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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/358,837	07/25/2023	Richard Quick	111552.8023.US06	6598
25096	7590	12/03/2024	EXAMINER	
PERKINS COIE LLP - SEA General			NGUYEN, TUAN VAN	
PATENT-SEA			ART UNIT	PAPER NUMBER
P.O. BOX 1247			3771	
SEATTLE, WA 98111-1247			NOTIFICATION DATE	DELIVERY MODE
			12/03/2024	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):

patentprocurement@perkinscoie.com

APPLICATION NO.	ISSUE DATE	PATENT NO.
18/358,837	03-Dec-2024	12156669

PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

EGRANT NOTIFICATION

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25096 7590 11/13/2024
PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

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 0 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):

Richard Quick, Mission Viejo, CA;
Benjamin Edward Merritt, San Clemente, CA;
Paul Lubock, Monarch Beach, CA;
John Coleman Thress, Capistrano Beach, CA;

APPLICANT(s) (Please see PATENT CENTER site <https://patentcenter.uspto.gov> for additional applicants):

Inari Medical, Inc., Irvine, CA;

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Document Code:WFEE

User :Sengpheth Sandara

Refund Accounting Date:11/04/2024

Effective Date	Sale Item Reference Number	Refund Total
11/04/2024	18358837	\$2,000.00

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method	Account Number
I2024A4C30469418	1820	RCE- 2ND AND SUBSEQUENT REQUEST	\$2,000.00	DA	500665



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Document Code:WFEE

User :Sengpheth Sandara

Sale Adjustment Accounting Date:11/04/2024

Effective Date	Sale Accounting Date	Sale Item Reference Number
11/04/2024	11/04/2024	18358837

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I2024A4C30469418	1820	RCE- 2ND AND SUBSEQUENT REQUEST	\$2,000.00	DA



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18/358,837	07/25/2023	Richard Quick	111552.8023.US06	6598
25096	7590	11/01/2024	EXAMINER	
PERKINS COIE LLP - SEA General			NGUYEN, TUAN VAN	
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patentprocurement@perkinscoie.com

Supplemental Notice of Allowability	Application No. 18/358,837	Applicant(s) Quick et al.	
	Examiner TUAN V NGUYEN	Art Unit 3771	AIA (FITF) Status Yes

-- 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 the Information Disclosure Statement filed on October 10, 2024.
☐ 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 1-30. 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)	5. ☐ Examiner's Amendment/Comment
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.	6. ☐ Examiner's Statement of Reasons for Allowance
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.	7. ☐ Other _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.	

/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771	
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Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031

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Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552.8023.US06

U.S. PATENTS AND PUBLICATIONS					
Examiner Initial*	Cite No	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	4880408	11-14-1989	Cumes et al.	
	2.	20070010787	01-11-2007	Hackett et al.	
	3.	5429616	07-04-1995	Schaffer	
	4.	8734374	05-27-2014	Aklog et al.	
	5.	6776770	08-17-2004	Trerotola	
	6.	20100042118	02-18-2010	Garrison et al.	
	7.	5938645	08-17-1999	Gordon	
	8.	7998104	08-16-2011	Chang	
	9.	8157760	04-17-2012	Criado et al.	
	10.	6481439	11-19-2002	Lewis et al.	
	11.	20170043066	02-16-2017	Laub	
	12.				
	13.				

FOREIGN PATENT DOCUMENTS						
Examiner Initial*	Cite No	Foreign Document Number ³	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
	1.	WO2018019829	02-01-2018	NEURAVI LIMITED		
	2.					
	3.					
	4.					
	5.					
	6.					
	7.					

Doc code: IDS

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	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552.8023.US06

NON-PATENT LITERATURE DOCUMENTS				
Examiner Initials*	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	
	1.	Shani, Jacob M.D., et al., "Mechanical Manipulation of Thrombus: Coronary Thrombectomy," Intracoronary Clot Displacement, and Transcatheter Aspiration," 72 Am. J. Cardiol. 116G-118G, 1993, 3 pages.		
	2.	Bose, A., et al., "The Penumbra System: A Mechanical Device for the Treatment of Acute Stroke due to Thromboembolism," 29 Am. J. Neuroradiol. 1409-1413, August 2008, 6 pages.		
	3.	Turk, Aquilla S., et al., "Initial clinical experience with the ADAPT technique: A direct aspiration first pass technique for stroke thrombectomy," 6 J. NeuroIntervent. Surg. 231-237, 2014, 8 pages.		
	4.	Turk, Aquilla S., et al., "Aspiration thrombectomy versus stent retriever thrombectomy as first-line approach for large vessel occlusion (COMPASS): a multicentre, randomized, open label, blinded outcome, non-inferiority trial," 393 Lancet 998-1008, March 2019, 11 pages.		
	5.	Saver, Jeffrey L., "Time is Brain – Quantified," Stroke Center and Department of Neurology, University of California, Los Angeles, 2005, https://www.ahajournals.org/doi/10.1161/01.str.0000196957.55928.ab , 4 pages.		
	6.	Petition for Inter Partes Review of U.S. Patent No. 11,744,691, IMPERATIVE CARE, INC. (Petitioner) V. INARI MEDICAL, INC. (Patent Owner), Case IPR2024-01257, 103 pages.		
	7.	Declaration of TROY L. THORNTON in Support of Petition for Inter Partes Review of U.S. Patent No. 11,744,691, IMPERATIVE CARE, INC. (Petitioner) V. INARI MEDICAL, INC. (Patent Owner), Case IPR2024-01257, filed with IPR as exhibit on August 12, 2024, 114 pages.		
	8.	Expert Declaration of AQUILLA S. TURK, III, D.O. in Support of Petition for Inter Partes Review of U.S. Patent No. 11,744,691, IMPERATIVE CARE, INC. (Petitioner) V. INARI MEDICAL, INC. (Patent Owner), Case IPR2024-01257, filed with IPR as exhibit on August 12, 2024, 24 pages.		
	9.	DEFENDANT IMPERATIVE CARE'S OPPOSITION TO PLAINTIFF INARI MEDICAL'S MOTION FOR A PRELIMINARY INJUNCTION, IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF CALIFORNIA SAN JOSE DIVISION, INARI MEDICAL, INC. (Plaintiff) V. IMPERATIVE CARE, INC. (Defendants), Civil Action No. 5:24-cv-03117-EKL, filed on September 9, 2024, 44 pages.		
	10.	DECLARATION OF TROY THORNTON IN SUPPORT OF OPPOSITION TO PLAINTIFF'S MOTION FOR PRELIMINARY INJUNCTION, IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF CALIFORNIA SAN JOSE DIVISION, INARI MEDICAL, INC. (Plaintiff) V. IMPERATIVE CARE, INC. (Defendants), Civil Action No. 5:24-cv-03117-EKL, filed on September 9, 2024, 74 pages.		

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)

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	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552.8023.US06

EXAMINER SIGNATURE			
Examiner Signature	/TUAN V NGUYEN/	Date Considered	10/28/2024
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			
<small>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.</small>			

CERTIFICATION STATEMENT	
Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):	
☐ 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. See 37 CFR 1.97(e) (1).	
OR	
☐ 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).	
☐ See attached certification statement.	
☒ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.	
☐ None	
It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references. This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, Applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.	
COPIES OF REFERENCES	
In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).	
SIGNATURE	

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

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	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552.8023.US06

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	/Matthew S. Williams/	Date (YYYY-MM-DD)	2024-10-10
Name/Print	Matthew S. Williams	Registration Number	77,516

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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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Sale Item Reference Number

18358837

Effective Date

10/10/2024

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I20240ED56118182	1806	SUBMISSION- INFORMATION DISCLOSURE STMT	\$260.00	Deposit Account



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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
18/358,837

RECEIPT DATE / TIME
10/10/2024 05:09:03 PM Z ET

ATTORNEY DOCKET #
111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	12114876
CONFIRMATION #	6598	FILED BY	Michelle Burge
PATENT CENTER #	67505550	FILING DATE	07/25/2023
CUSTOMER #	25096	FIRST NAMED INVENTOR	Richard Quick
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Matthew Williams

Documents

TOTAL DOCUMENTS: 11

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
FOR_WO2018019829.pdf	59	Foreign Reference	3832 KB
NPL_Bose - pto.pdf	6	Non Patent Literature	555 KB
NPL_Expert Declaration of AQUILLA S. TURK - 24 pages.pdf	24	Non Patent Literature	276 KB
NPL_Saver.pdf	4	Non Patent Literature	317 KB
NPL_DEFENDANT IMPERATIVE CARES OPPOSITION - 44 pages.pdf	44	Non Patent Literature	2586 KB
NPL_Declaration of TROY L. THORNTON 114 pages.pdf	114	Non Patent Literature	3856 KB

NPL_Turk_Aspiration - 11 pages.pdf	11	Non Patent Literature	1681 KB
NPL_Shani.pdf	3	Non Patent Literature	1821 KB
NPL_Petition for Inter Partes Review - 103 pages - uspto.pdf	103	Non Patent Literature	5201 KB
NPL_Turk_Initial clinical experience - 8 pages.pdf	8	Non Patent Literature	2315 KB
NPL_DECLARATION OF TROY THORNTON - 74 pages.pdf	74	Non Patent Literature	7696 KB

Digest

DOCUMENT

MESSAGE DIGEST(SHA-512)

FOR_WO2018019829.pdf	BC63E4D705CC8A70836C7B236F702DCB6116168843CD4CF8886ACA941132AC936809DFC05C5F88F137F4F4B7F67BC5D13A69D81EA24B4E413ED9935BDE4CB451
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NPL_Turk_Aspiration - 11 pages.pdf	3FC8AF403E3E8D87EFF783668D28378461F5F6598012A80E9007A2B4C0BE7A2F1B7CE8C483E0B4E82C1640B5A4CBE6688F6C4FA40C5EE93B9601C3C140F77C3D
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NPL_Petition for Inter Partes Review - 103 pages - uspto.pdf	8B86FC0C25DA1306655FACD46D4AD8049786EC2C1EDA7573 FF0D0235FDBCC8AD5A73BBAEED1A79C175AB0D34DEC025A AD1F42967D58D137D13403FF0CC403367
NPL_Turk_Initial clinical experience - 8 pages.pdf	B0780510EABD662C9D1029DB6C85B4C98A36A537836D8EC3 C9FC9F010B9327C9D3CCB151F27CDD1457747E36101700458 8AF1E42BD791D3FDBF16DF80D6280B4
NPL_DECLARATION OF TROY THORNTON - 74 pages.pdf	E7C236EC6F91FFCA51601E0BF6E3BEE3474190645C8E8A7A3 C1F8471295E64828706A8F54856C10FFE744220D91BCC09015 00E2AC8B2C032338F5C88F2867948

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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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PETITION TO WITHDRAW AN APPLICATION FROM ISSUE AFTER PAYMENT OF THE ISSUE FEE UNDER 37 CFR 1.313(c)(2) with Assigned Patent Number

APPLICATION #
18358837

ATTORNEY DOCKET #
111552.8023.US06

FILING DATE
07/25/2023

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

CONFIRMATION # 6598

FILING DATE 07/25/2023

ART UNIT 3771

FIRST NAMED INVENTOR Richard Quick

EXAMINER TUAN NGUYEN

An application may be withdrawn from issue for further action upon petition by the applicant. To request that the Office withdraw an application from issue, applicant must file a petition under this section including the fee set forth in § 1.17(h) and a showing of good and sufficient reasons why withdrawal of the application from issue is necessary.

APPLICANT HEREBY PETITIONS TO WITHDRAW THIS APPLICATION FROM ISSUE UNDER 37 CFR 1.313(c).

A grantable petition requires the following items:

- (1) Petition fee; and
- (2) One of the following reasons: A grantable petition requires the following items: (a) Unpatentability of one or more claims, which must be accompanied by an unequivocal statement that one or more claims are unpatentable, an amendment to such claim or claims, and an explanation as to how the amendment causes such claim or claims to be patentable;
- (b) Consideration of a request for continued examination in compliance with § 1.114 (for a utility or plant application only); or
- (c) Express abandonment of the application. Such express abandonment may be in favor of a continuing application, but not a CPA under 37 CFR 1.53(d).

