, 2020

For: METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

Art Unit: 3794

Examiner: Eun Hwa Kim

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

	Fee	Small Entity Fee	Micro Entity Fee	
☐ One month (37 CFR 1.17(a)(1))	$220	$88	$44	$
☐ Two months (37 CFR 1.17(a)(2))	$640	$256	$128	$
☑ Three months (37 CFR 1.17(a)(3))	$1,480	$592	$296	$ 592
☐ Four months (37 CFR 1.17(a)(4))	$2,320	$928	$464	$
☐ Five months (37 CFR 1.17(a)(5))	$3,160	$1,264	$632	$

☐ Applicant asserts small entity status. See 37 CFR 1.27.

☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ A check in the amount of the fee is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☑ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 602176.

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I am the

☐ applicant.

☑ attorney or agent of record. Registration number 55,265.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/Daniel C. Higgs/ — Signature

June 16, 2023 — Date

Daniel C. Higgs — Typed or printed name

801.703.1964 — Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/126,675	Wright et al.
	Examiner	Art Unit
	EUNHWA KIM	3794

CPC - Searched*		
Symbol	Date	Examiner
A61B2018/0044,00577,1253,1467; A61B18/1477	12/16/2022	EK

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
Inventor and Assignee	12/16/2022	EK
CPC based text search	12/16/2022	EK

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
see SEARCH	see SEARCH History	06/28/2023	EK

/EUN HWA KIM/ Primary Examiner, Art Unit 3794	

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CPC						
Symbol					**Type**	**Version**
A61B	/	18	/	1477	F	2013-01-01
A61B	/	18	/	1206	I	2013-01-01
A61B	/	2018	/	00434	A	2013-01-01
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A61B	/	2090	/	3762	A	2016-02-01
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A61B	/	2018	/	00791	A	2013-01-01
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A61B	/	2018	/	126	A	2013-01-01
A61B	/	2018	/	1467	A	2013-01-01

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	28	
/EUN HWA KIM/ Primary Examiner, Art Unit 3794	28 June 2023	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	2	14

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	17/126,675	Wright et al.
	Examiner	**Art Unit**
	EUNHWA KIM	3794

INTERNATIONAL CLASSIFICATION					
CLAIMED					
A61B	/	18	/	14	

NON-CLAIMED					
	/		/		

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

NONE (Assistant Examiner) (Date)	**Total Claims Allowed:** 28	
/EUN HWA KIM/ Primary Examiner, Art Unit 3794 (Primary Examiner) 28 June 2023 (Date)	O.G. Print Claim(s) 2	O.G. Print Figure 14

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Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/126,675	Wright et al.
	Examiner	**Art Unit**
	EUNHWA KIM	3794

☑ Claims renumbered in the same order as presented by applicant ☐ CPA ☑ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	28	
/EUN HWA KIM/ Primary Examiner, Art Unit 3794	28 June 2023	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	2	14

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Doc description: Information Disclosure Statement (IDS) Filed

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application Number	17/126,675
	Filing Date	December 18, 2020
	First Named Inventor	Robert E. Wright
	Art Unit	3794
	Examiner Name	Eun Hwa Kim
	Attorney Docket Number	NBUS.001C1C1C1

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	Attorney Docket Number	NBUS.001C1C1C1

U.S. PATENTS

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /E.K./

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	172	6416520		07-09-2002	Kynast et al.	
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	272	7276064		10-02-2007	Paul et al.	
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	281	7387626		06-17-2008	Edwards et al.	
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	312	7892231		02-22-2011	Elliott	
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	320	6045532		04-04-2000	Eggers et al.	
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	328	6699242		03-02-2004	Heggeness	
	329	6740080		05-25-2004	Jain et al.	
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	335	7344533		2008-03-18	Pearson et al.	
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	342	7896871		2011-03-01	Bhushan et al.	
	343	8262574		2012-09-11	Placek et al.	
	344	8512330		2013-08-20	Epstein et al.	
	345	8518037		2013-08-27	Young	
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	348	9675406		2017-06-13	Moss et al.	
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	357	20030018332		01-23-2003	Schmaltz et al.	
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	362	20040100376		05-27-2004	Lye et al.	
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	372	20050165391		07-28-2005	Maguire et al.	
	373	20050171522		08-04-2005	Christopherson	
	374	20050177209		08-11-2005	Leung et al.	
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	376	20050203503		09-15-2005	Edwards et al.	
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	380	20050277918		12-15-2005	Shah et al.	
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	388	20060173359		08-03-2006	Lin et al.	
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	403	20060271036		11-30-2006	Garabedian et al.	
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	405	20070016183		01-18-2007	Lee et al.	
	406	20070027449		02-01-2007	Godara et al.	
	407	20070060921		03-15-2007	Janssen et al.	
	408	20070112342		05-17-2007	Pearson et al.	
	409	20070118191		05-24-2007	Godara	
	410	20070123964		05-31-2007	Davies et al.	
	411	20070156136		07-05-2007	Godara et al.	
	412	20070161905		07-12-2007	Munrow	
	413	20070167943		07-19-2007	Janssen et al.	
	414	20070179380		08-02-2007	Grossman	
	415	20070179491		08-02-2007	Kratoska et al.	
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	418	20070203486		08-30-2007	Young	
	419	20070260234		11-08-2007	Mccullagh et al.	
	420	20070282321		12-06-2007	Shah et al.	
	421	20080015569		01-17-2008	Saadat et al.	
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	Art Unit	3794
	Examiner Name	Eun Hwa Kim
	Attorney Docket Number	NBUS.001C1C1C1

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	Application Number	17/126,675
	Filing Date	December 18, 2020
	First Named Inventor	Robert E. Wright
	Art Unit	3794
	Examiner Name	Eun Hwa Kim
	Attorney Docket Number	NBUS.001C1C1C1

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initial*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
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EXAMINER SIGNATURE

Examiner Signature	/EUN HWA KIM/	Date Considered	06/30/2023

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw a line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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	Examiner Name	Eun Hwa Kim
	Attorney Docket Number	NBUS.001C1C1C1

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ Applicant hereby states that each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. (37 CFR 1.97(e)(1))

OR

☐ Applicant hereby states that no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in § 1.56(c) more than three months prior to the filing of the information disclosure statement. (37 CFR 1.97(e)(2))

☐ See attached certification statement.

☒ A certification statement is not submitted herewith.

☒ The fee set forth in 37 CFR 1.17(p) is submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Daniel C. Higgs/	Date (YYYY-MM-DD)	2022-06-13
Name/Print	Daniel C. Higgs	Registration Number	55,265

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /E.H./

IPR2024-01211
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Stratus Ex. 2013

Bibliographic Data

Application No: 17/126,675

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☐ No ☐ Met After Allowance

Verified and Acknowledged: /EUN HWA KIM/ Examiner's Signature | Initials

Title: METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
12/18/2020	606	3794	NBUS.001C1C1C1
RULE			

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CONTINUING DATA

This application is a CON of 16933995 07/20/2020 PAT 10925664

16933995 is a CON of 15098673 04/14/2016 PAT 10736688

15098673 is a CON of 12940974 11/05/2010ABN

12940974 has PRO of 61347351 05/21/2010

12940974 has PRO of 61280557 11/05/2009

FOREIGN APPLICATIONS

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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	5986	606/41,44.ccls.	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 10:14 AM
L2	501	((ROBERT) near2 (WRIGHT)).INV.	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 11:32 AM
L3	110	((ROBERT) near2 (WRIGHT)).INV.	(EPO; JPO; DERWENT)	OR	ON	ON	2014/01/29 11:33 AM
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L5	3	((SCOTT) near2 (BRANDT)).INV.	(EPO; JPO; DERWENT)	OR	ON	ON	2014/01/29 11:33 AM
L6	3	L2 and "606".CLAS.	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 11:33 AM
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L10	373	US-1234567-$.DID. OR US-D372086-$.DID. OR US-4011872-$.DID. OR US-4206761-$.DID. OR US-4206762-$.DID. OR US-4281667-$.DID. OR US-4353371-$.DID. OR US-4375220-$.DID. OR US-4378809-$.DID. OR US-4385636-$.DID. OR US-4411266-$.DID. OR US-4565200-$.DID. OR US-4573980-$.DID. OR US-4583538-$.DID. OR US-4593703-$.DID. OR US-4618978-$.DID. OR US-4646752-$.DID. OR US-4653508-$.DID. OR US-4660568-$.DID. OR US-4676255-$.DID. OR US-4698207-$.DID. OR US-4787886-$.DID. OR US-4796615-$.DID. OR US-4827927-$.DID. OR US-4838265-$.DID. OR US-4886506-$.DID. OR US-4907589-$.DID. OR US-4966597-$.DID. OR US-5010897-$.DID. OR US-5160337-$.DID. OR US-5217457-$.DID. OR US-5230623-$.DID. OR	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 11:37 AM

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L11	4	US-1234567-$.DID. OR US-5507802-$.DID. OR US-7270661-$.DID. OR US-20070287996-$.DID.	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 11:38 AM
L12	20	(US-20040260282-$ or US-20050101950-$ or US-20060189972-$).did. or (US-2994324-$ or US-5599346-$ or US-5683384-$ or US-5728143-$ or US-5735847-$ or US-5782827-$ or US-5800484-$ or US-5810804-$ or US-5863290-$ or US-5913855-$ or US-5925042-$ or US-5928229-$ or US-5951547-$ or US-6053937-$ or US-6092528-$ or US-6254598-$ or US-6958062-$).did.	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 12:00 PM
L13	379	L10 or L11 L12	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 12:00 PM
L14	20	L13 and L12	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 12:19 PM
L15	379	L13 L12	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 12:19 PM