Reason for withdrawal

Consideration of a request for continued examination (Quick Path Information Disclosure Statement) - RCE request, submission, and fee are attached

Applicant claims the following entity status

Regular Undiscounted

Signature

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 has been given power of attorney in this application

Signature	Name	Registration #
/Matthew S. Williams/	Matthew Williams	77516



UNITED STATES
PATENT AND TRADEMARK OFFICE

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
18/358,837

RECEIPT DATE / TIME
10/10/2024 04:18:55 PM Z ET

ATTORNEY DOCKET #
111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # 12114876

CONFIRMATION # 6598

FILED BY Matthew Williams

PATENT CENTER # 67522303

FILING DATE 07/25/2023

CUSTOMER # 25096

FIRST NAMED
INVENTOR Richard Quick

CORRESPONDENCE
ADDRESS -

AUTHORIZED BY -

Documents

TOTAL DOCUMENTS: 4

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
petition-request.pdf	2	ePetition Request Form	29 KB
2024-10-10 IDS SB08 - 111552.8023.US06.pdf	4	Information Disclosure Statement (IDS) Form (SB08)	141 KB
Warning: This is not a USPTO supplied IDS fillable form. Data in the form cannot be automatically loaded to other USPTO systems.			
2024-10-10 RCE - 111552.8023.US06.pdf	3	Request for Continued Examination (RCE)	1628 KB
2024-10-010 QPIDS Request - 111552.8023.US06.pdf	2	Quick Path Information Disclosure Statement	774 KB

Digest

DOCUMENT

MESSAGE DIGEST(SHA-512)

petition-request.pdf	292B4FEFCCFEBF7B649EF0B187459561D497B9AFC7298ADD 85EB8BC8B2E700A0EBDA5E474D4942A09447D9EA233C8AB2 702E0DA65BFC18DAA5D579C311544CB4
2024-10-10 IDS SB08 - 111552.8023.US06.pdf	52CA51EA84374B78ACF1BE54A9FD7A4057845512E7F98397D 24A626B267B88C0F1691B83B324955FFB2E3CBE91FC610168 D3A17A1EB843F38D363C4479A1F128
2024-10-10 RCE - 111552.8023.US06.pdf	C423BDAD473AB1D84BAE59F02FFD7AD64C06CE7C59207D2 EC6C5784E5AE3C0AC2B2710B07B2B0860331B9261512A3576 FAC0CD590E50266BB1C33EFDE85C3F67
2024-10-010 QPIDS Request - 111552.8023.US06.pdf	830BC43199B783F3698D160D20AE26419FB8DE86746989A9E7 9FF75EA0B65C771469E2C735136C071EAFA7DFE7ED36142A8 4A7E3C1E526076A1B6F71B3BA50A3

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 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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ELECTRONIC PAYMENT RECEIPT

APPLICATION # 18/358,837	RECEIPT DATE / TIME 10/10/2024 04:18:55 PM Z ET	ATTORNEY DOCKET # 111552.8023.US06
------------------------------------	---	--

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	12114876
CONFIRMATION #	6598	FILED BY	Matthew Williams
PATENT CENTER #	67522303	AUTHORIZED BY	-
CUSTOMER #	25096	FILING DATE	07/25/2023
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Richard Quick

Payment Information

PAYMENT METHOD DA / 500665	PAYMENT TRANSACTION ID E202400G19119659	PAYMENT AUTHORIZED BY Matthew Williams
PRE-AUTHORIZED ACCOUNT 500665	PRE-AUTHORIZED CATEGORY 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(\$)
1464	PETITIONS REQUIRING THE PETITION FEE SET FORTH IN 37 CFR 1.17(H) (GROUP III)	140.00	1	140.00
1820	REQUEST FOR CONTINUED EXAMINATION (RCE)- 2ND AND SUBSEQUENT REQUEST (SEE 37 CFR 1.114)	2000.00	1	2000.00
TOTAL AMOUNT:				\$2,140.00

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

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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552.8023.US06

U.S. PATENTS AND PUBLICATIONS					
Examiner Initial*	Cite No	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	4880408	11-14-1989	Cumes et al.	
	2.	20070010787	01-11-2007	Hackett et al.	
	3.	5429616	07-04-1995	Schaffer	
	4.	8734374	05-27-2014	Aklog et al.	
	5.	6776770	08-17-2004	Trerotola	
	6.	20100042118	02-18-2010	Garrison et al.	
	7.	5938645	08-17-1999	Gordon	
	8.	7998104	08-16-2011	Chang	
	9.	8157760	04-17-2012	Criado et al.	
	10.	6481439	11-19-2002	Lewis et al.	
	11.	20170043066	02-16-2017	Laub	
	12.				
	13.				

FOREIGN PATENT DOCUMENTS						
Examiner Initial*	Cite No	Foreign Document Number ³	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
	1.	WO2018019829	02-01-2018	NEURAVI LIMITED		
	2.					
	3.					
	4.					
	5.					
	6.					
	7.					

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552.8023.US06

NON-PATENT LITERATURE DOCUMENTS				
Examiner Initials*	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	
	1.	Shani, Jacob M.D., et al., "Mechanical Manipulation of Thrombus: Coronary Thrombectomy," Intracoronary Clot Displacement, and Transcatheter Aspiration," 72 Am. J. Cardiol. 116G-118G, 1993, 3 pages.		
	2.	Bose, A., et al., "The Penumbra System: A Mechanical Device for the Treatment of Acute Stroke due to Thromboembolism," 29 Am. J. Neuroradiol. 1409-1413, August 2008, 6 pages.		
	3.	Turk, Aquilla S., et al., "Initial clinical experience with the ADAPT technique: A direct aspiration first pass technique for stroke thrombectomy," 6 J. NeuroIntervent. Surg. 231-237, 2014, 8 pages.		
	4.	Turk, Aquilla S., et al., "Aspiration thrombectomy versus stent retriever thrombectomy as first-line approach for large vessel occlusion (COMPASS): a multicentre, randomized, open label, blinded outcome, non-inferiority trial," 393 Lancet 998-1008, March 2019, 11 pages.		
	5.	Saver, Jeffrey L., "Time is Brain – Quantified," Stroke Center and Department of Neurology, University of California, Los Angeles, 2005, https://www.ahajournals.org/doi/10.1161/01.str.0000196957.55928.ab , 4 pages.		
	6.	Petition for Inter Partes Review of U.S. Patent No. 11,744,691, IMPERATIVE CARE, INC. (Petitioner) V. INARI MEDICAL, INC. (Patent Owner), Case IPR2024-01257, 103 pages.		
	7.	Declaration of TROY L. THORNTON in Support of Petition for Inter Partes Review of U.S. Patent No. 11,744,691, IMPERATIVE CARE, INC. (Petitioner) V. INARI MEDICAL, INC. (Patent Owner), Case IPR2024-01257, filed with IPR as exhibit on August 12, 2024, 114 pages.		
	8.	Expert Declaration of AQUILLA S. TURK, III, D.O. in Support of Petition for Inter Partes Review of U.S. Patent No. 11,744,691, IMPERATIVE CARE, INC. (Petitioner) V. INARI MEDICAL, INC. (Patent Owner), Case IPR2024-01257, filed with IPR as exhibit on August 12, 2024, 24 pages.		
	9.	DEFENDANT IMPERATIVE CARE'S OPPOSITION TO PLAINTIFF INARI MEDICAL'S MOTION FOR A PRELIMINARY INJUNCTION, IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF CALIFORNIA SAN JOSE DIVISION, INARI MEDICAL, INC. (Plaintiff) V. IMPERATIVE CARE, INC. (Defendants), Civil Action No. 5:24-cv-03117-EKL, filed on September 9, 2024, 44 pages.		
	10.	DECLARATION OF TROY THORNTON IN SUPPORT OF OPPOSITION TO PLAINTIFF'S MOTION FOR PRELIMINARY INJUNCTION, IN THE UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF CALIFORNIA SAN JOSE DIVISION, INARI MEDICAL, INC. (Plaintiff) V. IMPERATIVE CARE, INC. (Defendants), Civil Action No. 5:24-cv-03117-EKL, filed on September 9, 2024, 74 pages.		

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552.8023.US06

EXAMINER SIGNATURE	
Examiner Signature	Date Considered
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	
<small>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.</small>	

CERTIFICATION STATEMENT
Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):
☐ 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. See 37 CFR 1.97(e) (1).
OR
☐ 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).
☐ See attached certification statement.
☒ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.
☐ None
It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references. This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, Applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.
COPIES OF REFERENCES
In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).
SIGNATURE

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552.8023.US06

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	/Matthew S. Williams/	Date (YYYY-MM-DD)	2024-10-10
Name/Print	Matthew S. Williams	Registration Number	77,516

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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.**

CERTIFICATION AND REQUEST FOR CONSIDERATION OF AN INFORMATION DISCLOSURE STATEMENT FILED AFTER PAYMENT OF THE ISSUE FEE UNDER THE QPIDS PROGRAM

Non-Provisional Application Number: 18/358,837	Filing Date: 2023-07-25
First Named Inventor: Richard Quick	Title of Invention: SINGLE INSERTION DELIVERY SYSTE

THE UNDERSIGNED HEREBY CERTIFIES AND REQUESTS THE FOLLOWING FOR THE ABOVE-IDENTIFIED APPLICATION.

- Consideration is requested of the information disclosure statement (IDS) submitted herewith, which is being filed after payment of the issue fee.
- Check the box next to the appropriate selection:

☐ Each item of information contained in the IDS 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 IDS. See 37 CFR 1.97(e)(1).

OR

☒ No item of information contained in the IDS 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 IDS was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the IDS. See 37 CFR 1.97(e)(2).

OR

☐ See attached certification statement in compliance with 37 CFR 1.97(e).
- Please charge the IDS fee set forth in 37 CFR 1.17(p) to Deposit Account No. 50-0665.
- A Petition to Withdraw from Issue After Payment of the Issue Fee (37 CFR 1.313(c)(2)), including the petition fee set forth in 37 CFR 1.17(h), is submitted herewith as a **Web-based ePetition**.
WARNING: Do not submit the petition as a follow-on paper via EFS-Web. Submit the petition as a Web-based ePetition by signing on to EFS-Web as a registered user, selecting the radio button next to "Existing application/patent," and then selecting the radio button next to "ePetition (for automatic processing and immediate grant, if all petitions requirements are met)." Failure to use the Web-based ePetition interface will result in automatic entry of the RCE.
- A request for continued examination (RCE) under 37 CFR 1.114 and the RCE fee under 37 CFR 1.17(e) are submitted herewith.
- The RCE will be treated as a "conditional" RCE. In the event the examiner determines that any item of information contained in the IDS necessitates the reopening of prosecution in the application, the undersigned understands that (i) the RCE will be processed and treated as an RCE under 37 CFR 1.114 and therefore (ii) the IDS fee under 37 CFR 1.17(p) will be returned in accordance with 37 CFR 1.97(b)(4). In the event that no item of information in the IDS necessitates reopening prosecution, the undersigned understands that the RCE will not be processed and the RCE fee under 37 CFR 1.17(e) will be returned.
- This certification and request is being filed as a **Web-based ePetition** and is not accompanied by an amendment to the application. Inclusion of an amendment will result in automatic entry of the RCE.

Signature <u>/Matthew S. Williams/</u>	Date <u>2024-10-10</u>
Name <u>Matthew S. Williams</u> (Print/Typed)	Practitioner Registration Number <u>77,516</u> (If applicable)
<p>Note: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required in accordance with 37 CFR 1.33 and 11.18. Please see 37 CFR 1.4(d) for the form of the signature. If necessary, submit multiple forms for more than one signature, see below.*</p>	
<p>☒ *Total of <u>1</u> forms are submitted.</p>	

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.



UNITED STATES
PATENT AND TRADEMARK OFFICE

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

APPLICATION #	DECISION DATE	DECISION ON PETITION #	ATTORNEY DOCKET NUMBER
18/358,837	10/10/2024		111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

In re Application of Richard Quick

This is an electronic decision on the petition under , filed October 10, 2024 to withdraw the above-identified application from issue after payment of the issue fee.

The request is **GRANTED**.

Petitioner is advised that the issue fee paid in this application cannot be refunded. If, however, this application is again allowed, petitioner may request that it be applied towards the issue fee required by the new Notice of Allowance.

The application is being referred to Technology Center AU for

Telephone inquired concerning this decision should be directed to the Patent Electronic Business Center (EBC) at 866-217-9197.

Office of Petitions



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/358,837	10/15/2024	12114876	111552.8023.US06	6598

25096 7590 09/25/2024
PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

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 0 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):

Richard Quick, Mission Viejo, CA;
Benjamin Edward Merritt, San Clemente, CA;
Paul Lubock, Monarch Beach, CA;
John Coleman Thress, Capistrano Beach, CA;

APPLICANT(s) (Please see PATENT CENTER site <https://patentcenter.uspto.gov> for additional applicants):

Inari Medical, Inc., Irvine, CA;

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](https://selectusa.gov).



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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/358,837	07/25/2023	Richard Quick	111552.8023.US06	6598
25096	7590	09/11/2024	EXAMINER	
PERKINS COIE LLP - SEA General			NGUYEN, TUAN VAN	
PATENT-SEA				
P.O. BOX 1247				
SEATTLE, WA 98111-1247				
			ART UNIT	PAPER NUMBER
			3771	
			NOTIFICATION DATE	DELIVERY MODE
			09/11/2024	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):

patentprocurement@perkinscoie.com

Supplemental Notice of Allowability	Application No. 18/358,837	Applicant(s) Quick et al.	
	Examiner TUAN V NGUYEN	Art Unit 3771	AIA (FITF) Status Yes

-- 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 the filing of Information Disclosure Statement on August 27, 2024.
☐ 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 1-30. 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)	5. ☐ Examiner's Amendment/Comment
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.	6. ☐ Examiner's Statement of Reasons for Allowance
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.	7. ☐ Other _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.	