L16	23	L15 and (detent)	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 12:19 PM
L17	100218	"606"/$.ccls.	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 12:21 PM
L18	136	neurotomy	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 12:21 PM
L19	5	"7108696".pn. "7357798".pn. "20090221998".pgnr. "20060217705".pgnr. "200620200121".pgnr. "20090024124".pgnr.	(US-PGPUB; USPAT)	OR	ON	ON	2014/01/29 12:46 PM
L20	88	US-8292822-$.DID. OR US-5540778-$.DID. OR US-5672375-$.DID. OR US-3918455-$.DID. OR US-4341094-$.DID. OR US-5232442-$.DID. OR US-5304141-$.DID. OR US-5379900-$.DID. OR US-5562685-$.DID. OR US-5709692-$.DID. OR US-20050059964-$.DID. OR US-5226912-$.DID. OR US-5269808-$.DID. OR US-5425746-$.DID. OR US-5437726-$.DID. OR US-5569302-$.DID. OR US-5250247-$.DID. OR US-5507777-$.DID. OR US-5649962-$.DID. OR US-5374278-$.DID. OR US-5639506-$.DID. OR US-5643628-$.DID. OR US-5891247-$.DID. OR US-6031018-$.DID. OR US-6053086-$.DID. OR US-4124153-$.DID. OR US-4282637-$.DID. OR US-4457128-$.DID. OR US-4501133-$.DID. OR US-4907741-$.DID. OR US-5503092-$.DID. OR US-5532657-$.DID. OR US-5648003-$.DID. OR US-5683025-$.DID. OR US-5891166-$.DID. OR US-5897044-$.DID. OR US-5954242-$.DID. OR US-5991957-$.DID. OR US-6035916-$.DID. OR US-6051180-$.DID. OR US-6126676-$.DID. OR US-6270464-$.DID. OR US-6402770-$.DID. OR US-6536482-$.DID. OR	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	ON	ON	2014/02/11 12:24 PM

		US-6699205-$.DID. OR US-6730042-$.DID. OR US-6739024-$.DID. OR US-7761964-$.DID.					
L21	75	US-5769822-$.DID. OR US-20050288759-$.DID. OR US-4998661-$.DID. OR US-5934275-$.DID. OR US-5133738-$.DID. OR US-5226912-$.DID. OR US-5503092-$.DID. OR US-6536482-$.DID. OR US-20060106405-$.DID. OR US-6803013-$.DID. OR US-20020176734-$.DID. OR US-20070215543-$.DID. OR US-5749846-$.DID. OR US-8206300-$.DID. OR US-8414509-$.DID. OR US-20050004563-$.DID. OR US-20050222565-$.DID. OR US-20050283148-$.DID. OR US-20090131790-$.DID. OR US-3840011-$.DID. OR US-4191054-$.DID. OR US-4269387-$.DID. OR US-4553687-$.DID. OR US-4710176-$.DID. OR US-4755173-$.DID. OR US-4808168-$.DID. OR US-4832690-$.DID. OR US-4833824-$.DID. OR US-5112311-$.DID. OR US-5154698-$.DID. OR US-5239773-$.DID. OR US-5265606-$.DID. OR US-5487739-$.DID. OR US-5542268-$.DID. OR US-5607003-$.DID. OR US-5687739-$.DID. OR US-5713872-$.DID. OR US-5743882-$.DID.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	ON	ON	2014/02/11 12:24 PM
L22	50	("20110213356" "20110288540" "5540778" "5672375" "3918455" "4341094" "5232442" "5304141" "5379900" "5562685" "5709692" "20050059964" "5226912" "5269808" "5425746" "5437726"	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/11 12:26 PM

		"5569302" "5250247" "5507777" "5649962" "5374278" "5639506" "5643628" "5891247" "6031018" "6053086" "4124153" "4282637" "4457128" "4501133" "4907741" "5503092" "5532657" "5648003" "5683025" "5891166" "5897044" "5954242" "5991957" "6035916" "6051180" "6126676" "6270464" "6402770" "6536482" "6699205" "6730042" "6739024" "7761964" "8292822").pn.					
L23	85	L20 L21 L22	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/11 12:26 PM
L24	85	L20 L21 L22	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/11 12:26 PM
L25	1	"20090221998"	(DERWENT)	OR	ON	ON	2014/02/11 12:39 PM
L26	259590	a61b2018/0016, "00166", "00196", "00208", "00273", "00279", "0091", "00434", "0044", "1425", "143", "1432", "1465" "1475".cpc.	(DERWENT)	OR	ON	ON	2014/02/11 12:56 PM
L27	891	a61b2018/0016,00166,00196,00208,00273,00279,0091,00434,0044,1425,143,1432,1465,1475.cpc.	(DERWENT)	OR	ON	ON	2014/02/11 12:58 PM
L28	5217	a61b2018/0016,00166,00196,00208,00273,00279,0091,00434,0044,1425,143,1432,1465,1475.cpc.	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/11 12:58 PM
L29	3226	L28 and @py<"2009"	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/11 01:00 PM
L30	3	"7108696".pn. "7357798".pn. "20060217705".pgnr. "7108696".pn.	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 09:58 AM
L31	3	"7108696".pn. "7357798".pn. "20060217705".pgnr.	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 09:59 AM
L32	2	"7270661".pn. "5507802.pn" "20070287996".pgnr.	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 10:01 AM

L33	3	"7270661".pn. "5507802".pn. "20070287996".pgnr.	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 10:02 AM
L34	50	(actuator actuate actuating) same (helical adj track thread) same (filament electrode) same (hub)	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 10:34 AM
L35	12	(actuator actuate actuating) same (helical adj track thread) same (filament electrode) same (hub) same (advanced advancing deployed deploying deploy retracted retracting retract)	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 10:38 AM
L37	316	(actuator actuate actuating) same (helical adj track thread) same (advanced advancing deployed deploying deploy retracted retracting retract) near3 (filament stylet anchor element)	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 10:41 AM
L38	274031	("600" "606" "607").CLAS.	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 10:45 AM
L39	13082	L38 and filament	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 10:45 AM
L40	3630	L39 and (actuate actuator actuating)	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 10:46 AM
L41	6	L39 and (hub with thread) and (actuat$3 with thread)	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 10:47 AM
L42	2598	L39 and (rotate rotat$4) same (deployment deploy retract retract$4 advance advancing)	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 11:33 AM
L43	251	L39 and (rotate rotat$4) same (deployment deploy retract retract$4 advance advancing) same (filament)	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 11:34 AM
L44	1	"5964756".pn.	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 11:55 AM
L45	110	L39 and (rotate rotat$4) with (actuate actuating actuated) and (deployment deploy retract retract$4 advance advancing) same (filament)	(US-PGPUB; USPAT; USOCR; EPO; JPO)	OR	ON	ON	2014/02/12 12:00 PM
L46	52	(US-20040260282-$ or	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12

		US-20050101950-$ or US-20060189972-$ or US-20060206133-$ or US-20060206132-$ or US-20060206131-$ or US-20090221998-$ or US-20090024124-$ or US-20060217705-$ or US-20010018586-$ or US-20010031941-$ or US-20060206130-$ or US-20060206129-$ or US-20060206111-$ or US-20070016183-$ or US-20070077230-$ or US-20080161804-$ or US-20070287996-$ or US-20090105640-$ or US-20060229645-$).did. or (US-2994324-$ or US-5599346-$ or US-5683384-$ or US-5728143-$ or US-5735847-$ or US-5782827-$ or US-5800484-$ or US-5810804-$ or US-5863290-$ or US-5913855-$ or US-5925042-$ or US-5928229-$ or US-5951547-$ or US-6053937-$ or US-6092528-$ or US-6254598-$ or US-6958062-$ or US-6132425-$ or US-6129726-$ or US-5672173-$ or US-7108696-$ or US-7357798-$ or US-5687739-$ or US-5749846-$ or US-2022065-$ or US-5995875-$).did. or (US-6123084-$ or US-6245070-$ or US-7198625-$ or US-7270661-$ or US-5507802-$ or US-6638275-$).did.					02:02 PM
L47	49	L46 and (filament antenna electrode)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:04 PM
L48	37500	L46 and (filament antenna electrode) and (single near2 wire) or ("same" near2 wire)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:05 PM

L49	3	L46 and (filament antenna electrode) and ((single near2 wire) or ("same" near2 wire))	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:05 PM
L50	4674	L38 and (filament antenna electrode) and ((single near2 wire) or ("same" near2 wire))	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:06 PM
L51	1425	L38 and (filament antenna electrode) with ((single near2 wire) or ("same" near2 wire))	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:07 PM
L52	2	L38 and (filament antenna electrode) with ((single near2 wire) or ("same" near2 wire)) with (actuator actuating actuate)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:07 PM
L53	4	L38 and (filament antenna electrode) with ((single near2 wire) or ("same" near2 wire)) same (actuator actuating actuate)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:07 PM
L54	92	L38 and (filament antenna electrode) with ((single near2 wire) or ("same" near2 wire)) same2 (actuator actuating actuate)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:08 PM
L55	504	L38 and (filament antenna electrode) with (form$3 made built) with (single near2 wire)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:09 PM
L56	258	L38 and (filament antenna electrode) with (form$3 made built) with (single near2 wire) same (control$4 deploy$4 retract$4 advanc$4)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:09 PM
L57	17	US-6379353-$.DID. OR US-6888919-$.DID. OR US-20020077627-$.DID. OR US-20040024300-$.DID. OR US-20040096033-$.DID. OR US-20040158239-$.DID. OR US-20050261570-$.DID. OR WO-9903397-$.DID. OR WO-0222019-$.DID. OR WO-2005036124-$.DID.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	ON	ON	2014/02/12 02:23 PM

L58	0	("2010/0256625").URPN.	(USPAT)	OR	ON	ON	2014/02/12 02:23 PM
L59	331	(filament antenna electrode array) with (form$3 made built) with (single near2 wire) same (control$4 deploy$4 retract$4 advanc$4)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:31 PM
L60	258	L38 and(sylet filament antenna electrode array) with (form$3 made built) with (single near2 wire) same (control$4 deploy$4 retract$4 advanc$4)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:31 PM
L61	258	L38 and(stylet filament antenna electrode array) with (form$3 made built) with (single near2 wire) same (control$4 deploy$4 retract$4 advanc$4)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/12 02:32 PM
L62	258	L38 and(stylet filament antenna electrode array) with (form$3 made built) with (single near2 wire) same (control$4 deploy$4 retract$4 advanc$4)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/12 02:32 PM
L63	1332	(filament electrode) with (form$3 made built) with (single near2 wire)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/12 02:33 PM
L64	495	(filament electrode) with (form$3 made built) with (single near2 wire) and L38	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/12 02:34 PM
L65	237	L64 not L59	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/12 02:34 PM
L66	0	"606"/$.clas. and (helical) near2 (track thread) with (detents) same (deploy$4 retract$4 advanc$4)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/12 02:56 PM
L67	0	"606"/$.clas. and (helical) near2 (track thread) same (detents) same (deploy$4 retract$4 advanc$4)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/12 02:56 PM
L68	0	"606"/$.clas. and (track thread) same (detent) same (deploy$4 retract$4 advanc$4)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/12 02:56 PM

L69	4757	(track thread) same (detent) same (deploy$4 retract$4 advanc$4)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/12 02:56 PM
L70	14	(track thread) same (detent) same (indicat$4 alert$4) with (deploy$4 retract$4 advanc$4) same (visual tactile audible)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/12 02:57 PM
L71	2	"20060264974".pgnr. "5827276".pn.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/12 04:33 PM
L72	1332	(filament electrode) with (form$3 made built) with (single near2 wire)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/14 12:00 PM
L73	2599	(filament electrode) with (form$3 made built) with (single near2 wire or "same" near2 wire)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/14 12:01 PM
L74	389	L73 and "606"/$.ccls.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/14 12:01 PM
L75	50	"606"/$.ccls. and (distal near2 (tip end)) near4 (insulat$4) with (partially partial "part of")	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/14 12:41 PM
L76	0	"606"/$.ccls. and (distal near2 (tip end)) with (insulat$4) with (partially partial "part of") same ("non-adhere" "adhere")	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/14 12:55 PM
L77	126	"606"/$.ccls. and (distal near2 (tip end)) with (insulat$4 insulate insulated) with (partially partial "part of")	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/14 12:56 PM
L78	76	L77 not L75	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	ON	ON	2014/02/14 12:56 PM
L79	57	(US-20040260282-$ or US-20050101950-$ or US-20060189972-$ or US-20060206133-$ or US-20060206132-$ or US-20060206131-$ or US-20090221998-$ or US-20090024124-$ or US-20060217705-$ or US-20010018586-$ or US-20010031941-$ or US-20060206130-$ or US-20060206129-$ or	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/14 01:07 PM

		US-20060206111-$ or US-20070016183-$ or US-20070077230-$ or US-20080161804-$ or US-20070287996-$ or US-20090105640-$ or US-20060229645-$ or US-20060264974-$ or US-20020143302-$ or US-20040199179-$).did. or (US-2994324-$ or US-5599346-$ or US-5683384-$ or US-5728143-$ or US-5735847-$ or US-5782827-$ or US-5800484-$ or US-5810804-$ or US-5863290-$ or US-5913855-$ or US-5925042-$ or US-5928229-$ or US-5951547-$ or US-6053937-$ or US-6092528-$ or US-6254598-$ or US-6958062-$ or US-6132425-$ or US-6129726-$ or US-5672173-$ or US-7108696-$ or US-7357798-$ or US-5687739-$ or US-5749846-$ or US-2022065-$ or US-5995875-$).did. or (US-6123084-$ or US-6245070-$ or US-7198625-$ or US-7270661-$ or US-5507802-$ or US-6638275-$ or US-5827276-$ or US-5855576-$).did.					
L80	27	L79 and (distal near2 (tip end point)) with (insulat$4 insulate insulated)	(US-PGPUB; USPAT)	OR	ON	ON	2014/02/14 01:32 PM
L81	8	(tip) with (filament stylet tine) with (active adj electrode)	(US-PGPUB; USPAT)	OR	ON	ON	2014/06/16 03:31 PM
L82	587	("0164184" | "1366756" | "1735271" | "1814791" | "1889609" | "1932258" | "1943543" | "1952617" | "1983669" | "2050904" | "2056377" | "2196171"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2014/06/16 03:33 PM

		| "2888928" | "3035580" | "3460539" | "3595239" | "3601126" | "3614414" | "3648001" | "3685518" | "3699967" | "3707149" | "3801766" | "3815604" | "3845771" | "3847153" | "3885569" | "3898991" | "3901242" | "3902494" | "3903891" | "3920021" | "3920022" | "3923063" | "3929137" | "3939839" | "3945375" | "3963030" | "3964487" | "3970088" | "3974833" | "4011872" | "4016881" | "4024467" | "4033351" | "4040426" | "4043342" | "4051855" | "4060088" | "4069827" | "4074718" | "4092986" | "4114623" | "4116198" | "4119102" | "4126137" | "4154240" | "4189685" | "4200104" | "4202337" | "4204549" | "4210152" | "4228800" | "4248231" | "4271837" | "4281373" | "4301802" | "4326529" | "4346332" | "4376263" | "4381007" | "4416277" | "4418692" | "4429698" | "4448198" | "4474179" | "4476862" | "4492231" | "4494541" | "4512338" | "4517976" | "4524770" | "4532924" | "4534347" | "4548207" | "4559943" | "4559951" | "4562838" | "4565200" | "4567890" | "4580557" | "4590934" | "4593691" | "4617927" | "4657015" | "4658819" | "4658820" | "4669468" | "4674499" | "4681122" | "4682596" | "4688569" | "4696668" | "4706667" | "4709698" | "4712544" | "4727874" | "4735201" | "4769005" | "4781175" | "4799480" | "4800899" | "4802476" | "4805616" | "4813429" | "4820298" | "4823791" | "4827927" | "4832048" | "4850353" | "4860744" | "4878493" | "4886074" | "4919129" | "4920978").PN. OR ("4931047" | "4936281"					

		| "4936301" | "4936310" | "4936842" | "4943290" | "4950267" | "4955377" | "4966597" | "4967765" | "4969885" | "4976711" | "4994069" | "4998933" | "5007908" | "5009656" | "5013312" | "5019076" | "5035696" | "5037379" | "5047026" | "5047027" | "5057107" | "5062031" | "5071418" | "5080660" | "5083565" | "5085659" | "5088997" | "5098431" | "5099840" | "5108391" | "5108407" | "5117978" | "5122138" | "5133365" | "5158561" | "5167658" | "5167659" | "5171255" | "5171311" | "5178620" | "5190517" | "5195959" | "5196007" | "5197963" | "5201743" | "5207675" | "5217457" | "5217458" | "5217459" | "5221281" | "5244462" | "5249585" | "5250047" | "5258006" | "5259395" | "5261906" | "5267994" | "5267997" | "5277201" | "5277696" | "5281213" | "5281216" | "5282799" | "5282845" | "5290282" | "5290283" | "5300068" | "5300069" | "5300070" | "5304214" | "5306238" | "5318563" | "5320627" | "5330470" | "5330471" | "5334193" | "5334198" | "5336222" | "5342357" | "5342391" | "5344428" | "5352222" | "5354296" | "5366443" | "5370645" | "5370675" | "5372596" | "5382247" | "5383874" | "5383876" | "5383917" | "5383923" | "5395363" | "5395368" | "5403311" | "5419767" | "5422567" | "5423808" | "5423809" | "5423810" | "5423811" | "5431649" | "5437662" | "5438302" | "5441499" | "5443470" | "5454809" | "5462521" | "5472441" | "5472443" | "5480397" | "5480398" | "5496312" | "5496314" | "5505728" | "5505730"				

		| "5507743" | "5514129" | "5514130" | "5514131" | "5520684" | "5520685" | "5522815").PN. OR ("5531744" | "5536267" | "5540680" | "5540681" | "5540682" | "5540683" | "5540684" | "5540685" | "5542916" | "5542945" | "5545161" | "5545193" | "5549605" | "5554172" | "5555618" | "5556396" | "5556397" | "5558671" | "5562720" | "5569164" | "5569242" | "5569244" | "5569245" | "5575789" | "5578007" | "5582609" | "5582610" | "5584830" | "5591141" | "5599344" | "5599345" | "5599346" | "5599347" | "5599348" | "5599349" | "5603711" | "5603712" | "5607422" | "5609151" | "5609573" | "5611798" | "5620481" | "5624439" | "5626560" | "5626575" | "5626576" | "5626578" | "5628745" | "5628771" | "5630426" | "5633578" | "5634924" | "5672174" | "5683366" | "5693045" | "5697281" | "5697536" | "5697882" | "5697909" | "5700262" | "5766153" | "5810764" | "5843019" | "5860951" | "5871469" | "5873855" | "5888198" | "5891095" | "Re33925").PN. OR ("6015406").URPN.					
L83	67	("5800482" | "5807395").PN. OR ("6053937").URPN.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2014/10/01 03:55 PM
L84	1050	"606"/$.ccls. and (bipolar) and (stylet filament) and (trocar needle)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2014/10/01 03:56 PM
L85	752	"606"/29-41.ccls. and (bipolar) and (stylet filament) and (trocar needle)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2014/10/01 03:57 PM
L86	43	"606"/29-41.ccls. and (bipolar) same (stylet filament antenna) same (trocar needle)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2014/10/02 08:26 AM
L87	2	"7270661".pn.	(US-PGPUB; USPAT;	OR	ON	ON	2014/10/02