/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771	
--	--

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552.8023.US06

U.S. PATENTS AND PUBLICATIONS

Examiner Initial*	Cite No	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	20240225674	07-15-2024	Dederich et al.	
	2.	20090082857	03-26-2009	Lashinski et al.	
	3.	5053008	10-01-1991	Bajaj	
	4.	10779855	09-22-2020	Garrison	
	5.	20180014840	01-18-2018	Panian	
	6.	20150327875	11-19-2015	Look et al.	
	7.	20240245501	07-25-2024	Strauss et al.	
	8.	20240245502	07-25-2024	Merritt et al.	
	9.	3383131	05-14-1968	ROSFELDER	
	10.	4705518	11-10-1987	Baker et al.	
	11.	8118275	02-21-2012	Miaihe	
	12.	11197684	12-14-2021	Ngo et al.	
	13.	11478262	10-25-2022	Ngo et al.	
	14.	2502639	02-16-1948	M. A. Blake	
	15.	4826483	05-02-1989	Molnar, IV	
	16.	2707954	05-10-1955	J.L. KAS, SR	
	17.	9545464	01-17-2017	Roche et al.	
	18.	5429610	07-04-1995	Vaillancourt	

FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number ³	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
	1.	WO2024151629	07-18-2024	Inari Medical, Inc.		
	2.	JP2003033359	02-04-2023	TARGET THERAPEUTICS INC		
	3.	EP0914807 (corresponds to JP2003033359)	05-12-1999	TARGET THERAPEUTICS INC		
	4.	JP2016104212	06-09-2016	Covidien LP		
	5.	EP2367482 (corresponds to JP2016104212)	10-12-2016	Covidien LP		
	6.	JP2017533051	11-09-2017	NATIONAL UNIVERSITY OF IRELAND, GALWAY		

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
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	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552.8023.US06

FOREIGN PATENT DOCUMENTS						
Examiner Initial*	Cite No	Foreign Document Number ^a	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
	7.	WO2016071524 (corresponds to JP2017533051)	05-12-2016	NATIONAL UNIVERSITY OF IRELAND, GALWAY		
	8.	JP2011517424 (corresponds to WO2009126747)	06-09-2011	REVERSE MEDICAL CORP		
	9.	WO2009126747	10-15-2009	REVERSE MEDICAL CORP		
	10.	CN110312481 (corresponds to US2018193043)	10-08-2019	Inari Medical, Inc.		
	11.	CN106470728 (corresponds to WO2015191646)	03-01-2017	Inceptus Medical, LLC		
	12.	WO2002055146	07-18-2002	Microvention, Inc.		
	13.	JP7324264 (corresponds to WO2017070702)	08-01-2023	Inari Medical, Inc.		
	14.	JP7491974 (corresponds to WO2017070702)	05-20-2024	Inari Medical, Inc.		
	15.	JP7253376 (corresponds to WO2017070702)	03-29-2023	Inari Medical, Inc.		
	16.	WO2017070702	04-27-2017	Inari Medical, Inc.		
	17.	JP2016513505 (corresponds to WO2014139845)	05-16-2016	Neuravi Limited		
	18.	JP2018525088 (corresponds to WO2017033182)	09-06-2018	CARDIOSERT LTD.		
	19.	WO2017033182	03-02-2017	CARDIOSERT LTD.		

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552.8023.US06

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	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
	1.	English translation of Japanese Office Action mailed June 25, 2024 for Japanese Application No. 2022-574456, 5 pages.	
	2.	Japanese Office Action mailed July 8, 2024 for Japanese Application No. 2022-522892, 14 pages.	
	3.	Chinese first Office Action mailed May 10, 2024 for Chinese Application No. 202080087833.X, 11 pages.	
	4.	Partial Supplementary European Search Report received for European Application No. 21852966.7; Applicant: Inari Medical, Inc., Date of Mailing: July 23, 2024, 12 pages.	
	5.	Japanese Office Action mailed August 2, 2024 for Japanese Application No. 2023-213724, 3 pages.	
	6.	English Translation of Japanese Office Action mailed July 23, 2024 for Japanese Application No. 2022-535535, 11 pages.	

EXAMINER SIGNATURE			
Examiner Signature	/TUAN V NGUYEN/	Date Considered	09/06/2024
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw 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.			

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)

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	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552.8023.US06

CERTIFICATION STATEMENT

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

☐ 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. See 37 CFR 1.97(e) (1).

OR

☐ 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references. This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, Applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.

COPIES OF REFERENCES

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

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	/Matthew S. Williams/	Date (YYYY-MM-DD)	2024-08-27
Name/Print	Matthew S. Williams	Registration Number	77,516

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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.

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	Not Yet Assigned
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552.8023.US06

U.S. PATENTS AND PUBLICATIONS					
Examiner Initial*	Cite No.	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	146.	8092486	01-10-2012	Berrada et al.	
	147.	8100935	01-24-2012	Rosenbluth et al.	
	148.	8109962	02-07-2012	Pal	
	149.	8118829	02-21-2011	Carrison et al. 02/2012	
	150.	8197493	06-12-2012	Ferrera et al.	
	151.	8246641	08-21-2012	Osborne et al.	
	152.	8261648	09-11-2012	Marchand et al.	
	153.	8267897	09-18-2012	Wells	
	154.	8298257	10-30-2012	Sepetka et al.	
	155.	8317748	11-27-2012	Fiorella et al.	
	156.	8337450	12-25-2012	Fotjik	
	157.	8357178	01-22-2013	Grandfield et al.	
	158.	8361104	01-29-2013	Jones et al.	
	159.	8409215	04-02-2013	Sepetka et al.	
	160.	8486105	07-16-2013	Demond et al.	
	161.	8491539	07-23-2013	Fotjik	
	162.	8512352	08-20-2013	Martin	
	163.	8535334	09-17-2013	Martin	
	164.	8545526	10-01-2013	Martin et al.	
	165.	8568432	10-29-2013	Straub	
	166.	8574262	11-05-2013	Ferrera et al.	
	167.	8579915	11-12-2013	French et al.	
	168.	8585713	11-19-2013	Ferrera et al.	
	169.	8657867	02-25-2014	Dorn et al.	
	170.	8696622	04-15-2014	Fiorella et al.	
	171.	8715314	05-06-2014	Janardhan et al.	
	172.	8721714	05-13-2014	Kelley	
	173.	8771289	07-08-2014	Mohiuddin et al.	
	174.	8777893	07-15-2014	Malewicz	

Change(s) applied
to document,
/C.S./
1/17/2024



UNITED STATES
PATENT AND TRADEMARK OFFICE

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

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
18/358,837

RECEIPT DATE / TIME
09/08/2024 05:28:06 PM Z ET

ATTORNEY DOCKET #
111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 6598

FILED BY JiYoung Anderson

PATENT CENTER # 67088390

FILING DATE 07/25/2023

CUSTOMER # 25096

FIRST NAMED
INVENTOR Richard Quick

CORRESPONDENCE
ADDRESS -

AUTHORIZED BY Matthew Williams

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2024.9-8 Issue Fee Transmittal - 111552.8023.US06.pdf	2	Issue Fee Payment (PTO-85B)	237 KB
2024.9.8 Comments - 111552.8023.US06.pdf	2	Miscellaneous Incoming Letter	90 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2024.9-8 Issue Fee Transmittal - 111552.8023.US06.pdf	818209907CC9D2E4F933D2DADAAAEAAAB23DFA0020B5EE7C 5E60DD4A5EA60464BFE03B9C8715D3809822F179A62B2F354 496A20841CF47615FC009B62FB9E2FC3

2024.9.8 Comments -
111552.8023.US06.pdf

1086960A152BD9952CCD15FFC00E8E30976BBE3CB143C879
D13CBB742E7719F39E73648FDB29ECA4A9D47FFB8D46A27
9464A8655B8735B6BD5713476FEB4860

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 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.

PART B -- FEE(S) TRANSMITTAL

Complete and send this form, together with the 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, VA 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)

25096
Perkins Coie LLP
P.O. Box 1247
PATENT - SEA
Seattle, WA, 98111-1247
US

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.

JiYoung Anderson	(Typed or printed name)
/JiYoung Anderson/	(Signature)
2024-09-08	(Date)

APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO	CONFIRMATION NO
18/358,837	Jul 25, 2023	Richard Quick	111552.8023.US06	6598

TITLE OF INVENTION: SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
UTILITY	LARGE	1200	0	0	1200	2024-11-29

EXAMINER	ART UNIT	CLASS-SUBCLASS
NGUYEN, TUAN VAN	3771	606-200000

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/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-09 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.

Perkins Coie LLP

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

Inari Medical, Inc.

(B) RESIDENCE: (CITY and STATE or COUNTRY)

Irvine, CA

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government4a. 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. 50-0665

5. Change of Entity Status (from status indicated above)

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29.
- ☐ Applicant asserting small entity status. See 37 CFR 1.27.
- ☐ Applicant changing to regular undiscounted fee status.

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.

NOTE: If the application was previously under micro entity status, checking this box will be taken as a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken as 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 /Matthew S. Williams/

Date 2024-09-08

Typed or printed name Matthew S. Williams

Registration No. 77,516

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.



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 #
18/358,837	09/08/2024 05:28:06 PM Z ET	111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	6598	FILED BY	JiYoung Anderson
PATENT CENTER #	67088390	AUTHORIZED BY	Matthew Williams
CUSTOMER #	25096	FILING DATE	07/25/2023
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Richard Quick

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 5111	E202498H28425300	JiYoung Anderson

FEE CODE	DESCRIPTION	ITEM PRICE(\$)	QUANTITY	ITEM TOTAL(\$)
1501	UTILITY ISSUE FEE	1200.00	1	1200.00
TOTAL AMOUNT:				\$1,200.00

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

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Richard Quick et al.

Application No.: 18/358,837

Confirmation No.: 6598

Filed: July 25, 2023

Art Unit: 3771

For: SINGLE INSERTION DELIVERY SYSTEM
FOR TREATING EMBOLISM AND
ASSOCIATED SYSTEMS AND METHODS

Examiner: TUAN VAN NGUYEN

COMMENTS ON STATEMENT OF REASONS FOR ALLOWANCE

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

Dear Commissioner:

In the Notice of Allowability mailed December 29, 2023, June 28, 2024, and August 29, 2024, the Examiner allowed claims 1–30. The Applicant acknowledges Examiner's statements of Reasons for Allowance of the above-referenced patent application and agrees that the claimed subject matter is patentable. However, the Applicant takes no position regarding the Reasons for Allowance presented by the Examiner other than the positions the Applicant may have previously taken during prosecution. Therefore, the Examiner's Reasons for Allowance should not be attributed to the Applicant as an indication of the basis for the Applicant's belief that the claims are patentable. Furthermore, the Applicant respectfully asserts that there may also be additional reasons for patentability of the claimed subject matter not explicitly stated in this record and the Applicant does not waive its rights to such arguments by not further addressing such reasons herein.

Dated: September 8, 2024

Respectfully submitted,

By /Matthew S. Williams/
Matthew S. Williams
Registration No.: 77,516

Perkins Coie LLP
P.O. Box 1247
Seattle, WA 98111-1247
Phone: (206) 359-3343
Fax: (206) 359-7198

Attorneys for Applicant



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

25096 7590 08/29/2024
PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

EXAMINER

NGUYEN, TUAN VAN

ART UNIT

PAPER NUMBER

3771

DATE MAILED: 08/29/2024

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/358,837	07/25/2023	Richard Quick	111552.8023.US06	6598

TITLE OF INVENTION: SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	11/29/2024

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 the USPTO patent electronic filing system.

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)

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 the USPTO patent electronic filing system 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.
18/358,837	07/25/2023	Richard Quick	111552.8023.US06	6598

TITLE OF INVENTION: SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	11/29/2024

EXAMINER	ART UNIT	CLASS-SUBCLASS
NGUYEN, TUAN VAN	3771	606-200000

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,

1 _____

(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.

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 the USPTO patent electronic filing system ☐ 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

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

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.

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.

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. _____



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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/358,837	07/25/2023	Richard Quick	111552.8023.US06	6598
25096	7590	08/29/2024	EXAMINER	
PERKINS COIE LLP - SEA General PATENT-SEA P.O. BOX 1247 SEATTLE, WA 98111-1247			NGUYEN, TUAN VAN	
			ART UNIT	PAPER NUMBER
			3771	
DATE MAILED: 08/29/2024				

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. The United States Patent and Trademark Office (USPTO) collects the information in this record under authority of 35 U.S.C. 2. The USPTO's system of records is used to manage all applicant and owner information including name, citizenship, residence, post office address, and other information with respect to inventors and their legal representatives pertaining to the applicant's/owner's activities in connection with the invention for which a patent is sought or has been granted. The applicable Privacy Act System of Records Notice for the information collected in this form is COMMERCE/PAT-TM-7 Patent Application Files, available in the Federal Register at 78 FR 19243 (March 29, 2013).

<https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf>

Routine uses of the information in this record may include disclosure to:

- 1) law enforcement, in the event that the system of records indicates a violation or potential violation of law;
- 2) a federal, state, local, or international agency, in response to its request;
- 3) a contractor of the USPTO having need for the information in order to perform a contract;
- 4) the Department of Justice for determination of whether the Freedom of Information Act (FOIA) requires disclosure of the record;
- 5) a Member of Congress submitting a request involving an individual to whom the record pertains, when the individual has requested the Member's assistance with respect to the subject matter of the record;
- 6) a court, magistrate, or administrative tribunal, in the course of presenting evidence, including disclosures to opposing counsel in the course of settlement negotiations;
- 7) the Administrator, General Services Administration (GSA), or their designee, during an inspection of records conducted by GSA under authority of 44 U.S.C. 2904 and 2906, in accordance with the GSA regulations and any other relevant (i.e., GSA or Commerce) directive, where such disclosure shall not be used to make determinations about individuals;
- 8) 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));
- 9) the Office of Personnel Management (OPM) for personnel research purposes; and
- 10) the Office of Management and Budget (OMB) for legislative coordination and clearance.

If you do not furnish the information requested on this form, the USPTO may not be able to process and/or examine your submission, which may result in termination of proceedings, abandonment of the application, and/or expiration of the patent.

Notice of Allowability	Application No. 18/358,837	Applicant(s) Quick et al.	
	Examiner TUAN V NGUYEN	Art Unit 3771	AIA (FITF) Status Yes

-- 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 the Request for Continued Examination filed July 2, 2024.
☐ 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 1-30. 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 ____.
--	--

/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771	
--	--

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on July 2, 2024 has been entered.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on July 2, 2024 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Allowable Subject Matter

Claims 1-30 allowed.

Please see Notice of Allowability issued on December 29, 2023 for examiner's statement of reasons for allowance.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TUAN V NGUYEN whose telephone number is (571)272-5962. The examiner can normally be reached Monday - Friday 8:30 AM - 5:30 PM.

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, Jackie Ho can be reached on 571-272-4696. 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.