		"5507802".pn.	USOCR)				08:32 AM
L88	9	bevel with (stylet filament) and 606/41.ccls.	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/02 10:21 AM
L89	1	"20070287996".pgnr.	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/02 11:00 AM
L90	64	(insulat$6) near4 (point tip) with (needle trocar) and 606/41.ccls.	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/02 11:02 AM
L91	1518	(insulat$6) near4 (point tip end) and 606/41.ccls.	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/02 11:12 AM
L92	7	(partial$6) near2 (cover$4) with (insulat$6) near4 (point tip end) and 606/41.ccls.	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/02 11:12 AM
L93	1	"20070203486".pgnr.	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/09 10:21 AM
L94	522	bevel$4 with (filament tine)	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/09 10:28 AM
L95	45	bevel$4 with tip with (filament tine)	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/09 10:37 AM
L96	299	bevel$4 with tip with (filament tine stylet)	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/09 10:38 AM
L97	16	bevel$4 with tip with (filament tine stylet) and 606/41.ccls.	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/09 10:39 AM
L98	1	13/101009.app.	(US-PGPUB; USPAT)	OR	ON	ON	2014/10/09 10:52 AM
L99	2	"20070203486"	(US-PGPUB; USPAT)	OR	ON	ON	2015/03/20 01:40 PM
L100	1	"13101009"	(US-PGPUB; USPAT)	OR	ON	ON	2015/03/20 05:00 PM
L101	0	(stylet filament antenna) with (retract$4) with (offset) with (angle)	(US-PGPUB; USPAT)	OR	ON	ON	2015/03/23 10:33 AM
L102	19	(stylet filament antenna) with (retract$4) with (offset)	(US-PGPUB; USPAT)	OR	ON	ON	2015/03/23 10:34 AM
L103	2309	(indicia indicat$4 marking marker) with (rotat$4) with (distal) near5 (tip end)	(US-PGPUB; USPAT)	OR	ON	ON	2015/03/23 10:47 AM
L104	11	(indicia indicat$4 marking marker) near5 (hub) with (rotat$4) with (distal) near5 (tip end)	(US-PGPUB; USPAT)	OR	ON	ON	2015/03/23 10:48 AM
L105	89	(indicia indicat$4 marking marker) near5 (hub handle) with (rotat$4) with (distal)	(US-PGPUB; USPAT)	OR	ON	ON	2015/03/23 11:32 AM

		near5 (tip end)					
L106	2	"20070203486"	(US-PGPUB; USPAT)	OR	ON	ON	2015/03/23 11:36 AM
L107	1	"13101009"	(US-PGPUB; USPAT)	OR	ON	ON	2015/03/23 12:41 PM
L108	9	("20010012956"|"20040059328"|"20040158239"|"20060084965"|"20070112340"|"20080161804"|"20080249392"|"20080269558"|"20110213356").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2015/03/23 12:43 PM
L109	106	("2001/0012956" | "2004/0059328" | "2004/0158239" | "2006/0084965" | "2007/0112340" | "2008/0161804" | "2008/0249392" | "2008/0269558" | "2011/0213356").URPN.	(USPAT)	OR	ON	ON	2015/03/23 12:43 PM
L110	167	("1653819" | "20010044596" | "20020010491" | "20020055731" | "20020077676" | "20020099323" | "20020138117" | "20020183735" | "20020183740" | "20020193831" | "20030009110" | "20030060856" | "20030088189" | "20030130711" | "20030170898" | "20030195406" | "20030208200" | "20030225360" | "20040019371" | "20040059328" | "20040059389" | "20040146877" | "20040153057" | "20040199159" | "20040243107" | "20040267189" | "20050043726" | "20050049541" | "20050165393" | "20050171523" | "20050171574" | "20050182462" | "20050261672" | "20050288730" |	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2015/03/23 12:44 PM

		"20060015147" | "20060025760" | "20060079883" | "20060121610" | "20060212078" | "20060217703" | "20060264752" | "20070016183" | "20070043345" | "20070118069" | "20070203486" | "20080052786" | "20080154259" | "20080167649" | "20090062792" | "20090228001" | "20090281477" | "20100049190" | "20100087813" | "20100130975" | "20100222677" | "20110202053" | "20120165813" | "20120310236" | "20130110106" | "4016886" | "4226246" | "4262672" | "4407943" | "4810963" | "4907601" | "4946793" | "5019034" | "5052391" | "5058605" | "5098843" | "5134070" | "5173158" | "5193537" | "5273525" | "5283194" | "5318563" | "5328451" | "5389069" | "5403311" | "5425752" | "5439440" | "5458625" | "5533999" | "5536240" | "5575811" | "5626146" | "5634899" | "5674267" | "5702359" | "5720921" | "5778894" | "5782882" | "5800378" | "5810762" | "5836905" | "5843026" | "5873849" | "5919142" | "5947889" | "5983131" | "5991697" | "5999847" | "6009347" | "6010613" | "6016452").PN. OR ("6041252" | "6055453" | "6068650" | "6085115" | "6090106" | "6102885" | "6106521" | "6109270" | "6122599" | "6132419" | "6159163" | "6208893" | "6210402" | "6212433" | "6216034" | "6219577" | "6241702" | "6261831"					

		| "6278895" | "6300108" | "6326177" | "6347247" | "6349233" | "6351674" | "6387671" | "6403348" | "6470211" | "6482619" | "6493592" | "6500173" | "6526320" | "6562604" | "6607529" | "6611706" | "6613211" | "6627421" | "6653091" | "6669691" | "6692493" | "6697669" | "6697670" | "6702808" | "6795728" | "6801804" | "6865416" | "6881213" | "6892099" | "6912417" | "6927049" | "6962587" | "6972014" | "6994706" | "7053063" | "7063698" | "7130697" | "7211083" | "7267676" | "7387626" | "7455675" | "7771401" | "8511317").PN. OR ("8753335").URPN.					
L111	273	L109 L110	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2015/03/23 12:45 PM
L112	2	L111 and (rotat$4) near3 (mechanism) with (advancement advanc$4 deploy$4 retract$4)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2015/03/23 12:46 PM
L113	3	L111 and (rotat$4) near3 (mechanism) same(advancement advanc$4 deploy$4 retract$4)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2015/03/23 12:46 PM
L114	628	((ROBERT) near2 (WRIGHT)).INV.	(US-PGPUB; USPAT)	OR	ON	ON	2018/09/10 08:23 PM
L115	25	((SCOTT) near2 (BRANDT)).INV.	(US-PGPUB; USPAT)	OR	ON	ON	2018/09/10 08:23 PM
L116	0	((("NIMBUS") near3 ("CONCEPTS") near3 ("LLC"))).AS,AANM.	(USPAT)	OR	OFF	OFF	2018/09/10 08:23 PM
L117	2	"20060084965"	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2018/09/10 08:25 PM
L118	66	("20040158239" | "20050080409" | "20050107781" | "20060217702" | "3174851" | "3351463" | "3753700" | "5472441" | "5507743" | "5536267" | "5827276" | "5855576" | "6090105").PN. OR ("7229438").URPN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2018/09/10 08:25 PM
L119	5060	(A61B18/1477 or	(US-PGPUB; USPAT;	OR	OFF	OFF	2018/09/10

		A61B2018/1467).cpc.	USOCR)				08:28 PM
L120	739	L119 and (stylet)	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2018/09/10 08:28 PM
L121	402	L119 and (stylet) and monopolar	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2018/09/10 08:28 PM
L122	109	L119 and (stylet filaments) with actuat$4	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2018/09/10 08:41 PM
L123	2	"13101009"	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2018/09/10 08:43 PM
L124	8841	(A61B2018/1253 or A61B2018/00577).cpc.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2018/09/10 08:51 PM
L125	1129	L124 and (stylet filament)	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2018/09/10 08:51 PM
L126	1	"5364351".pn.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2018/09/10 09:18 PM
L127	175	("5672173" | "5697536" | "5814066" | "5827276" | "6033401" | "6241725" | "6264651" | "6302898" | "6478793" | "6562059" | "6602248").PN. OR ("7108696").URPN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2019/08/29 10:26 AM
L128	451	("3987795" | "3991770" | "4033351" | "4043342" | "4121592" | "4237898" | "4289135" | "4303636" | "4346715" | "4411266" | "4565200" | "4574782" | "4586490" | "4660571" | "4763671" | "4800899" | "4838265" | "4907589" | "4920978" | "4931047" | "4940064" | "4945912" | "4976680" | "4976711" | "5003991" | "5009656" | "5013312" | "5015227" | "5026959" | "5047027" | "5057107" | "5059199" | "5067952" | "5071419" | "5078717" | "5080660" | "5084045" | "5085659" | "5100423" | "5115818" | "5125928" | "5128147" | "5183455" | "5190539" | "5197466" | "5197963" | "5205289" | "5207675" | "5215103" | "5217458" | "5246438" | "5251645" | "5252922" | "5267994" | "5277696" | "5281213" | "5290286" | "5300068" | "5304214" | "5336222" | "5365926" | "5385544" | "5397339" | "5403311" | "5411025").PN. OR	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2019/08/29 10:52 AM

		("5599346").URPN.					
L129	451	("3987795" | "3991770" | "4033351" | "4043342" | "4121592" | "4237898" | "4289135" | "4303636" | "4346715" | "4411266" | "4565200" | "4574782" | "4586490" | "4660571" | "4763671" | "4800899" | "4838265" | "4907589" | "4920978" | "4931047" | "4940064" | "4945912" | "4976680" | "4976711" | "5003991" | "5009656" | "5013312" | "5015227" | "5026959" | "5047027" | "5057107" | "5059199" | "5067952" | "5071419" | "5078717" | "5080660" | "5084045" | "5085659" | "5100423" | "5115818" | "5125928" | "5128147" | "5183455" | "5190539" | "5197466" | "5197963" | "5205289" | "5207675" | "5215103" | "5217458" | "5246438" | "5251645" | "5252922" | "5267994" | "5277696" | "5281213" | "5290286" | "5300068" | "5304214" | "5336222" | "5365926" | "5385544" | "5397339" | "5403311" | "5411025").PN. OR ("5599346").URPN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2019/08/29 11:15 AM
L130	2	"5599346".pn.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	OFF	OFF	2019/08/29 11:57 AM
L131	219	("2006/0095029").URPN.	(USPAT)	OR	OFF	OFF	2019/08/30 08:26 AM
L132	198	L131 and deploy$4	(USPAT)	OR	OFF	OFF	2019/08/30 08:26 AM
L133	65	L131 and deploy$4 same (thread$4 helical$4 track$4)	(USPAT)	OR	OFF	OFF	2019/08/30 08:27 AM
L134	63	(US-20040260282-$ or US-20050101950-$ or US-20060189972-$ or US-20060206133-$ or US-20060206132-$ or US-20060206131-$ or US-20090221998-$ or US-20090024124-$ or US-20060217705-$ or US-20010018586-$ or US-20010031941-$ or	(US-PGPUB; USPAT)	OR	OFF	OFF	2019/08/30 10:21 AM