/TUAN V NGUYEN/
Primary Examiner, Art Unit 3771

Issue Classification 	Application/Control No. 18/358,837	Applicant(s)/Patent Under Reexamination Quick et al.
	Examiner TUAN V NGUYEN	Art Unit 3771

CPC						
Symbol					Type	Version
A61B	/	17	/	22031	F	2013-01-01
A61M	/	25	/	0082	I	2013-01-01
A61B	/	17	/	22	I	2013-01-01
A61M	/	39	/	06	I	2013-01-01
A61B	/	17	/	221	I	2013-01-01
A61B	/	2017	/	22042	A	2013-01-01
A61M	/	2210	/	12	A	2013-01-01
A61B	/	2017	/	22079	A	2013-01-01
A61B	/	2017	/	22094	A	2013-01-01
A61B	/	2017	/	22034	A	2013-01-01
A61B	/	2017	/	00907	A	2013-01-01
A61B	/	2217	/	005	A	2013-01-01

CPC Combination Sets							
Symbol				Type	Set	Ranking	Version
	/		/				

NONE	Total Claims Allowed:		
(Assistant Examiner)	(Date)	30	
/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771	21 August 2024	O.G. Print Claim(s)	
(Primary Examiner)	(Date)	1	O.G. Print Figure
		1A	

Issue Classification 	Application/Control No. 18/358,837	Applicant(s)/Patent Under Reexamination Quick et al.
	Examiner TUAN V NGUYEN	Art Unit 3771

INTERNATIONAL CLASSIFICATION			
CLAIMED			
A61B	/	17	/ 00
A61B	/	17	/ 22
NON-CLAIMED			
	/		/

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	30	
/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771 (Primary Examiner)	21 August 2024 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1A

Issue Classification 	Application/Control No. 18/358,837	Applicant(s)/Patent Under Reexamination Quick et al.
	Examiner TUAN V NGUYEN	Art Unit 3771

☐ 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
1	1	10	10	22	19	12	28								
2	2	11	11	23	20	13	29								
3	3	15	12	24	21	14	30								
4	4	16	13	25	22										
5	5	17	14	26	23										
6	6	18	15	27	24										
7	7	19	16	28	25										
8	8	20	17	29	26										
9	9	21	18	30	27										

NONE	Total Claims Allowed:	
(Assistant Examiner)	(Date)	30
/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771	21 August 2024	O.G. Print Claim(s)
(Primary Examiner)	(Date)	1
		O.G. Print Figure
		1A

<i>Search Notes</i> 	Application/Control No. 18/358,837	Applicant(s)/Patent Under Reexamination Quick et al.
	Examiner TUAN V NGUYEN	Art Unit 3771

CPC - Searched*		
Symbol	Date	Examiner
A61B17/22031,22,221,220758,320725	10/19/2023	TN
A61B2017/22034,22042,22079,22094	10/19/2023	TN
A61M1/60,0001,0003	10/19/2023	TN
A61M2039/027	10/19/2023	TN

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
Group/subgroups combined with text (see search history printout)	10/19/2023	TN
Search update (see search history printout)	12/08/2023	TN
Search update (see search history printout)	06/14/2024	TN
Search update (see search history printout)	08/21/2024	TN

/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771	
--	--

<i>Search Notes</i> 	Application/Control No. 18/358,837	Applicant(s)/Patent Under Reexamination Quick et al.
	Examiner TUAN V NGUYEN	Art Unit 3771

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
Text search	USPAT; US_PGPUB	12/08/2023	TN
Text search	USPAT; US_PGPUB	06/14/2024	TN
Text search	USPAT; US_PGPU	08/21/2024	TN

/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771	
--	--

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

U.S. PATENTS AND PUBLICATIONS						
Examiner Initial*	Cite No	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	
	1.	20240198072	06-20-2024	Merritt et al.		
	2.	20170238951	08-24-2017	Yang et al.		
	3.	20240207593	06-27-2024	Merritt et al.		
	4.					
	5.					
FOREIGN PATENT DOCUMENTS						
Examiner Initial*	Cite No	Foreign Document Number ³	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
	1.	WO2024103036	05-16-2024	Shifamed Holdings LLC		
	2.	WO2019064306	04-04-2019	CERETRIVE LTD.		
	3.	CN102316809 (Counterpart: WO2010/095712)	01-11-2012	WELLFIND CO., LTD.		
	4.	WO2010095712	08-26-2010	WELLFIND CO., LTD.		
	5.					
	6.					
NON-PATENT LITERATURE DOCUMENTS						
Examiner Initials*	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
	1.	Extended European Search Report for European Application No. 21818772.2, Applicant: Inari Medical, Inc., Date of Mailing: May 10, 9 pages.				
	2.	Chinese Office Action received for Application No. 202111061740.2, Applicant: Inari Medical, Inc, Date of Mailing: May 23, 2024, 15 pages.				
	3.					
	4.					
	5.					
EXAMINER SIGNATURE						
Examiner Signature		/TUAN V NGUYEN/		Date Considered	08/21/2024	

Doc code: IDS

PTO/SB/08a (01-10)

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	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

***EXAMINER:** Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw 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.

CERTIFICATION STATEMENT

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

☐ 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. See 37 CFR 1.97(e) (1).

OR

☐ 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references. This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, Applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.

COPIES OF REFERENCES

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

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	/Matthew S. Williams/	Date (YYYY-MM-DD)	2024-07-02
Name/Print	Matthew S. Williams	Registration Number	77,516

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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.**

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031
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	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

U.S. PATENTS AND PUBLICATIONS					
Examiner Initial*	Cite No	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	11918244	03-05-2024	Marchand et al.	
	2.	11918243	03-05-2024	Marchand et al.	
	3.	6059745	05-09-2000	Gelbfish	
	4.	20030225379	12-04-2003	Schaffer et al.	
	5.	20050131387	06-16-2005	Pursley	
	6.	5951539	09-14-1999	Nita et al.	
	7.	11213356	01-04-2022	Tanner et al.	
	8.	7905877	03-15-2011	Jilnenez et al.	
	9.	20010041881	11-15-2001	SARGE et al.	
	10.	20110264132	10-27-2011	Strauss et al.	
	11.	20200054861	02-20-2020	Korkuch et al.	
	12.	20190223893	07-25-2019	GILVARRY et al.	
	13.	20190328411	10-31-2019	VALE et al.	
	14.	20240074771	03-07-2024	Quick et al.	
	15.				
	16.				
	17.				

FOREIGN PATENT DOCUMENTS						
Examiner Initial*	Cite No	Foreign Document Number ³	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
	1.	WO2012114633	08-30-2012	TERUMO KABUSHIKI KAISHA		
	2.					
	3.					

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	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
	1.	International Search Report and Written Opinion for International App. No. PCT/US23/66538; Date of Filing: May 3, 2023, Applicant: Inari Medical, Inc., Date of Mailing: January 4, 2024, 14 pages.	

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)

Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

2.	English translation of Japanese Office Action received for JP Application No. 2022-574456, Applicant: Inari Medical, Inc, Date of Mailing: January 23, 2024, 12 pages.
3.	Chinese First Office Action received for CN Application No. 201980067623.1, Applicant: Inari Medical, Inc., Date of Mailing: January 31, 2024, 10 pages.
4.	International Search Report and Written Opinion for International App. No. PCT/US23/73765; Date of Filing: September 8, 2023, Applicant: Inari Medical, Inc., Date of Mailing: February 28, 2024, 7 pages.
5.	

EXAMINER SIGNATURE

Examiner Signature	/TUAN V NGUYEN/	Date Considered	08/27/2024
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw 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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☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

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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	/Matthew S. Williams/	Date (YYYY-MM-DD)	2024-03-12
Name/Print	Matthew S. Williams	Registration Number	77,516

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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.**

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L239	3	("20240198072" "20170238951" "20240207593").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/08/21 08:25 AM

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N108	0	(reservoir AND housing SAME sealed WITH chamber AND first WITH port SAME aspirat\$4 WITH catheter SAME first WITH path AND second WITH port SAME aspirat\$4 WITH source SAME second WITH path AND cylindrical WITH shape SAME filter WITH end AND housing SAME transparent SAME material).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/08/21 08:29 AM
N109	0	(reservoir AND housing SAME sealed WITH chamber AND first WITH port SAME aspirat\$4 WITH catheter SAME first WITH path AND second WITH port SAME aspirat\$4 WITH source SAME second WITH path AND cylindrical WITH shape SAME filter WITH end AND housing SAME transparent SAME material AND cap).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/08/21 08:29 AM
N110	0	(reservoir AND housing SAME sealed WITH chamber AND first WITH port SAME aspirat\$4 WITH catheter SAME first WITH path AND second WITH port SAME aspirat\$4 WITH source SAME second WITH path AND cylindrical	(US-PGPUB; USPAT)	OR	ON	ON	2024/08/21 08:29 AM

		WITH shape SAME filter WITH end AND housing SAME transparent SAME material AND remova\$5 SAME chamber SAME access SAME material).clm.					
N111	0	(reservoir AND housing SAME sealed WITH chamber AND first WITH port SAME aspirat\$4 WITH catheter SAME first WITH path AND second WITH port SAME aspirat\$4 WITH source SAME second WITH path AND valve SAME clot WITH reservoir SAME first WITH port SAME open WITH position AND negative WITH pressure SAME chamber SAME second WITH port).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/08/21 08:29 AM
N112	0	(clot WITH system AND aspirat\$4 SAME clot WITH material AND hemostasis WITH valve SAME catheter AND at WITH least WITH one SAME first WITH port AND aspirat\$4 WITH source AND clot WITH reservoir AND housing SAME chamber SAME first WITH end SAME second WITH end AND first WITH port AND second WITH port AND filter SAME cylindrical WITH shape AND negative WITH pressure SAME chamber).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/08/21 08:30 AM

Bibliographic Data

Application No: 18/358,837

Foreign Priority claimed: ☐ Yes ☒ No

35 USC 119 (a-d) conditions met: ☐ Yes ☒ No ☐ Met After Allowance

Verified and Acknowledged: /TUAN V NGUYEN/

Examiner's Signature

Initials

Title:

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
07/25/2023	606	3771	111552.8023.US06
RULE			

APPLICANTS

Inari Medical, Inc., Irvine, CA, UNITED STATES

INVENTORS

Richard Quick,
Benjamin Edward Merritt,
Paul Lubock,
John Coleman Thress,

CONTINUING DATA

This application is a CON of 17865307 07/14/2022 PAT 11849963
17865307 is a CON of 17498642 10/11/2021 PAT 12016580
17498642 is a CON of 16258344 01/25/2019 PAT 11154314
16258344 has PRO of 62622691 01/26/2018

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

08/09/2023

STATE OR COUNTRY

ADDRESS

PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247
UNITED STATES

FILING FEE RECEIVED

\$6,360



UNITED STATES
PATENT AND TRADEMARK OFFICE

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

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
18/358,837

RECEIPT DATE / TIME
08/27/2024 05:04:15 PM Z ET

ATTORNEY DOCKET #
111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 6598

FILED BY Michelle Burge

PATENT CENTER # 66948078

FILING DATE 07/25/2023

CUSTOMER # 25096

FIRST NAMED
INVENTOR Richard Quick

CORRESPONDENCE
ADDRESS -

AUTHORIZED BY Matthew Williams

Documents

TOTAL DOCUMENTS: 26

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2024-08-27_IDS_SB08_1115528023_US06.pdf	4	Information Disclosure Statement (IDS) Form (SB08)	111 KB
Warning: This is not a USPTO supplied IDS fillable form. Data in the form cannot be automatically loaded to other USPTO systems.			
FOR_JP7324264.pdf	43	Foreign Reference	399 KB
FOR_JP2018525088.pdf	22	Foreign Reference	733 KB
FOR_JP2003033359.pdf	24	Foreign Reference	1709 KB
FOR_JP2017533051.pdf	26	Foreign Reference	1939 KB
FOR_JP2016513505.pdf	49	Foreign Reference	1355 KB

FOR_JP7491974.pdf	71	Foreign Reference	4582 KB
FOR_WO2002055146.pdf	87	Foreign Reference	3517 KB
FOR_JP2016104212.pdf	100	Foreign Reference	4688 KB
FOR_WO2016071524.pdf	39	Foreign Reference	2063 KB
FOR_WO2009126747.pdf	78	Foreign Reference	3922 KB
FOR_WO2024151629.pdf	43	Foreign Reference	1923 KB
FOR_WO2017070702.pdf	87	Foreign Reference	1820 KB
FOR_JP7253376.pdf	78	Foreign Reference	11197 KB
FOR_WO2017033182.pdf	36	Foreign Reference	2460 KB
FOR_EP0914807A2.pdf	33	Foreign Reference	2742 KB
FOR_JP2011517424_Count erpart_WO2009126747.pdf	124	Foreign Reference	13317 KB
FOR_CN110312481.pdf	105	Foreign Reference	8560 KB
FOR_EP2367482.pdf	116	Foreign Reference	6104 KB
FOR_CN106470728_Counte rpart_WO2015191646.pdf	108	Foreign Reference	11032 KB
NPL_JP_OA_2023- 213724_mailed_August_2_2 024_3pages.pdf	3	Non Patent Literature	122 KB
NPL_JP_OA_EN_translation _2022_535535_July_23_20 24_11pages.pdf	11	Non Patent Literature	85 KB
NPL_EN translation of JP Official Action mailed June 25 2024 - 5 pages.pdf	5	Non Patent Literature	81 KB
NPL_CN_First_OA_2020800 87833.X_mailed_May_10_20 24_11pages.pdf	11	Non Patent Literature	536 KB
NPL_JP_OA_2022- 522892_mailed_July_8_2024 _14pages.pdf	14	Non Patent Literature	4244 KB
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Digest

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FOR_WO2024151629.pdf	99DE01E594CA9171C6B92BFC6557A362E14E3C9CFEE1A464 6F216CEB48D620E7DDDD24D35D436CA28B5D14D7F1535BE9 FF14AAA67E8795CA3E0A03DB26049468

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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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552.8023.US06

U.S. PATENTS AND PUBLICATIONS

Examiner Initial*	Cite No	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	20240225674	07-15-2024	Dederich et al.	
	2.	20090082857	03-26-2009	Lashinski et al.	
	3.	5053008	10-01-1991	Bajaj	
	4.	10779855	09-22-2020	Garrison	
	5.	20180014840	01-18-2018	Panian	
	6.	20150327875	11-19-2015	Look et al.	
	7.	20240245501	07-25-2024	Strauss et al.	
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	9.	3383131	05-14-1968	ROSFELDER	
	10.	4705518	11-10-1987	Baker et al.	
	11.	8118275	02-21-2012	Miaihe	
	12.	11197684	12-14-2021	Ngo et al.	
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	14.	2502639	02-16-1948	M. A. Blake	
	15.	4826483	05-02-1989	Molnar, IV	
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Examiner Initial*	Cite No	Foreign Document Number ³	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
	1.	WO2024151629	07-18-2024	Inari Medical, Inc.		
	2.	JP2003033359	02-04-2023	TARGET THERAPEUTICS INC		
	3.	EP0914807 (corresponds to JP2003033359)	05-12-1999	TARGET THERAPEUTICS INC		
	4.	JP2016104212	06-09-2016	Covidien LP		
	5.	EP2367482 (corresponds to JP2016104212)	10-12-2016	Covidien LP		
	6.	JP2017533051	11-09-2017	NATIONAL UNIVERSITY OF IRELAND, GALWAY		

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	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552.8023.US06

FOREIGN PATENT DOCUMENTS						
Examiner Initial*	Cite No	Foreign Document Number ^a	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
	7.	WO2016071524 (corresponds to JP2017533051)	05-12-2016	NATIONAL UNIVERSITY OF IRELAND, GALWAY		
	8.	JP2011517424 (corresponds to WO2009126747)	06-09-2011	REVERSE MEDICAL CORP		
	9.	WO2009126747	10-15-2009	REVERSE MEDICAL CORP		
	10.	CN110312481 (corresponds to US2018193043)	10-08-2019	Inari Medical, Inc.		
	11.	CN106470728 (corresponds to WO2015191646)	03-01-2017	Inceptus Medical, LLC		
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	15.	JP7253376 (corresponds to WO2017070702)	03-29-2023	Inari Medical, Inc.		
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	19.	WO2017033182	03-02-2017	CARDIOSERT LTD.		

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552.8023.US06

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	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
	1.	English translation of Japanese Office Action mailed June 25, 2024 for Japanese Application No. 2022-574456, 5 pages.	
	2.	Japanese Office Action mailed July 8, 2024 for Japanese Application No. 2022-522892, 14 pages.	
	3.	Chinese first Office Action mailed May 10, 2024 for Chinese Application No. 202080087833.X, 11 pages	
	4.	Partial Supplementary European Search Report received for European Application No. 21852966.7; Applicant: Inari Medical, Inc., Date of Mailing: July 23, 2024, 12 pages.	
	5.	Japanese Office Action mailed August 2, 2024 for Japanese Application No. 2023-213724, 3 pages.	
	6.	English Translation of Japanese Office Action mailed July 23, 2024 for Japanese Application No. 2022-535535, 11 pages.	

EXAMINER SIGNATURE			
Examiner Signature		Date Considered	
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw 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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	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552.8023.US06

CERTIFICATION STATEMENT

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

☐ 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. See 37 CFR 1.97(e) (1).

OR

☐ 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references. This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, Applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.

COPIES OF REFERENCES

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

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	/Matthew S. Williams/	Date (YYYY-MM-DD)	2024-08-27
Name/Print	Matthew S. Williams	Registration Number	77,516

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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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APPLICATION #
18/358,837

RECEIPT DATE / TIME
07/02/2024 04:55:14 PM Z ET

ATTORNEY DOCKET #
111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	6598	FILED BY	JiYoung Anderson
PATENT CENTER #	66217149	FILING DATE	07/25/2023
CUSTOMER #	25096	FIRST NAMED INVENTOR	Richard Quick
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Matthew Williams

Documents

TOTAL DOCUMENTS: 8

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2024.7.2 - IDS SB08 - 111552-8023.US06.pdf	3	Information Disclosure Statement (IDS) Form (SB08)	132 KB
Warning: This is not a USPTO supplied IDS fillable form. Data in the form cannot be automatically loaded to other USPTO systems.			
2024.7.2 RCE - 111552.8023.US06.pdf	3	Request for Continued Examination (RCE)	1628 KB
NPL_CN_Office Action received for 2021110617402 mailed May 23 2024 15 pages.pdf	15	Non Patent Literature	605 KB

FOR_CN102316809.pdf	16	Foreign Reference	529 KB
FOR_WO2010095712.pdf	23	Foreign Reference	693 KB
NPL_EESR_21818772.2 mailed May 10 2024 _ 9 pages.pdf	9	Non Patent Literature	822 KB
FOR_WO2019064306.pdf	42	Foreign Reference	2569 KB
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NPL_EESR_21818772.2 mailed May 10 2024 _ 9 pages.pdf	BA2A26C581FABD34AF4DD80D04D9529AEBF50AD5A93C9956 89EF866397FDF7D1AE3A9A77215E69F461AEBEF37861EA0E5

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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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SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
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FILED BY JiYoung Anderson

PATENT CENTER # 66217149

AUTHORIZED BY Matthew Williams

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CORRESPONDENCE ADDRESS -

FIRST NAMED INVENTOR Richard Quick

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
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U.S. PATENTS AND PUBLICATIONS						
Examiner Initial*	Cite No	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	
	1.	20240198072	06-20-2024	Merritt et al.		
	2.	20170238951	08-24-2017	Yang et al.		
	3.	20240207593	06-27-2024	Merritt et al.		
	4.					
	5.					
FOREIGN PATENT DOCUMENTS						
Examiner Initial*	Cite No	Foreign Document Number ³	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
	1.	WO2024103036	05-16-2024	Shifamed Holdings LLC		
	2.	WO2019064306	04-04-2019	CERETRIVE LTD.		
	3.	CN102316809 (Counterpart: WO2010/095712)	01-11-2012	WELLFIND CO., LTD.		
	4.	WO2010095712	08-26-2010	WELLFIND CO., LTD.		
	5.					
	6.					
NON-PATENT LITERATURE DOCUMENTS						
Examiner Initials*	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
	1.	Extended European Search Report for European Application No. 21818772.2, Applicant: Inari Medical, Inc., Date of Mailing: May 10, 9 pages.				
	2.	Chinese Office Action received for Application No. 202111061740.2, Applicant: Inari Medical, Inc, Date of Mailing: May 23, 2024, 15 pages.				
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	4.					
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***EXAMINER:** Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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CERTIFICATION STATEMENT

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

☐ 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. See 37 CFR 1.97(e) (1).

OR

☐ 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references. This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, Applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.

COPIES OF REFERENCES

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

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	Attorney Docket Number	111552-8023.US06

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	/Matthew S. Williams/	Date (YYYY-MM-DD)	2024-07-02
Name/Print	Matthew S. Williams	Registration Number	77,516

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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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(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, MG, MK, MN, MU, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH,

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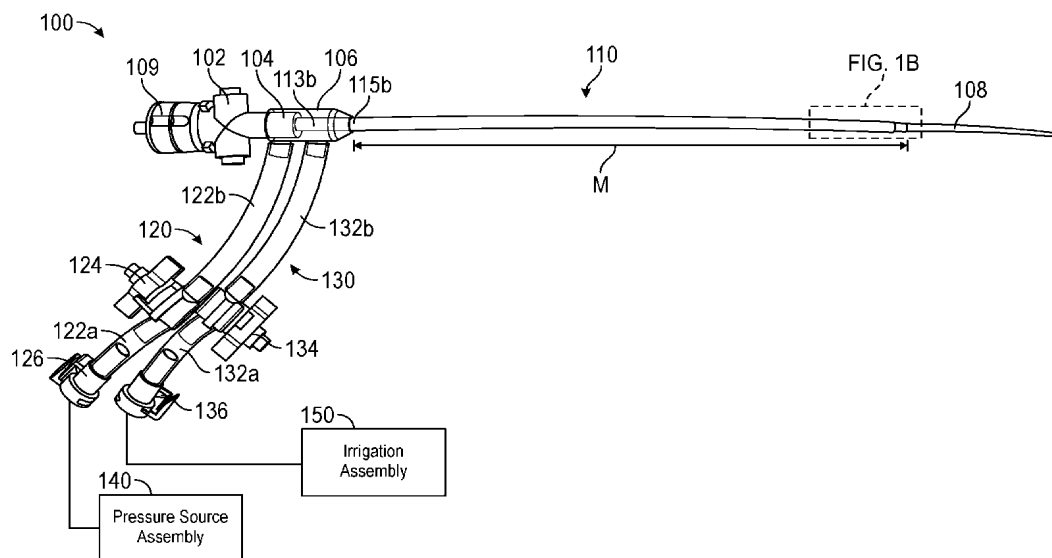


FIG. 1A

(57) Abstract: Disclosed herein are systems for aspirating, irrigating, and/or mechanically disrupting body cavities, such as abdominal abscesses, empyemas, and/or (e.g., complicated) pleural effusions, and associated devices and methods. In some embodiments, an aspiration and irrigation system includes an inner catheter defining an aspiration lumen and an outer tube positioned coaxially around the inner catheter and defining an irrigation lumen. A distal portion of the outer tube can be bonded to the inner catheter, and a plurality of apertures can be formed through the outer tube proximal of the bond. The aspiration lumen can be fluidly coupled to an aspiration circuit configured to aspirate through the aspiration lumen, and the irrigation lumen can be fluidly coupled to an irrigation circuit configured to flow an irrigation fluid through the irrigation lumen and out of the apertures.



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SYSTEMS FOR ASPIRATING AND IRRIGATING BODY CAVITIES,
AND ASSOCIATED DEVICES AND METHODS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 63/383,440, filed November 11, 2022, and titled “SYSTEMS FOR ASPIRATING AND IRRIGATING BODY CAVITIES, AND ASSOCIATED DEVICES AND METHODS,” and U.S. Provisional Patent Application No. 63/426,560, filed November 18, 2022, and titled “SYSTEMS FOR ASPIRATING AND IRRIGATING BODY CAVITIES, AND ASSOCIATED DEVICES AND METHODS,” each which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The present technology generally relates to systems for aspirating, irrigating, and/or mechanically disrupting material within body cavities, such as abdominal abscesses, empyemas, and/or (e.g., complicated) pleural effusions.

BACKGROUND

[0003] Abdominal abscesses and pleural effusions are collections that fill a body cavity with low viscosity, sterile serosanguinous fluid. If the collection is large enough, percutaneous drainage can be performed to drain the collection contents. The drainage is typically performed with the use of an indwelling percutaneous drainage catheter which is typically left in for less than a week for simple collections. Upon further progression of the disease state, the pleural effusion can become a complicated pleural/parapneumonic effusion or pleural empyema, both of which involve infection of the cavity contents. Intraabdominal abscesses can also become infected, leading to a more complicated presentation.

[0004] Such complicated abdominal abscess collections, pleural effusions, and pleural empyemas can generate thick, viscous pus (purulent fluid) with the inclusion of necrotic debris, blood clots, enteral content, and/or multiple loculations. Loculations are contained within fibrinous sheets (e.g., septations) that create distinct fluid-filled pockets within a single cavity. The progression of these disease states to a complicated presentation significantly challenges the ability for current percutaneous drains to evacuate the collection efficiently and completely. For

example, current indwelling drains are limited by inner lumen size, drainage side-hole diameter, number of drainage side-holes, constrictions along the fluid path (e.g., stopcock), length of the fluid path, and the pressure difference between the inlet (abscess) and outlet (collection bag). Although drains have improved in size, shape, and suction over time, current technology still struggles to evacuate complex collections. This is evidenced by the need for multiple drains within the same collection, the need for multiple drain replacements due to clogging or malpositioning, long duration of drainage (days to months), the use of pharmacologic agents to supplement drainage efficiency, and the use of off-label devices to make collections more amenable to percutaneous drainage.

[0005] Some thrombectomy devices have been used off-label for mechanical debridement of cavities. These devices are not targeted and/or lack precise spatial control. Additionally, pharmacological agents such as tissue plasminogen activator (tPA) and deoxyribonuclease (DNase) have been administered to liquefy the collection and accelerate drainage by reducing viscosity of the fluid; however, most protocols are labor-intensive and time-consuming.

[0006] Further, drainage catheters require daily flushing with a low volume of sterile saline to prevent the catheter from clogging and impeding flow. While *flushing* aims to clear the catheter and maintain its patency, *irrigation* is meant to mobilize debris and reduce viscosity of local contents within the collection. Irrigation techniques have been performed using current drainage catheters. For such techniques, a large volume of sterile saline is flushed through a placed percutaneous drain and immediately aspirated. This method can also effectively clear a clogged drain, but advances debris already within the drain back into the cavity, thus potentially allowing it to later clog the drain again. Sometimes, the use of two separate drains in a single cavity can reduce clogging after irrigation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Many aspects of the present technology can be better understood with reference to the following drawings. The components in the drawings are not necessarily to scale. Instead, emphasis is placed on illustrating clearly the principles of the present disclosure.

[0008] Figure 1A is a partially schematic side view of an aspiration and irrigation system in accordance with embodiments of the present technology.

[0009] Figure 1B is an enlarged side perspective view of a distal portion of a catheter assembly of the system shown in Figure 1A in accordance with embodiments of the present technology.

[0010] Figure 1C is an enlarged distally-facing perspective view of a distal portion of the catheter assembly of Figure 1A in accordance with embodiments of the present technology.

[0011] Figures 2A and 2B are a side view and an enlarged partially-schematic side view of a pressure source assembly and an irrigation assembly of the system of Figure 1A in accordance with embodiments of the present technology.