		US-20060206130-$ or US-20060206129-$ or US-20060206111-$ or US-20070016183-$ or US-20070077230-$ or US-20080161804-$ or US-20070287996-$ or US-20090105640-$ or US-20060229645-$ or US-20060264974-$ or US-20020143302-$ or US-20040199179-$ or US-20060095029-$ or US-20040015161-$ or US-20050085804-$).did. or (US-20060084965-$).did. or (US-2994324-$ or US-5599346-$ or US-5683384-$ or US-5728143-$ or US-5735847-$ or US-5782827-$ or US-5800484-$ or US-5810804-$ or US-5863290-$ or US-5913855-$ or US-5925042-$ or US-5928229-$ or US-5951547-$ or US-6053937-$ or US-6092528-$ or US-6254598-$ or US-6958062-$ or US-6132425-$ or US-6129726-$ or US-5672173-$ or US-7108696-$ or US-7357798-$ or US-5687739-$ or US-5749846-$ or US-2022065-$ or US-5995875-$).did. or (US-6123084-$ or US-6245070-$ or US-7198625-$ or US-7270661-$ or US-5507802-$ or US-6638275-$ or US-5827276-$ or US-5855576-$ or US-6015406-$ or US-8753335-$).did.					
L135	205	(a61b18/$5.cpc. a61b2018/$5.cpc.) and (hypotube) with (needle cannula)	(US-PGPUB; USPAT)	OR	OFF	OFF	2019/08/30 11:01 AM

L136	136	(a61b18/$5.cpc. a61b2018/$5.cpc.) and (tube) near5 conduct$4 near10 (cannula needle trocar)	(US-PGPUB; USPAT)	OR	OFF	OFF	2019/08/30 11:16 AM
L137	1	"15098673"	(US-PGPUB; USPAT)	OR	OFF	OFF	2019/08/30 11:21 AM
L138	2	"20080294162"	(US-PGPUB; USPAT)	OR	OFF	OFF	2019/08/30 11:28 AM
L139	1	"6878147".pn.	(US-PGPUB; USPAT)	OR	OFF	OFF	2019/08/30 11:30 AM
L140	1	"15225945"	(US-PGPUB; USPAT)	OR	OFF	OFF	2019/08/30 11:34 AM
L141	2427	(a61b18/$5.cpc. a61b2018/$5.cpc.) and conduct$4 near10 (cannula needle trocar)	(US-PGPUB; USPAT)	OR	OFF	OFF	2019/08/30 11:45 AM
L142	272	(a61b18/$5.cpc. a61b2018/$5.cpc.) and conduct$4 near5 inner near10 (cannula needle trocar)	(US-PGPUB; USPAT)	OR	OFF	OFF	2019/08/30 11:46 AM
L143	8	"5599346".pn. "20060095029"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	OFF	OFF	2019/08/30 12:58 PM
L144	659	((ROBERT) near2 (WRIGHT)).INV.	(US-PGPUB; USPAT)	OR	ON	ON	2019/08/30 01:00 PM
L145	120	((ROBERT) near2 (WRIGHT)).INV.	(EPO; JPO; DERWENT)	OR	ON	ON	2019/08/30 01:00 PM
L146	26	((SCOTT) near2 (BRANDT)).INV.	(US-PGPUB; USPAT)	OR	ON	ON	2019/08/30 01:00 PM
L147	5	((SCOTT) near2 (BRANDT)).INV.	(EPO; JPO; DERWENT)	OR	ON	ON	2019/08/30 01:00 PM
L148	1	"7918852".pn.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	OFF	OFF	2020/03/16 02:34 PM
L149	86	("20020019596" | "20020065541" | "20040116793" | "3946738" | "3964487" | "3980085" | "4003380" | "4043342" | "4116198" | "4126137" | "4188927" | "4214804" | "4245649" | "4474179" | "4476862" | "4483338" | "4565200" | "4590934" | "4651734" | "4655226" | "4674499" | "4685459" | "4727874" | "4844063" | "4907585" | "4907589" | "4955377" | "4966597" | "5007908" | "5009656" | "5019076" | "5267997" | "5342357" |	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/03/16 04:44 PM

		"5383874" | "5403311" | "5433739" | "5651780" | "5697281" | "5697536" | "5697882" | "5697909" | "5827280" | "5843019" | "5888198" | "5891095" | "5902272" | "6004319" | "6056746" | "6066134" | "6106524" | "6146380" | "6149620" | "6159194" | "6193715" | "6312408" | "6312428" | "6379350" | "6416508" | "6506189" | "6582441" | "6632220" | "6837884").PN. OR ("7918852").URPN.					
L150	788	("4813429" | "4907589" | "5191883" | "5281213" | "5281218").PN. OR ("5433739").URPN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/03/16 05:11 PM
L151	4	"20040158239"	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/03/16 06:05 PM
L152	6	"20070112340" "20080161804" "20080249392"	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/03/16 06:06 PM
L153	130	(behl.in. epstein.in.) and 606/$5.ccls.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/03/16 07:17 PM
L154	16	"11429921" "11173928"	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2020/03/16 07:19 PM
L155	2	"20020095080"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO)	OR	OFF	OFF	2020/03/16 10:54 PM
L156	673	((ROBERT) near2 (WRIGHT)).INV.	(US-PGPUB; USPAT)	OR	ON	ON	2020/03/17 01:53 PM
L157	26	((SCOTT) near2 (BRANDT)).INV.	(US-PGPUB; USPAT)	OR	ON	ON	2020/03/17 01:53 PM
L158	15	(US-15796806-$ | US-55503426-$ | US-5961471-$ | US-6245064-$ | US-6424861-$ | US-7051569-$ | US-7111502-$ | US-7182509-$ | US-7204122-$ | US-7297123-$ | US-7344679-$ | US-7395103-$ | US-7574902-$ | US-7762718-$ | US-7905134-$ | US-7908906-$ | US-8020433-$).DID.	(US-PGPUB; USPAT)	OR	ON	ON	2020/03/17 02:31 PM
L159	1	"15098673"	(US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	OFF	2020/04/06 06:41 PM

			JPO)				
L160	673	((ROBERT) near2 (WRIGHT)).INV.	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 06:46 PM
L161	26	((SCOTT) near2 (BRANDT)).INV.	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 06:46 PM
L162	695	L160 L161	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 06:46 PM
L163	47	L162 and filaments	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 06:47 PM
L164	4	((("STRATUS") near3 ("MEDICAL") near3 ("LLC"))).AS,AANM.	(USPAT)	OR	ON	ON	2022/12/14 03:53 PM
L165	1059	((("WRIGHT") near3 ("Robert")) OR (("BRANDT") near3 ("Scott"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/12/14 05:49 PM
L166	53	165 AND (cannula needle)	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/12/14 05:50 PM
L167	6927	a61b18/1477.cpc.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/12/14 05:53 PM
L168	4858	a61b18/1477.cpc. AND (cannula needle)	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/12/14 05:53 PM
L169	1642	a61b18/1477.cpc. AND (cannula needle) AND (spine spline filament arm leg)	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/12/14 05:53 PM
L170	518	a61b18/1477.cpc. AND (cannula needle) AND (deploy$4 advanc$4 introduc$4 insert$4) near10 (spine spline filament arm leg)	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/12/14 05:54 PM
L171	75	((US-20080161804-A1 OR US-20060264974-A1 OR US-20060229645-A1 OR US-20090105640-A1 OR US-20070287996-A1 OR US-20020143302-A1 OR US-20070077230-A1 OR US-20070016183-A1 OR US-20060206111-A1 OR US-20060206129-A1 OR US-20060206130-A1 OR US-20010031941-A1 OR US-20010018586-A1 OR US-20070006215-A1 OR US-	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/12/15 09:13 AM

		20110230874-A1 OR US-20070112340-A1 OR US-20040158239-A1 OR US-20060224223-A1 OR US-20060084965-A1 OR US-20050085804-A1 OR US-20040015161-A1 OR US-20060095029-A1 OR US-20040199179-A1 OR US-20050101950-A1 OR US-20040260282-A1 OR US-20090024124-A1 OR US-20060217705-A1 OR US-20090221998-A1 OR US-20060206131-A1 OR US-20060206132-A1 OR US-20060206133-A1 OR US-20060189972-A1 OR US-20050060006-A1 OR US-20110060314-A1).did. AND PGPB.dbnm.) OR ((US-5855576-A OR US-5827276-A OR US-6638275-B1 OR US-5507802-A OR US-7270661-B2 OR US-7198625-B1 OR US-7918852-B2 OR US-7627380-B2 OR US-5571147-A OR US-4907589-A OR US-5433739-A OR US-6245070-B1 OR US-8753335-B2 OR US-6015406-A OR US-5913855-A OR US-6254598-B1 OR US-6092528-A OR US-6053937-A OR US-5951547-A OR US-5928229-A OR US-5925042-A OR US-6958062-B1 OR US-5863290-A OR US-5810804-A OR US-5800484-A OR US-5782827-A OR US-5735847-A OR US-5728143-A OR US-5683384-A OR US-5599346-A OR US-					