[0012] Figures 3A–3C are enlarged side views of a mechanical disruptor assembly in a compressed position, a partially-expanded position, and an expanded position, respectively, that is configured to be advanced through the catheter assembly of Figure 1A to within a body cavity to mechanically disrupt material therein in accordance with embodiments of the present technology.

[0013] Figure 3D is a side view of a handle of the mechanical disruptor assembly of Figures 3A–3C in accordance with embodiments of the present technology.

[0014] Figure 4 is a flow diagram of a process or method for treating a body cavity of a patient using the system of Figure 1A in accordance with embodiments of the present technology.

[0015] Figures 5A–5E are side cross-sectional views of a distal portion of the catheter assembly of Figure 1A during different stages of the method of Figure 4 in accordance with embodiments of the present technology.

[0016] Figure 6 is a side view of an aspiration and irrigation system in accordance with additional embodiments of the present technology.

[0017] Figure 7A is a side view of a catheter assembly of the system of Figure 6 in accordance with embodiments of the present technology.

[0018] Figure 7B is a side view of the of the catheter assembly of Figure 7A with a dilator inserted therein in accordance with embodiments of the present technology.

[0019] Figures 8A and 8B are enlarged side views of a distal portion of an elongate member of the catheter assembly of Figure 6 in accordance with embodiments of the present technology.

DETAILED DESCRIPTION

[0020] The present technology is generally directed to systems for aspirating, irrigating, and/or mechanically disrupting material/contents within body cavities, such as abdominal abscesses, empyemas, and/or (e.g., complicated) pleural effusions, and associated devices and methods. In some embodiments, an aspiration and irrigation system configured in accordance with the present technology includes an inner catheter defining an aspiration lumen and an outer tube positioned coaxially around the inner catheter and defining an irrigation lumen. A distal portion of the outer tube can be fluidly sealed to the inner catheter, and a plurality of apertures can be formed through the outer tube proximal to the fluidly sealed portion. The aspiration lumen can be fluidly coupled to an aspiration circuit configured to aspirate the aspiration lumen, and the irrigation lumen can be fluidly coupled to an irrigation circuit configured to flow an irrigation fluid through the irrigation lumen and out of the apertures. The catheter assembly can be positioned within a body cavity, and the aspiration circuit can be operated to aspirate material from the abscess. At the same or a different time, the irrigation circuit can be operated to irrigate the cavity with the irrigation fluid to, for example, break apart (e.g., mobilize) material within the cavity and/or reduce the viscosity of the material within the cavity.

[0021] In some aspects of the present technology, the aspiration and irrigation system (i) maximizes the area of aspiration lumen along the entire length of the aspiration lumen, (ii) provides vigorous circumferential irrigation to reduce viscosity of the cavity contents and break up loculations and other large debris, and (iii) separates the aspiration and irrigation circuits. The catheter assembly permits a physician to quickly irrigate and aspirate large, complex, collections to save drain management time and overcome repeated drain clogging. The complicated material can be evacuated with the aspiration and irrigation system during an initial treatment procedure, thus making the collection amenable to drainage with currently available drainage catheters. Alternatively, the aspiration and irrigation system may be employed in collections that currently available drainage catheters have failed to evacuate.

[0022] The aspiration and irrigation system can be designed to maximize flow of material by utilizing Poiseuille's law as defined below. In some embodiments, the pressure differential is maximized by using an aspiration source comprising a 60cc syringe, which is capable of creating a vacuum of -25.5inHg when fully evacuated. The aspiration catheter radius can be maximized by maintaining a single lumen having the same diameter from the distal tip of the aspiration catheter to the syringe by utilizing a large bore side port tubing and large bore syringe.

Fluid viscosity can be lowered via the irrigation process which can dilute the cavity contents. The length of the system can be minimized by maintaining a minimal distance between the tip of the catheter and the aspiration source/syringe. In contrast, current drains typically use excess tubing length to connect to gravity collection bags, wall suction, or suction bulbs, which decreases the efficiency of the drain.

[0023] In cases where contents within the cavity are too viscous or large for the aspiration catheter, a mechanical element can be employed. The mechanical element can have a size and shape that can be safely controlled to a desired geometry and manipulated within the cavity to aid with subsequent aspiration and drainage.

[0024] Certain details are set forth in the following description and in Figures 1–8B to provide a thorough understanding of various embodiments of the present technology. In other instances, well-known structures, materials, operations, and/or systems often associated with percutaneous procedures, body cavity material removal procedures, catheters, and the like are not shown or described in detail in the following disclosure to avoid unnecessarily obscuring the description of the various embodiments of the technology. Moreover, although reference is primarily made to aspiration and drainage catheters for use in removing material from body cavities, the catheters of the present technology can be other types of catheters and/or can be used in other types of medical procedures. Those of ordinary skill in the art will recognize, however, that the present technology can be practiced without one or more of the details set forth herein, and/or with other structures, methods, components, and so forth.

[0025] The terminology used below is to be interpreted in its broadest reasonable manner, even though it is being used in conjunction with a detailed description of certain examples of embodiments of the technology. Indeed, certain terms may even be emphasized below; however, any terminology intended to be interpreted in any restricted manner will be overtly and specifically defined as such in this Detailed Description section.

[0026] The accompanying Figures depict embodiments of the present technology and are not intended to be limiting of its scope unless expressly indicated. The sizes of various depicted elements are not necessarily drawn to scale, and these various elements may be enlarged to improve legibility. Component details may be abstracted in the Figures to exclude details such as position of components and certain precise connections between such components when such details are unnecessary for a complete understanding of how to make and use the present technology. Many of the details, dimensions, angles and other features shown in the Figures are

merely illustrative of particular embodiments of the disclosure. Accordingly, other embodiments can have other details, dimensions, angles and features without departing from the present technology. In addition, those of ordinary skill in the art will appreciate that further embodiments of the present technology can be practiced without several of the details described below.

[0027] With regard to the terms “distal” and “proximal” within this description, unless otherwise specified, the terms can reference a relative position of the portions of a catheter subsystem with reference to an operator and/or a location in the vasculature. Also, as used herein, the designations “rearward,” “forward,” “upward,” “downward,” and the like are not meant to limit the referenced component to a specific orientation. It will be appreciated that such designations refer to the orientation of the referenced component as illustrated in the Figures; the systems of the present technology can be used in any orientation suitable to the user.

[0028] As used herein, unless expressly indicated otherwise, the terms “about,” “approximately,” “substantially” and the like mean within plus or minus 10% of the stated value. To the extent any materials incorporated herein by reference conflict with the present disclosure, the present disclosure controls.

[0029] Figure 1A is a partially schematic side view of an aspiration and irrigation system 100 (“system 100”) in accordance with embodiments of the present technology. In the illustrated embodiment, the system 100 includes a catheter assembly 110 fluidly coupled to (i) a valve 102, (ii) a first tubing assembly 120 via a first hub 104, and (iii) a second tubing assembly 130 via a second hub 106. The system 100 can include several features generally similar or identical to those of the clot treatment systems described in detail in U.S. Patent Application No. 16/536,185, filed August 8, 2019, and titled “SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED DEVICES AND METHODS,” which is incorporated herein by reference in its entirety.

[0030] Figure 1B is an enlarged side perspective view of a distal portion of the catheter assembly 110 shown in Figure 1A in accordance with embodiments of the present technology. In the illustrated embodiment, the catheter assembly 110 and extends along an axis L (e.g., a longitudinal axis) includes an inner elongate member 112 (which can also be referred to as an inner sheath, an inner tube, an inner catheter, an aspiration member, an aspiration sheath, an aspiration tube, an aspiration catheter, and/or the like) and an outer elongate member 114 (which can also be referred to as an outer sheath, an outer tube, an outer catheter, an irrigation member,

an irrigation sheath, an irrigation tube, an irrigation catheter, and/or the like) coaxially positioned at least partially around the inner elongate member 112. The outer elongate member 114 is shown as partially transparent in Figure 1B for clarity. The inner elongate member 112 can be a reinforced thin-walled catheter. In some embodiments, the inner elongate member 112 can include some features that are at least generally similar in structure and function, or identical in structure and function, to those of the catheters disclosed in (i) U.S. Patent Application Publication No. 17/529,018, filed November 17, 2021, and titled “CATHETERS HAVING SHAPED DISTAL PORTIONS, AND ASSOCIATED SYSTEMS AND METHODS,” and/or (ii) U.S. Patent Application Publication No. 17/529,064, filed November 17, 2021, and titled “CATHETERS HAVING STEERABLE DISTAL PORTIONS, AND ASSOCIATED SYSTEMS AND METHODS,” each of which is incorporated herein by reference in its entirety. The outer elongate member 114 can be a tube formed from a plastic material, elastomeric material, and/or thermoplastic elastomer (TPE) material, such as a TPE manufactured by Arkema S.A., of Colombes, France, such as the TPEs manufactured under the trademark “Pebax.” In other embodiments, the outer elongate member 114 can be a reinforced thin-walled catheter. The outer elongate member 114 can have a size of between about 6–30 French, such as a size of 6 French, 8 French, 12 French, 16 French, 20 French, 24 French, 26 French, or 30 French. The inner elongate member 112 can have a size smaller than the outer elongate member 114, such a size between about 1–8 French smaller than the outer elongate member 114.

[0031] Figure 1C is an enlarged distally-facing perspective view of the distal portion of the catheter assembly 110 in accordance with embodiments of the present technology. Referring to Figures 1B and 1C, a distal end portion 115a of the outer elongate member 114 can be fluidly sealed to/against (e.g., coupled to, mechanically attached to, bonded to, affixed to, etc.) to a distal portion 113a (e.g., a distal end portion) of the inner elongate member 112. Referring to Figure 1A, a proximal end portion 113b of the inner elongate member 112 can be coupled to (e.g., bonded to) the first hub 104 and/or the valve 102, and a proximal end portion 115b of the outer elongate member 114 can be coupled to (e.g., bonded to) the second hub 106.

[0032] Referring to Figure 1B, the inner elongate member 112 defines an inner lumen 111 (e.g., an aspiration lumen) and the outer elongate member 114 defines an outer lumen 117 (e.g., an irrigation lumen). The inner lumen 111 is accessible at the distal portion 113a of the inner elongate member 112 via a distal opening 119 (e.g., an aspiration opening). Referring to Figures 1B and 1C, the distal end portion 115a of the outer elongate member 114 includes/defines one or more (e.g., a plurality of) circumferentially distributed apertures 118 (e.g., holes) fluidly

coupled/connected to the outer lumen 117. As described in further detail below, the apertures 118 can serve as an outlet for an irrigation fluid, a targeted drug, and/or another fluid to flow out of the outer lumen 117 to outside the catheter assembly 110. In the illustrated embodiment, the apertures 118 have a circular shape. The size of the apertures 118, the shape of the apertures 118, a clearance between the outer elongate member 114 and the inner elongate member 112, and/or a lumen diameter of the second tubing assembly 130 (Figure 1A), including the tubing sections 132a-b and the fluid control device 134, can be controlled (e.g., selected) to permit vigorous infusion of an irrigation fluid through the apertures 118. Further, the number of the apertures 118, the size of the apertures 118, the shape of the apertures 118 (e.g., circular, square, rectangular, rectilinear, polygonal, irregular, etc.) can be adjusted to adjust a jet fluid angle of the irrigation fluid leaving the apertures 118. In some embodiments, the distal opening 119 extends in a plane orthogonal to the axis L, and the apertures 118 extend along planes different than that of the distal opening 119 (e.g., planes orthogonal to the distal opening 119). In some embodiments, the apertures 118 are fluidly coupled/connected to the outer lumen 117 at the distal end portion 115a of the outer elongate member 114 where the distal end portion 115a (fluidly coupled/connected portion) extends proximal such that there is a longer distance between the distal opening 119 and the apertures 118.

[0033] Referring to Figures 1A–1C, the inner lumen 111 is fluidly coupled to the first tubing assembly 120 via the first hub 104, and the outer lumen 117 is fluidly coupled to the second tubing assembly 130 via the second hub 106. The valve 102 is fluidly coupled to the inner lumen 111 of the inner elongate member 112. In some embodiments, the valve 102 is an actuated access valve that is configured to maintain fluid control during a body cavity treatment procedure by inhibiting or preventing fluid flow in the proximal direction through the valve 102 as various components such as delivery sheaths, pull members, guidewires, interventional devices, mechanical disruptor assemblies, other aspiration catheters, and so on, are inserted through the valve 102 to be delivered through the inner elongate member 112 to a treatment site in a body cavity. In some embodiments, the valve 102 can be a valve of the type disclosed in U.S. Patent Application No. 16/117,519, filed August 30, 2018, and titled “HEMOSTASIS VALVES AND METHODS OF USE,” which is incorporated herein by reference in its entirety.

[0034] In the illustrated embodiment, the first tubing assembly 120 fluidly couples the inner lumen 111 of the inner elongate member 112 of the catheter assembly 110 to a pressure source assembly 140, such as a syringe and one or more valves as described in detail below with reference to Figures 2A and 2B. Similarly, the second tubing assembly 130 fluidly couples the

outer lumen 117 of the outer elongate member 114 to an irrigation assembly 150, such as a syringe and one or more valves as described in detail below with reference to Figures 2A and 2B. Referring to Figure 1A, the first and second tubing assemblies 120, 130 (“tubing assemblies 120, 130”) can be generally similar or identical. For example, in the illustrated embodiment the first tubing assembly 120 includes one or more tubing sections 122 (individually labeled as a first tubing section 122a and a second tubing section 122b), at least one fluid control device 124 (e.g., a valve), and at least one connector 126 (e.g., a Toomey tip connector) for fluidly coupling the first tubing assembly 120 to the pressure source assembly 140 and/or other suitable components. Similarly, in the illustrated embodiment the second tubing assembly 130 includes one or more tubing sections 132 (individually labeled as a first tubing section 132a and a second tubing section 132b), at least one fluid control device 134 (e.g., a valve), and at least one connector 136 (e.g., a Toomey tip connector) for fluidly coupling the second tubing assembly 130 to the irrigation assembly 150 and/or other suitable components. Referring to Figures 1A and 1B, in some embodiments the fluid control device 124 comprises a stopcock that is fluidly coupled to (i) the inner lumen 111 of the inner elongate member 112 via the second tubing section 122b and (ii) the connector 126 via the first tubing section 122a. Likewise, the fluid control device 134 can comprise a stopcock that is fluidly coupled to (i) the outer lumen 117 of the outer elongate member 114 via the second tubing section 132b and (ii) the connector 136 via the first tubing section 132a. The fluid control devices 124, 134 are externally operable by a user to regulate the flow of fluid therethrough and, specifically, from the inner lumen 111 and to the outer lumen 117, respectively, of the catheter assembly 110 to the pressure source assembly 140 and from the irrigation assembly 150, respectively. In some embodiments, the connectors 126, 136 are quick-release connectors (e.g., quick disconnect fittings) that enable rapid coupling/decoupling of the catheter assembly 110 from the pressure source assembly 140 and/or the irrigation assembly 150.

[0035] The system 100 can further include a dilator 108 insertable through the inner lumen 111 of the inner elongate member 112 via the valve 102. The dilator 108 can include a proximal coupling portion 109 configured to be secured to and/or mate to a corresponding portion of the valve 102. In some embodiments, the dilator 108 and/or the valve 102 can be of the type disclosed in U.S. Patent Application No. 18/156,944, filed January 19, 2023, and titled “CLOT TREATMENT SYSTEMS WITH DILATOR LOCKING MECHANISMS, AND ASSOCIATED DEVICES AND METHODS,” which is incorporated herein by reference in its entirety.

[0036] Figures 2A and 2B are a side view and an enlarged partially-schematic side view of the pressure source assembly 140 and the irrigation assembly 150 in accordance with embodiments of the present technology. Referring to Figures 2A and 2B, the pressure source assembly 140 includes a pressure source 242, such as a syringe 242 having a barrel 243 and a plunger 244 slidable through the barrel 243, and an aspiration flow control assembly 245 fluidly coupled to the barrel 243. The aspiration flow control assembly 245 can include (i) a first connector 246 (ii) a second connector 247 (obscured in Figure 2A), (iii) a first one-way valve 248 (shown schematically in Figure 2B) fluidly coupling the first connector 246 to the barrel 243, and (iv) a second one-way valve 249 (shown schematically in Figure 2B) fluidly coupling the second connector 247 to the barrel 243 and the first one-way valve 248. Similarly, the irrigation assembly 150 can include a pressure source 252, such as a syringe 252 having a barrel 253 and a plunger 254 slidable through the barrel 253, and an irrigation flow control assembly 255 fluidly coupled to the barrel 253. The irrigation flow control assembly 255 can include (i) a first connector 256, (ii) a second connector 257, (iii) a first one-way valve 258 (shown schematically in Figure 2B) fluidly coupling the first connector 256 to the barrel 253, and (iv) a second one-way valve 259 (shown schematically in Figure 2B) fluidly coupling the second connector 257 to the barrel 253 and the first one-way valve 258. In other embodiments, the pressure sources 242, 252 can be other types of pumps or sources of fluid pressure. In some embodiments, the plungers 244, 254 are coupled together via a handle 264 (Figure 2A) such that the plungers 244, 254 are constrained to move together. In other embodiments, the syringes 242, 252 can be separated such that they are independently operable and/or can have different sizes. In some embodiments, the syringes 242, 252 can have a volume of about 60 cubic centimeters, and can have a large bore coupling of the type described in, for example, U.S. Patent Application No. 16/536,185, filed August 8, 2019, and titled “SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED DEVICES AND METHODS,” which is incorporated herein by reference in its entirety.

[0037] Referring to Figures 1A–2B, the first connector 246 of the pressure source assembly 140 can be connected to the connector 126 of the first tubing assembly 120 to fluidly couple the inner lumen 111 of the catheter assembly 110 to the syringe 242, and the first connector 256 of the irrigation assembly 150 can be connected to the connector 136 of the second tubing assembly 130 to fluidly couple the outer lumen 117 of the catheter assembly 110 to the syringe 252. Referring to Figure 2B, the second connector 247 of the pressure source assembly 140 can be connected to a waste reservoir 260 (e.g., a waste bag), and the second connector 257

of the irrigation assembly 150 can be connected to an irrigation reservoir 262 (e.g., a saline bag) configured to hold an irrigation fluid. The irrigation fluid can be a sterile fluid having a relatively low viscosity, such as saline.

[0038] Arrows P_{withdraw} and P_{depress} in Figure 2B over the aspiration flow control assembly 245 illustrate the operation of the aspiration flow control assembly 245 when the plunger 244 is withdrawn and depressed, respectively. The first one-way valve 248 of the aspiration flow control assembly 245 can be positioned to, upon pullback (e.g., withdrawal) of the plunger 244, permit fluid flow through the first connector 246 (e.g., from the inner lumen 111) to the barrel 243 of the syringe 242. Concurrently, the second one-way valve 249 of the aspiration flow control assembly 245 inhibits (e.g., blocks) backward fluid flow from the waste reservoir 260 into the barrel 243 of the syringe 242. When the plunger 244 is depressed (e.g., advanced), the second one-way valve 249 can be positioned to permit fluid flow through the second connector 247 (e.g., from the barrel 243) to the waste reservoir 260. Concurrently, the first one-way valve 248 inhibits (e.g., blocks) fluid flow from the barrel 243 into the inner lumen 111.

[0039] Similarly, arrows I_{withdraw} and I_{depress} in Figure 2B over the irrigation flow control assembly 255 illustrate the operation of the irrigation flow control assembly 255 when the plunger 254 is withdrawn and depressed, respectively. The second one-way valve 259 of the irrigation flow control assembly 255 can be positioned to, upon pullback (e.g., withdrawal) of the plunger 254, permit fluid flow through the second connector 257 (e.g., from the irrigation reservoir 262) to the barrel 253 of the syringe 252. Concurrently, the first one-way valve 258 of the irrigation flow control assembly 255 inhibits (e.g., blocks) backward fluid flow from first connector 256 into the barrel 253 of the syringe 252. When the plunger 254 is depressed (e.g., advanced), the first one-way valve 258 can be positioned to permit fluid flow through the first connector 256 (e.g., from the barrel 253) to the outer lumen 117. Concurrently, the second one-way valve 259 inhibits (e.g., blocks) fluid flow from the barrel 253 into the irrigation reservoir 262.

[0040] Referring to Figures 1A–2B, the catheter assembly 110 can be introduced into a patient through a percutaneous opening (e.g., an opening in the abdomen, an opening in an intercostal space) and advanced such that the distal portion of the catheter assembly 110 is positioned within and/or proximate to a cavity within the body of the patient. The proximal portion 109 of the dilator 108 can be decoupled from the valve 102 and the dilator 108 can be removed from the catheter assembly 110 within the body. Then, the handle 264 can be

withdrawn to withdraw the plungers 244, 254 within the barrels 243, 253, respectively. The withdrawal of the plungers 244, 254 simultaneously (i) aspirates the inner lumen 111 of the inner elongate member 112 to aspirate material from within the cavity and (ii) fills (e.g., primes) the syringe 252 with irrigation fluid from the irrigation reservoir 262. Then, the handle 264 can be depressed to depress the plungers 244, 254 within the barrels 243, 253, respectively. The depression of the plungers 244, 254 simultaneously (i) empties the aspirated contents from the cavity from the barrel 243 into the waste reservoir 260 and (ii) forces the irrigation fluid from the barrel 253 into the outer lumen 117 of the outer elongate member 114 and through the apertures 118 into the cavity to irrigate the cavity. Table 1 below illustrates such as an operation of the system 100:

Table 1

Step No.	Aspiration Syringe 242	Irrigation Syringe 252
1. Pull Syringes	Aspirate Cavity	Prime with Saline
2. Push Syringes	Empty into Waste Bag	Irrigate Cavity

[0041] In some aspects of the present technology, operation of the syringe 242 can aspirate material from the cavity while operation of the syringe 252 can irrigate the cavity to disrupt and/or lower the viscosity of the material therein. Simultaneous operation of the syringes 242 and 252 can ensure constant volume retention within the cavity, such that the aspirated volume is replaced with irrigation volume. In additional aspects of the present technology, the aspiration and irrigation circuits 140, 150, respectively, are independently controlled by the first and second one-way valves 248, 249 of the aspiration flow control assembly 245 and the first and second one-way valves 258, 259 of the irrigation flow control assembly 255, respectively, connected to the syringes 242, 252, respectively. The flow control assemblies can ensure that each of the inner and outer lumens 111, 117 is a one-way path so that the irrigation apertures 118 do not become clogged as, for example, conventional drainage catheter side-holes can when placed in complex collections for aspiration. Moreover, any contents inside the aspiration lumen 111 will not be reintroduced into the cavity during irrigation. That is, the irrigation fluid is introduced via the outer lumen 117 which is separate from the aspiration lumen 111 such that irrigation does not reintroduce any aspirated material into the cavity and aspiration does not clog the fluid pathway for the irrigation fluid.

[0042] The syringes 242, 252 can be repeatedly actuated to provide multiple instances of aspiration/irrigation. In some embodiments, the system 100 can be used in a single-session to treat the cavity and entirely or substantially entirely remove the contents thereof, such that the cavity would be effectively drained at the initial treatment and there would be no need to leave a drainage catheter behind. In other embodiments, after treating the cavity with the system 100, a drainage catheter can be inserted into the cavity after aspiration and irrigation treatment. The system 100 can be left in the patient to function as a drainage system for a partial amount or the full duration of drainage, and/or a separate drainage catheter (e.g., having a smaller size) can be inserted into the patient and the system 100 removed for further drainage. That is, the system 100 can be used for initial debridement, drainage, and flushing of the contents of the cavity, and a standard commercial drain could then be inserted upon the removal of the system 100, within the same procedure, to allow for any remaining collection to be drained over the subsequent days. In some aspects of the present technology, use of the system 100 can eliminate the need for off-label mechanical devices and pharmacological agents for drainage, thus improving patient outcomes and reducing duration of drainage.

[0043] In additional aspects of the present technology, the catheter assembly 110 can be optimized to maximize drainage (e.g., aspiration) flow. For example, the catheter assembly 110 can be optimized in view of Poiseuille's law:

$$Q = \frac{\pi * \Delta P * R^4}{8 * \eta * L}$$

Where Q is the flow rate through a tube, ΔP is the pressure differential between the tube inlet and outlet, R is the radius of the tube (shown in Figure 1B), η is the fluid viscosity, and L is the tube length. Assuming the pressure difference ΔP and length L of the catheter assembly 110 are constant between an aspiration catheter and a standard drainage catheter, the present technology can reduce the collection viscosity η while maintaining a large radius R (Figure 1B) of the inner lumen 111 (e.g., the drainage lumen). For example, the introduction of the irrigation fluid via the outer lumen 117 can reduce the collection viscosity η while the coaxial arrangement of the inner and outer lumens 111, 117 can maximize the radius R of the inner lumen 111. In contrast, some conventional double-lumen drains (e.g., sumps) have been developed to promote drainage by providing a venting lumen. However, the introduction of such a secondary lumen compromises the radius of the collection lumen and thus decreases flow. Accordingly, the system 100 can provide an optimal drainage catheter solution that (i) maximizes the drainage lumen (e.g., the inner lumen 111) of the catheter assembly 110, (ii) reduces collection viscosity

via irrigation through the outer lumen 117, and/or (iii) breaks apart loculations and debris via the vigorous irrigation through the outer lumen 117.

[0044] Accordingly, the system 100 can be designed to maximize flow of material by utilizing Poiseuille's law as defined above. In some embodiments, the pressure differential is maximized by using a 60cc syringe 242 which can create a vacuum of -25.5 inHg when fully evacuated. The radius of the inner elongate member 112 is maximized by maintaining a single lumen at the same diameter from the distal tip to the syringe 242 by utilizing a large bore side port tubing (e.g., within the first tubing assembly 120) and a large bore syringe 242. Fluid viscosity can be lowered via the irrigation process which can dilute the cavity contents with an irrigation fluid of low viscosity. The length of the system 100 can be minimized by maintaining as short a distance as possible between the tip of the catheter assembly 110 and the vacuum source/syringe 242. In contrast, current drains can use excess tubing length to connect to gravity collection bags, wall suction, or suction bulbs, which decreases the efficiency of the drain.

[0045] In contrast to the present technology, a typical dual-lumen catheter (either extruded or as part of a braided catheter) will face challenges in maintaining a reduced overall profile. Some common designs include a second lumen within or adjacent to the main aspiration lumen. These designs suffer from an excessive outer diameter and a single lumen for irrigation which lies in the same plane as the aspiration lumen. In some aspects of the present technology, the two coaxial lumens 111, 117 provides several advantages for this application: (i) a continuous circular inner lumen 111 to maximize inlet area to the aspiration lumen 111, and (ii) a concentric reservoir for circumferential (3-dimensional) irrigation via the outer lumen 117. In some aspects of the present technology, circumferential irrigation is important not only to reduce viscosity of the collection, but also to vigorously agitate the local region, potentially disbanding loculations and displacing adherent material. The 3-dimensional pattern of the irrigation fluid distributed via the apertures 118 is helpful in providing more distributed, targeted irrigation that is not limited to a single plane as it would be in a single-lumen configuration. For example, a small single lumen (~1 French – 4 French) for infusion may only achieve local viscosity reduction without sufficient disruption of the collection.