		6123084-A OR US-5995875-A OR US-2022065-A OR US-5749846-A OR US-5687739-A OR US-7357798-B2 OR US-7108696-B2 OR US-2994324-A OR US-5672173-A OR US-6129726-A OR US-6132425-A).did. AND USPT.dbnm.)					
L172	0	a61b18/0044.cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/12/15 11:08 AM
L173	1587	a61b2018/0044.cpc.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/12/15 11:08 AM
L174	662	a61b2018/0044.cpc. AND needle	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA,	OR	ON	ON	2022/12/15 11:08 AM

			VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L175	270	a61b2018/0044.cpc. AND (energy) WITH (stylet needle)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/12/15 01:53 PM
L176	77	((US-20080161804-A1 OR US-20060264974-A1 OR US-20060229645-A1 OR US-20090105640-A1 OR US-20070287996-A1 OR US-20020143302-A1 OR US-20070077230-A1 OR US-20070016183-A1 OR US-20060206111-A1 OR US-20060206129-A1 OR US-20060206130-A1 OR US-20010031941-A1 OR US-20010018586-A1 OR US-20070006215-A1 OR US-20110230874-A1 OR US-20070112340-A1 OR US-20040158239-A1 OR US-20060224223-A1 OR US-20060084965-A1 OR US-20050085804-A1 OR US-20040015161-A1 OR US-20060095029-A1 OR US-20040199179-A1 OR US-20050101950-A1 OR US-20040260282-A1 OR US-20090024124-A1 OR US-20060217705-A1 OR US-20090221998-A1 OR US-20060206131-	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/12/15 01:58 PM

		A1 OR US-20060206132-A1 OR US-20060206133-A1 OR US-20060189972-A1 OR US-20050060006-A1 OR US-20110060314-A1 OR US-20170049503-A1 OR US-20060200121-A1).did. AND PGPB.dbnm.) OR ((US-5855576-A OR US-5827276-A OR US-6638275-B1 OR US-5507802-A OR US-7270661-B2 OR US-7198625-B1 OR US-7918852-B2 OR US-7627380-B2 OR US-5571147-A OR US-4907589-A OR US-5433739-A OR US-6245070-B1 OR US-8753335-B2 OR US-6015406-A OR US-5913855-A OR US-6254598-B1 OR US-6092528-A OR US-6053937-A OR US-5951547-A OR US-5928229-A OR US-5925042-A OR US-6958062-B1 OR US-5863290-A OR US-5810804-A OR US-5800484-A OR US-5782827-A OR US-5735847-A OR US-5728143-A OR US-5683384-A OR US-5599346-A OR US-6123084-A OR US-5995875-A OR US-2022065-A OR US-5749846-A OR US-5687739-A OR US-7357798-B2 OR US-7108696-B2 OR US-2994324-A OR US-5672173-A OR US-6129726-A OR US-6132425-A).did. AND USPT.dbnm.)					
L177	23	176 AND nerve	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA,	OR	ON	ON	2022/12/15 01:58 PM

			EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L178	77	((US-20080161804-A1 OR US-20060264974-A1 OR US-20060229645-A1 OR US-20090105640-A1 OR US-20070287996-A1 OR US-20020143302-A1 OR US-20070077230-A1 OR US-20070016183-A1 OR US-20060206111-A1 OR US-20060206129-A1 OR US-20060206130-A1 OR US-20010031941-A1 OR US-20010018586-A1 OR US-20070006215-A1 OR US-20110230874-A1 OR US-20070112340-A1 OR US-20040158239-A1 OR US-20060224223-A1 OR US-20060084965-A1 OR US-20050085804-A1 OR US-20040015161-A1 OR US-20060095029-A1 OR US-20040199179-A1 OR US-20050101950-A1 OR US-20040260282-A1 OR US-20090024124-A1 OR US-20060217705-A1 OR US-20090221998-A1 OR US-20060206131-A1 OR US-20060206132-A1 OR US-20060206133-A1 OR US-20060189972-A1 OR US-20050060006-A1 OR US-20110060314-A1 OR US-20170049503-A1 OR US-	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/12/15 02:02 PM

		20060200121-A1).did. AND PGPB.dbnm.) OR ((US-5855576-A OR US-5827276-A OR US-6638275-B1 OR US-5507802-A OR US-7270661-B2 OR US-7198625-B1 OR US-7918852-B2 OR US-7627380-B2 OR US-5571147-A OR US-4907589-A OR US-5433739-A OR US-6245070-B1 OR US-8753335-B2 OR US-6015406-A OR US-5913855-A OR US-6254598-B1 OR US-6092528-A OR US-6053937-A OR US-5951547-A OR US-5928229-A OR US-5925042-A OR US-6958062-B1 OR US-5863290-A OR US-5810804-A OR US-5800484-A OR US-5782827-A OR US-5735847-A OR US-5728143-A OR US-5683384-A OR US-5599346-A OR US-6123084-A OR US-5995875-A OR US-2022065-A OR US-5749846-A OR US-5687739-A OR US-7357798-B2 OR US-7108696-B2 OR US-2994324-A OR US-5672173-A OR US-6129726-A OR US-6132425-A).did. AND USPT.dbnm.)					
L179	28	"20060084965" "20060095029" "5599346".pn.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO;	OR	ON	ON	2022/12/15 02:05 PM

			JPO; DERWENT; IBM_TDB)				
L180	77	((US-20080161804-A1 OR US-20060264974-A1 OR US-20060229645-A1 OR US-20090105640-A1 OR US-20070287996-A1 OR US-20020143302-A1 OR US-20070077230-A1 OR US-20070016183-A1 OR US-20060206111-A1 OR US-20060206129-A1 OR US-20060206130-A1 OR US-20010031941-A1 OR US-20010018586-A1 OR US-20070006215-A1 OR US-20110230874-A1 OR US-20070112340-A1 OR US-20040158239-A1 OR US-20060224223-A1 OR US-20060084965-A1 OR US-20050085804-A1 OR US-20040015161-A1 OR US-20060095029-A1 OR US-20040199179-A1 OR US-20050101950-A1 OR US-20040260282-A1 OR US-20090024124-A1 OR US-20060217705-A1 OR US-20090221998-A1 OR US-20060206131-A1 OR US-20060206132-A1 OR US-20060206133-A1 OR US-20060189972-A1 OR US-20050060006-A1 OR US-20110060314-A1 OR US-20170049503-A1 OR US-20060200121-A1).did. AND PGPB.dbnm.) OR ((US-5855576-A OR US-5827276-A OR US-6638275-B1 OR US-5507802-A OR US-7270661-B2 OR US-7198625-B1 OR US-7918852-B2 OR US-	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/12/16 09:56 AM

		7627380-B2 OR US-5571147-A OR US-4907589-A OR US-5433739-A OR US-6245070-B1 OR US-8753335-B2 OR US-6015406-A OR US-5913855-A OR US-6254598-B1 OR US-6092528-A OR US-6053937-A OR US-5951547-A OR US-5928229-A OR US-5925042-A OR US-6958062-B1 OR US-5863290-A OR US-5810804-A OR US-5800484-A OR US-5782827-A OR US-5735847-A OR US-5728143-A OR US-5683384-A OR US-5599346-A OR US-6123084-A OR US-5995875-A OR US-2022065-A OR US-5749846-A OR US-5687739-A OR US-7357798-B2 OR US-7108696-B2 OR US-2994324-A OR US-5672173-A OR US-6129726-A OR US-6132425-A).did. AND USPT.dbnm.)					
L181	16	180 AND (rotat$4) near5 (cannula needle stylet)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/12/16 09:56 AM
L182	34	173 AND (posterior ADJ rami)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB,	OR	ON	ON	2022/12/16 12:34 PM

			HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L183	4	"10736688".pn. "10925664".pn.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/12/16 01:22 PM
L184	25	"20060200121" "20060095029" "20060106376" "20040199179"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/12/16 01:52 PM
L185	3	"17126675"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT;	OR	ON	ON	2023/06/27 12:38 PM

			IBM_TDB)				
L186	11	"15065980"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/06/27 12:58 PM
L187	2	"7918852".pn.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/06/27 05:02 PM
L188	22	"20060200121" "20060095029"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/06/27 05:15 PM
L189	13	"20060095029"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV,	OR	ON	ON	2023/06/27 05:26 PM

			MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L190	13	"20060095029"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/06/27 05:42 PM
L191	2	"7918852".pn.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/06/27 05:47 PM
L192	11	"15065980"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/06/28 08:16 AM
L193	2	"11445977".pn.	(US-PGPUB; USPAT;	OR	ON	ON	2023/06/28

			USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				10:06 AM
L194	11	"20150141914"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/06/28 12:52 PM
L195	12	"20090076445"	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/06/28 12:56 PM
L196	5	("2015/0141914").urpn. AND (PGPB | USPT | USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2023/06/28 01:03 PM
L197	100	(sheath) near3 (clamp$4) SAME (catheter) near3 (clamp$4)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2023/06/28 01:03 PM
L198	2020	("10716618"|"10736688"|"10925664"|"1096678	(US-PGPUB; USPAT; USOCR; FIT (AU, AP,	OR	ON	ON	2023/06/30 04:46 PM

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		61"|"6352536"|"640274 3"|"6402747"|"6405072" |"6416520"|"6419653"|" 6419680"|"6419798"|"6 425887"|"6440127"|"64 47477"|"6447505"|"645 1018"|"6454765"|"6458 130"|"6459769"|"64613 14"|"6464704"|"646827 3"|"6471695"|"6471698" |"6478793"|"6500175"|" 6506189"|"6517534"|"6 530922"|"6533987"|"65 51311"|"6562033"|"656 5562"|"6569159"|"6575 967"|"6575969"|"65857 35"|"6602249"|"660508 5"|"6610054"|"6622731" |"6623481"|"6632221"|" 6632222"|"6638275"|"6 641580"|"6645201"|"66 52515"|"6652516"|"666 0002"|"6660362"|"6663 624"|"6669693"|"66825 26"|"6682528"|"668570 1"|"6689127"|"6690210" |"6692490"|"6699242"|" 6706152"|"6723092"|"6 740080"|"6743226"|"67 43229"|"6746570"|"674 9719"|"6752804"|"6770 070"|"6780180"|"68035 49"|"6814712"|"683795 6"|"6846448"|"6847848" |"6852091"|"6866663"|" 6881214"|"6889089"|"6 896675"|"6932810"|"69 58062"|"6958064"|"696 1602"|"6962587"|"6964 660"|"6966908"|"69744 55"|"6989004"|"699792 5"|"7025767"|"7033353" |"7044949"|"7048733"|" 7056320"|"7074484"|"7 076399"|"7087051"|"70 99712"|"7108696"|"711 2197"|"7115124"|"7138 088"|"7150743"|"71507 44"|"7160296"|"716353 6"|"7179256"|"7179258" |"7207990"|"7229438"|" 7258688"|"7266414"|"7 270660"|"7270661"|"72 70662"|"7276064"|"728 1666"|"7294127"|"7306 596"|"7311702"|"73188 22"|"7340307"|"734453 3"|"7354436"|"7357798"					

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L199	140	198 AND nerve	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/06/30 06:28 PM

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N164	207705	(filaments probe).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 06:47 PM
N165	462	(filaments and probe).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 06:47 PM
N166	88	(filaments and probe and electrode).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 06:47 PM
N167	70	(filaments and probe).clm. and (a61b18/$5.cpc. a61b2018/$5.cpc.)	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 06:50 PM

N168	2	"20060084965"	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 06:59 PM
N169	4	"20070006215" "7108696".pn. "6989004".pn.	(US-PGPUB; USPAT)	OR	ON	ON	2020/04/06 07:06 PM
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N171	80	(filaments and probe).clm. and (a61b18/$5.cpc. a61b2018/$5.cpc.)	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/30 04:12 PM

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a-Equivalent Form
U.S. Patent and Trademark Office

INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application Number	17/126,675
	Filing Date	December 18, 2020
	First Named Inventor	Robert E. Wright
	Art Unit	3794
	Examiner Name	Eun Hwa Kim
	Attorney Docket Number	NBUS.001C1C1C1

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	5	4206761		06-10-1980	Cosman	
	6	4206762		06-10-1980	Cosman	
	7	4281667		08-04-1981	Cosman	
	8	4353371		10-12-1982	Cosman	
	9	4375220		03-01-1983	Matvias	
	10	4378809		04-05-1983	Cosman	
	11	4385636		05-31-1983	Cosman	
	12	4411266		10-25-1983	Cosman	
	13	4565200		01-21-1986	Cosman	
	14	4573980		03-04-1986	Karrasch et al.	
	15	4583538		04-22-1986	Onik et al.	
	16	4593703		06-10-1986	Cosman	
	17	4618978		10-21-1986	Cosman	
	18	4646752		03-03-1987	Swann et al.	
	19	4653508		03-31-1987	Cosman	
	20	4660568		04-28-1987	Cosman	
	21	4676255		06-30-1987	Cosman	
	22	4698207		10-06-1987	Bringham et al.	
	23	4787886		11-29-1988	Cosman	
	24	4796615		01-10-1989	Bullock et al.	
	25	4827927		05-09-1989	Newton	
	26	4838265		06-13-1989	Cosman et al.	
	27	4886506		12-12-1989	Lovgren et al.	
	28	4907589		03-13-1990	Cosman	
	29	4966597		10-30-1990	Cosman	
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	41	5312391		05-17-1994	Wilk	
	42	5318013		06-07-1994	Wilk	
	43	5324255		06-28-1994	Passafaro et al.	
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	45	5342292		08-30-1994	Nita et al.	
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	51	5401272		03-28-1995	Perkins	
	52	5421923		06-06-1995	Clarke et al.	
	53	5422567		06-06-1995	Matsunaga	
	54	5423809		06-13-1995	Klicek	
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	56	5447417		09-05-1995	Kuhl et al.	
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	72	5599345		02-04-1997	Edwards et al.	
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	76	5628743		05-13-1997	Cimino	
	77	5662111		09-02-1997	Cosman	
	78	5662620		09-02-1997	Lieber et al.	
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	80	5667488		09-16-1997	Lundquist et al.	
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	82	5672173		09-30-1997	Gough et al.	
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	221	6692490		02-17-2004	Edwards	
	222	6706152		03-16-2004	Burazin et al.	
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	240	6932810		08-23-2005	Ryan	
	241	6958062		10-25-2005	Gough et al.	
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	243	6961602		11-01-2005	Fuimaono et al.	
	244	6964660		11-15-2005	Maguire et al.	
	245	6966908		11-22-2005	Maguire et al.	
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	247	6997925		02-14-2006	Maguire et al.	
	248	7025767		04-11-2006	Schaefer et al.	
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	250	7044949		05-16-2006	Orszulak et al.	
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	252	7056320		06-06-2006	Utley et al.	
	253	7074484		07-11-2006	Topolkaraev et al.	
	254	7076399		07-11-2006	Godara	
	255	7087051		08-08-2006	Bourne et al.	
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	265	7179256		02-20-2007	Mest	
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	273	7281666		10-16-2007	Smith	
	274	7294127		11-13-2007	Leung et al.	
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	276	7311702		12-25-2007	Tallarida et al.	
	277	7340307		03-04-2008	Maguire et al.	
	278	7354436		04-08-2008	Rioux et al.	
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	280	7371234		05-13-2008	Young	
	281	7387626		06-17-2008	Edwards et al.	
	282	7387630		06-17-2008	Mest	
	283	7416549		08-26-2008	Young et al.	
	284	7449020		11-11-2008	Edwards et al.	
	285	7468062		12-23-2008	Oral et al.	
	286	7480533		01-20-2009	Cosman et al.	
	287	7517346		04-14-2009	Sloan et al.	
	288	7524318		04-28-2009	Young et al.	
	289	7533002		05-12-2009	Godara	
	290	7549986		06-23-2009	Rioux et al.	
	291	7561907		07-14-2009	Fuimaono et al.	
	292	7593778		09-22-2009	Chandran et al.	
	293	7596469		09-29-2009	Godara	
	294	7615050		11-10-2009	Cross et al.	
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	297	7678106		03-16-2010	Lee	
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	First Named Inventor	Robert E. Wright
	Art Unit	3794
	Examiner Name	Eun Hwa Kim
	Attorney Docket Number	NBUS.001C1C1C1

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EXAMINER SIGNATURE

Examiner Signature	/EUN HWA KIM/	Date Considered	06/30/2023

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw a line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /E.H.K/

IPR2024-01211
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application Number	17/126,675
	Filing Date	December 18, 2020
	First Named Inventor	Robert E. Wright
	Art Unit	3794
	Examiner Name	Eun Hwa Kim
	Attorney Docket Number	NBUS.001C1C1C1

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ Applicant hereby states that each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. (37 CFR 1.97(e)(1))

OR

☐ Applicant hereby states that no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in § 1.56(c) more than three months prior to the filing of the information disclosure statement. (37 CFR 1.97(e)(2))

☐ See attached certification statement.

☒ A certification statement is not submitted herewith.

☒ The fee set forth in 37 CFR 1.17(p) is submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Daniel C. Higgs/	Date (YYYY-MM-DD)	2023-06-13
Name/Print	Daniel C. Higgs	Registration Number	55,265

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /E.H./

IPR2024-01211
Avanos v. Stratus
Stratus Ex. 2013

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

148468 7590 07/06/2023
Med Venture Management, LLC
299 S. Main Street
Suite 2300
Salt Lake City, UT 84111

EXAMINER	
KIM, EUN HWA	
ART UNIT	PAPER NUMBER
3794	

DATE MAILED: 07/06/2023

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/126,675	12/18/2020	Robert E. Wright	NBUS.001C1C1C1	1065

TITLE OF INVENTION: METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	10/06/2023

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

148468 7590 07/06/2023

Med Venture Management, LLC
299 S. Main Street
Suite 2300
Salt Lake City, UT 84111

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/126,675	12/18/2020	Robert E. Wright	NBUS.001C1C1C1	1065

TITLE OF INVENTION: METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	10/06/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
KIM, EUN HWA	3794	606-034000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑ Issue Fee ❑ Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via Patent Center or EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

❑ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

❑ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (08-18) Approved for use through 01/31/2020 OMB 0651-0034 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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Avanos v. Stratus
Stratus Ex. 2013

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/126,675	12/18/2020	Robert E. Wright	NBUS.001C1C1C1	1065

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Salt Lake City, UT 84111

EXAMINER	
KIM, EUN HWA	
ART UNIT	**PAPER NUMBER**
3794	

DATE MAILED: 07/06/2023

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)

(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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Avanos v. Stratus
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Notice of Allowability	Application No. 17/126,675	Applicant(s) Wright et al.	
	Examiner EUNHWA KIM	Art Unit 3794	AIA (FITF) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to claim sfiled on 6/16/2023.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 2-15,17-18 and 22-33 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/EUN HWA KIM/
Primary Examiner, Art Unit 3794

EXAMINER'S AMENDMENT

1. The following is an examiner's statement of reasons for allowance: During the search of the prior art, Mowery (U.S. PGPub. No. 2006/0200121) was found to be pertinent to the claimed invention. Mowry discloses a method of performing spinal RF neurotomy in a patient ([0028]-[0029], [0037]);

a. moving a tip of a needle to a first position proximate to a target nerve along the spine of the patient ([0075], [0107]-[0112]: inserting stylet 20 through skin, muscle, fat to a target site including nerve fibers running along a spinal column);

b. advancing a filament relative to the tip to a deployed position ([0113]-[0015]: once the stylet has reached its desired target tissue site, tines 120 & 121 are withdrawn from the stylet to provide a desired lesioning affect);

c. after the filament has been advanced to the deployed position, applying RF energy to the filament to ablate a portion of the target nerve ([0158]: once the VIPER 10 has been deployed to the target tissue site, energy is delivered to develop the desired lesion).

2. Mowry fails to disclose the method step of applying RF energy to the needle tip.

3. Young (U.S. PGPub. No. 2006/0095029) teaches applying RF energy between a plurality of filaments in during a bipolar RF ablation configuration as also disclosed by Mowry (Mowry, [0016]: bipolar RF energy delivery between tine(s) 120 and 121 as shown in Fig. 10 & 12; Young, [0042]: bipolar RF energy delivery between electrodes 26 advancing from cannula 12 in Fig. 3). Alternatively, Young teaches providing a return electrode on a tip of a needle (cannula 12 which is in the form of a needle with internal stylet comprises an electrode 90 in Fig. 4, [0050]) so that the two plurality of filaments (electrodes 26) operate as active electrodes ([0042]).

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4. Mowry/Young combination fails to disclose a step of inserting a radiofrequency probe into the needle such that a distal end of the radiofrequency probe contacts the tip of the needle and the tip of the needle and the filament operating in combination as an active radiofrequency electrode to ablate at least a portion of the target nerve.

5. Tullis (U.S. Pat. No. 7,918,852) discloses inserting a radiofrequency probe (assembly 36 in Fig. 2) within a needle (cannula 28 in Fig. 2). However, Tullis only teaches that the proximal portion of the RF probe (electrical connector 140 in assembly 36 in Figs. 10 and 12) establishes electrical connection with the proximal portion of the needle (terminal 86 of the cannula 28 abuts connector 140 of the assembly as shown in Figs. 10 & 12). Tullis further teaches that the radiofrequency probe acts as the active radiofrequency electrode that comes into contact with tissue. Therefore, Tullis fails to disclose applying radiofrequency energy to the radiofrequency probe such that the radiofrequency energy is conducted away from the distal end of the radiofrequency probe by the tip of the needle and the filament, with the radiofrequency probe, the tip of the needle, and the filament operating in combination as an active radiofrequency electrode to ablate at least a portion of the target nerve as required in independent claim 2. Mowry/Young/Tullisc combination fails to disclose, teach, or suggest all the limitations as set forth in independent claim 2. Accordingly, claims 3-15, 17-18 & 22-33 are allowed as being dependent upon independent claim 2.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

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Terminal Disclaimer

6. The terminal disclaimer filed on June 13, 2023 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of **U.S. Pat. No. 10,925,664** has been reviewed and is accepted. The terminal disclaimer has been recorded.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to EUNHWA KIM whose telephone number is (571)270-1265. The examiner can normally be reached 9AM-5:30PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, JOSEPH STOKLOSA can be reached on (571) 272-1213. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/EUN HWA KIM/
Primary Examiner, Art Unit 3794
6/27/2023

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Stratus Ex. 2013

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	Robert E. Wright	)	
Application No.:	17/126,675	)	Art Unit: 3794
Filing Date:	December 18, 2020	)	
Title:	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY	)	
Examiner:	Eun Hwa Kim	)	
Confirmation No.:	1065	)	
Customer No.:	148468	)	

Comments on Statement of Reasons for Allowance

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

In reply to the Notice of Allowability that issued on July 6, 2023 in the above-identified application, the Applicant respectfully submits the following comments on the Statement of Reasons for Allowance ("Statement").

The Applicant thanks the examiner for her diligent review of the application and agrees that the claims are allowable. The Applicant does not, however, acquiesce to any characterizations of the prior art or the present application made in the Statement and takes no position regarding patentability other than positions taken during prosecution. Therefore, the examiner's Statement should not be attributed to the Applicant as an indication of the basis for Applicant's belief that the claims are patentable. To the extent the Statement summarizes or paraphrases the claims, or

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otherwise deviates from the language of the claims, the Applicant respectfully submits that the meaning and scope of the claims depend on the actual language of the claims. To the extent the Statement refers to only selected portions of a claim, the Applicant notes that the claims may contain additional limitations other than those mentioned in the Statement, and that patentability is measured against a claim as a whole, not just selected limitations. Other limitations alone or in combination may provide distinguishing aspects over the prior art. To the extent the Statement suggests that the mentioned limitations have any special prominence, the Applicant does not necessarily agree. Further, the dependent claims may include additional limitations that may also provide further reasons for patentability.

DATED this 29th day of September, 2023.

Respectfully submitted,

/Daniel C. Higgs/

Daniel C. Higgs
Attorney for Applicant
Registration No. 55,265

MED VENTURE HOLDINGS, LLC
299 S. Main Street
Suite 2300
Salt Lake City, Utah
(801) 703-1961

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications. **Because electronic patent issuance may occur shortly after issue fee payment, any desired continuing application should preferably be filed prior to payment of this issue fee in order not to jeopardize copendency.**

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

148468 7590 07/06/2023
Med Venture Management, LLC
299 S. Main Street
Suite 2300
Salt Lake City, UT 84111

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

Daniel C. Higgs	(Typed or printed name)
	(Signature)
September 29, 2023	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/126,675	12/18/2020	Robert E. Wright	NBUS.001C1C1C1	1065

TITLE OF INVENTION: METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	10/06/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
KIM, EUN HWA	3794	606-034000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Med Venture Management, LLC
2 Daniel C. Higgs
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Stratus Medical, LLC

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Magnolia, Texas

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☒ Issue Fee ☒ Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

☒ Electronic Payment via Patent Center or EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. 602176

5. **Change in Entity Status** (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

☐ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

☐ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date September 29, 2023

Typed or printed name Daniel C. Higgs Registration No. 55,265

Electronic Patent Application Fee Transmittal

Application Number:	17126675
Filing Date:	18-Dec-2020
Title of Invention:	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY
First Named Inventor/Applicant Name:	Robert E. Wright
Filer:	Daniel Christopher Higgs
Attorney Docket Number:	NBUS.001C1C1C1

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

IPR2024-01211
Avanos v. Stratus
Stratus Ex. 2013

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
PUBL. FEE- EARLY, VOLUNTARY, OR NORMAL	1504	1	0	0
UTILITY APPL ISSUE FEE	2501	1	480	480
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**480**

IPR2024-01211
Avanos v. Stratus
Stratus Ex. 2013

Electronic Acknowledgement Receipt

EFS ID:	48661367
Application Number:	17126675
International Application Number:	
Confirmation Number:	1065
Title of Invention:	METHODS AND SYSTEMS FOR SPINAL RADIO FREQUENCY NEUROTOMY
First Named Inventor/Applicant Name:	Robert E. Wright
Customer Number:	148468
Filer:	Daniel Christopher Higgs
Filer Authorized By:	
Attorney Docket Number:	NBUS.001C1C1C1
Receipt Date:	29-SEP-2023
Filing Date:	18-DEC-2020
Time Stamp:	13:38:19
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$480
RAM confirmation Number	E20239SD39158479
Deposit Account	602176
Authorized User	Daniel Higgs

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

IPR2024-01211
Avanos v. Stratus
Stratus Ex. 2013

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Post Allowance Communication - Incoming	NBUS001C1C1C1_Comments.pdf	84125 b2a2d707e9bae0c029eb5cd9fe6a1ce4ef16f6a4	no	2
Warnings:					
Information:					
2	Issue Fee Payment (PTO-85B)	NBUS001C1C1C1_PTOL_85_B.pdf	1691429 4e0c661644b95928cc780fc886e188c1334599f6	no	1
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	40384 5df338860605bec3547c13dded8f580badae80c2	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1815938		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/126,675	11/07/2023	11806070	NBUS.001C1C1C1	1065

148468 7590 10/18/2023

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ISSUE NOTIFICATION

The projected patent number and issue date are specified above. The patent will issue electronically. The electronically issued patent is the official patent grant pursuant to 35 U.S.C. § 153. The patent may be accessed on or after the issue date through Patent Center at https://patentcenter.uspto.gov/. The patent will be available in both the public and the private sides of Patent Center. Further assistance in electronically accessing the patent, or about Patent Center, is available by calling the Patent Electronic Business Center at 1-888-217-9197.

The USPTO is implementing electronic patent issuance with a transition period, during which period the USPTO will mail a ceremonial paper copy of the electronic patent grant to the correspondence address of record. Additional copies of the patent (i.e., certified and presentation copies) may be ordered for a fee from the USPTO's Certified Copy Center at https://certifiedcopycenter.uspto.gov/index.html. The Certified Copy Center may be reached at (800)972-6382.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 221 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Center (https://patentcenter.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

INVENTOR(s) (Please see PATENT CENTER site https://patentcenter.uspto.gov for additional inventors):

Robert E. Wright, Clayton, AUSTRALIA;
Scott A. Brandt, Denver, CO;

APPLICANT(s) (Please see PATENT CENTER site https://patentcenter.uspto.gov for additional applicants):

Stratus Medical, LLC, Magnolia, TX;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/126,675	12/18/2020	Robert E. Wright	NBUS.001C1C1C1	1065

148468 7590 11/07/2023

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EXAMINER	
KIM, EUN HWA	

ART UNIT	PAPER NUMBER
3794	

NOTIFICATION DATE	DELIVERY MODE
11/07/2023	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

acharlton@mvhg.legal
dhiggs@mvhg.legal

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APPLICATION NO.	ISSUE DATE	PATENT NO.
17/126,675	07-Nov-2023	11806070

Med Venture Management, LLC
299 S. Main Street
Salt Lake City, UT 84111

EGRANT NOTIFICATION

Your electronic patent grant (eGrant) is now available, which can be accessed via Patent Center at https://patentcenter.uspto.gov

The electronic patent grant is the official patent grant under 35 U.S.C. 153. For more information, please visit https://www.uspto.gov/electronicgrants

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