[0046] In other embodiments the pressure source assembly 140 and/or the irrigation assembly 150 can be configured to provide more control and/or operated in different manners. For example, the aspiration syringe 242 and the irrigation syringe 252 can be independently operated or have separately pre-determined volumes for each stroke (e.g., by omitting the handle

264). In some embodiments, the fluid control device 124 can be closed during withdrawal of the plunger 244 such that a vacuum is generated (e.g., pre-charged) within the barrel 243 of the syringe 242. The fluid control device 124 can subsequently be opened to apply the vacuum to the inner lumen 111 and generate a suction/aspiration pulse through the inner lumen 111. Moreover, although the first and second one-way valves 248, 249 are shown to be within the aspiration flow control assembly 245 and the first and second one-way valves 258, 259 are shown to be within the irrigation flow control assembly 255, in other embodiments any or all of the one-way valves 248, 249, 258, 259 can be incorporated directly into the catheter assembly 110 to, for example, avoid any confusion or mixing of the aspiration and irrigation circuits.

[0047] Referring to Figures 1A–1C, the system 100 can have various other configurations. For example, (i) the dilator 108 can be long-tipped or short-tipped for insertion of the system 100 into the patient, (ii) the catheter assembly 110 can include a balloon-tip for localized irrigation and retention within the cavity, and/or (iii) the distal portion of the catheter assembly 110 can have various curves (pig-tail, J-hook, etc.; e.g., as shown in Figures 7A–8B). Moreover, in some embodiments the outer lumen 117 can be omitted and the catheter assembly 110 can include/define only the inner lumen 111. Such embodiments can provide a simplified design that maintains the benefits of large-bore aspiration/drainage without the ability to irrigate through a separate lumen. The large-bore lumen could still be used for irrigation, if needed. Further, in some embodiments the outer elongate member 114 can define multiple irrigation lumens extending between the second hub 106 and, for example, corresponding ones or multiples of the apertures 118. The individual irrigation lumens can be placed around the inner aspiration lumen 111 and can be formed via a multi-lumen extrusion process, a tri-axial coiling/braiding process, and/or another suitable processes. The individual irrigation lumens can be circular or have other cross-sectional shapes.

[0048] Referring to Figures 1A–1C, in some embodiments if disruption of the contents of the cavity by irrigation is inadequate (e.g., where the contents are too viscous or large for aspiration after irrigation), a mechanical tool or element can be deployed within the cavity through the inner lumen 111 of the catheter assembly 110. In some embodiments, the mechanical element is similar to those used in thrombectomy procedures. The mechanical element can have a size and shape that can be controlled to form a desired geometry and manipulated within the cavity to aid with subsequent aspiration and drainage. Figures 3A–3C, for example, are enlarged side views of a mechanical disruptor assembly 370 in a compressed position, a partially-expanded position, and an expanded position, respectively, that is

configured to be advanced through the catheter assembly 110 to within a cavity to mechanically disrupt material therein in accordance with embodiments of the present technology. Referring to Figures 3A–3C, the mechanical disruptor assembly 370 includes a disruptor element 371 comprising a plurality of interconnected struts and having a proximal portion 372 secured to a first elongate shaft 373 and a distal portion 374 secured to a second elongate shaft 375. The second elongate shaft 375 is slidably disposed within the first elongate shaft 373. One or more of the struts can have a sharpened cutting edge and/or one or more of the struts can have an atraumatic edge.

[0049] The disruptor element 371 can be made of nitinol braid, tubing, stainless steel, and/or any other biocompatible material. In some embodiments, the mechanical disruptor assembly 370 can include several features generally similar or identical to those of the clot treatment devices described in detail in U.S. Patent Application No. 17/072,909, filed October 16, 2020, and titled “SYSTEMS, DEVICES, AND METHODS FOR TREATING VASCULAR OCCLUSIONS,” which is incorporated herein by reference in its entirety.

[0050] Figure 3D is a side view of a handle 380 of the mechanical disruptor assembly 370 in accordance with embodiments of the present technology. Referring to Figures 3A–3D, the first and second elongate shafts 373, 375 (e.g., proximal portions thereof) can be operably coupled to the handle 380. The handle 380 can include a first actuator 382 coupled to one of the first elongate shaft 373 or the second elongate shaft 375 and can be actuatable to translate the first and second elongate shafts 373, 375 relative to one another. For example, the first actuator 382 can be coupled to the second elongate shaft 375 such that (i) movement of the first actuator 382 in the proximal direction along an axis L retracts the second elongate shaft 375 proximally relative to the first elongate shaft 373 and (ii) movement of the first actuator 382 in the distal direction along the axis L advances the second elongate shaft 375 distally relative to the first elongate shaft 373. Movement of the first actuator 382 can move the disruptor element 371 between the compressed position, the partially-expanded position, and the expanded position. For example, when the disruptor element is in the compressed position (Figure 3A), the first actuator 382 can be slid (e.g., proximally) to move the second elongate shaft 375 proximally to move the distal portion 374 of the disruptor element 371 proximally toward the proximal portion 372 of the disruptor element 371 to radially expand the disruptor element to the partially-expanded position (Figure 3B) and, by further actuation, to the expanded position (Figure 3C). In other embodiments, the disruptor element 371 can be configured to passively expand (e.g.,

self-expand) within the cavity in addition to or alternatively to actively via, for example, the handle 380.

[0051] In other embodiments, the actuator 382 can have one or more locking positions within the handle 380 to determine a diameter of the disruptor element 371. Accordingly, the disruptor element can have a controllable diameter which can be gradually increased and manipulated to tear apart loculations and/or other material within a body cavity bit by bit until the diameter of the disruptor element 371 reaches the wall of the cavity. In some embodiments, the handle 380 further includes a second actuator 384 (e.g., a rotatable knob) operably coupled to the first and/or second elongate shafts 373, 375. The second actuator 384 can be actuated (e.g., rotated) to rotate the disruptor element 371 to, for example, further break apart material within the cavity, such as material adhered to the wall of the cavity. The mechanical disruptor assembly 370 can be translated laterally by a user if needed (e.g., via movement of the handle 380) and can be delivered through the inner lumen 111 of the catheter assembly 110 via a guidewire or without a guidewire.

[0052] Figure 4 is a flow diagram of a process or method 480 for treating a body cavity of a patient using the system 100 in accordance with embodiments of the present technology. The body cavity can be an abdominal abscess, an empyema, a (e.g., complicated) pleural effusion, and/or another cavity containing unwanted material/contents. Although some features of the method 480 are described in the context of the embodiments shown in Figures 1A–3D for illustration, one skilled in the art will readily understand that the method 480 can be carried out using other suitable systems and/or devices described herein. Figures 5A–5E are side cross-sectional views of a distal portion of the catheter assembly 110 during different stages of the method 480 in accordance with embodiments of the present technology.

[0053] At block 481, the method 480 can include percutaneously inserting the catheter assembly 110 of the system 100 into the patient such that a distal portion of the catheter assembly 110 is positioned within the cavity to be treated. For example, Figure 5A shows the catheter assembly 110 inserted through skin 591 of a patient and into a body cavity 592 including material or contents 593 positioned therein such that the distal opening 119 and the apertures 118 are positioned within the cavity 592. The material 593 can comprise pus that may be thick and viscous (e.g., purulent fluid), necrotic debris, blood clots, enteric content, loculations, and/or the like. The material 593 can substantially fill the cavity 592 as shown in Figure 5A, or can partially fill the cavity 592. In some embodiments, the catheter assembly 110 is inserted into the

abdomen or into an intercostal space of the patient proximate to the cavity 592 via, for example, the Seldinger technique, Trocar technique, and/or another catheter insertion technique. In some aspects of the present technology, the catheter assembly 110 can have a relatively short length M (Figure 1A) because the catheter assembly 110 is designed to be inserted into the skin 591 of the patient proximate to the cavity 592.

[0054] At block 482, the method 480 can include aspirating material from the cavity through the inner lumen 111 of the catheter assembly 110. For example, as described in detail above with reference to Figures 2A and 2B, the syringe 242 can be actuated (e.g., the plunger 244 withdrawn) to aspirate the inner lumen 111. During aspiration, the aspiration flow control assembly 245 is configured to permit fluid flow from the inner lumen 111 to the syringe 242 while simultaneously blocking fluid flow from the waste reservoir 260 to the syringe 242. Figure 5B shows the catheter assembly 110 during aspiration as an aspiration force indicated by arrows A pulls a portion 594 of the material 593 proximally into and through the inner lumen 111 of the inner elongate member 112 from the distal opening 119. The portion 594 of the material 593 can be pulled entirely through the inner lumen 111, through the first tubing assembly 120, through the aspiration and flow control assembly 245, and into the barrel 243 of the syringe 242 where it is collected. In some aspects of the present technology, the material 593 does not or substantially does not enter the outer lumen 117 of the outer elongate member 114 during aspiration because (i) the apertures 118 lay in a different plane than the distal opening 119 (e.g., in orthogonal planes) and (ii) only the inner lumen 111 is aspirated such that clogging of the apertures 118 is inhibited or even prevented.

[0055] At block 483, the method 480 can include flowing an irrigation fluid from the irrigation reservoir 262 through the outer lumen 117 of the catheter assembly 110 and out of the apertures 118 into the cavity to irrigate the cavity. For example, as described in detail above with reference to Figures 2A and 2B, the syringe 252 can be primed with the irrigation fluid by withdrawing the plunger 254 (e.g., at the same time the plunger 244 of the syringe 242 is withdrawn to aspirate the inner lumen 111) and then depressed to drive the irrigation fluid through the irrigation flow control assembly 255 into the outer lumen 117. As the plunger 254 is depressed, the irrigation flow control assembly 255 permits the irrigation fluid to flow into the outer lumen 117 while blocking the irrigation fluid from flowing into the irrigation reservoir 262. Figure 5C shows the catheter assembly 110 during irrigation as an irrigation fluid 595 is driven through the outer lumen 117 as indicated by arrows I and through the apertures 118 into the cavity 592. In some aspects of the present technology, the irrigation fluid 595 does not flow

through the inner lumen 111 such that any portion of the material 593 remaining within the inner lumen 111 after aspiration is not reintroduced into the cavity 592. The irrigation fluid 595 can exit the apertures 118 as a jet that mechanically disrupts (e.g., breaks apart) the material 593 within the cavity 592. As described in detail above, the position, size, shape, and/or orientation of the apertures 118 can be selected to provide a desired jet pattern for disrupting the material 593. The irrigation fluid 595 can also have a lower viscosity than the material 593 within the cavity 592 such that, after irrigation, a mixture of the irrigation fluid 595 and the material 593 within the cavity 592 has a lower viscosity that can be more easily aspirated in a subsequent aspiration operation. For example, Figure 5D shows the catheter assembly 110 after irrigation when a resulting mixed portion 596 of the material 593 and the irrigation fluid 595 (Figure 5C) has a lower viscosity than the material 593.

[0056] After irrigation at block 483, the method 480 can return to block 482 to again aspirate the cavity before again proceeding to block 483 to irrigate the cavity. Aspiration and irrigation can be performed as many times as necessary to sufficiently remove the material from the cavity. Optionally, at block 484, the method 480 can include mechanically disrupting (e.g., debriding) the material in the cavity with a mechanical element, such as the disruptor element 371, that is inserted through the inner lumen 111. Figure 5E, for example, shows the catheter assembly 110 after insertion of the disruptor element 371 (shown schematically in Figure 5E) into the cavity 592 through the inner lumen 111 of the inner elongate member 112, and after expansion of the disruptor element 371. The disruptor element 371 can be rotated as indicated by arrow R (e.g., about the first elongate shaft 373) within the cavity 592 and/or translated (e.g., proximally and/or distally) within the cavity 592 to mechanically disrupt any of the material 593 remaining after aspiration and irrigation (blocks 482 and 483). In some embodiments, the disruptor element 371 can be actuated to mechanically disrupt some or all of the material 593 that remains adhered to a wall 597 of the cavity 592 after aspiration and irrigation.

[0057] In other embodiments, the material in the cavity can be mechanically disrupted before aspiration and irrigation (blocks 482 and 483). That is, for example, the disruptor element 371 can be inserted through the inner lumen 111 and into the cavity 592 and rotated and/or translated within the cavity 592 to initially mechanically disrupt and/or break apart the material 593. In some aspects of the present technology, mechanically disrupting the material 593 before aspiration and irrigation can make the aspiration and irrigation more effective.

[0058] At block 485, the method 480 can include maintaining the catheter assembly 110 in the cavity to provide residual drainage of material from the cavity. The catheter assembly 110 can be maintained within the cavity for hours, days, or weeks to provide residual drainage.

[0059] At block 486, the method 480 can include removing the catheter assembly 110 from the patient after the material is sufficiently removed from the cavity. At block 487, the method 480 can optionally include percutaneously inserting a separate drainage catheter into the cavity to provide (further) residual drainage. In some aspects of the present technology, the drainage catheter can have a smaller size (e.g., for improved patient comfort), can be configured for connection to existing drainage waste bags, and/or can be of a type familiar to an operator (e.g., hospital staff). In such embodiments, the system 100 can be used for initial debridement, drainage, and flushing of the contents of the cavity (blocks 482–484), and the separate drainage catheter can be a standard commercial drain that is inserted upon the removal of the system 100 (block 486), within the same procedure, to allow for any remaining collection to be drained over the subsequent days.

[0060] Figure 6 is a side view of an aspiration and irrigation system 600 (“system 600”) in accordance with additional embodiments of the present technology. The system 600 can include some features that are at least generally similar in structure and function, or identical in structure and function, to the corresponding features of the system 100 described in detail above with reference to Figures 1A–5E, and can operate in a generally similar or identical manner to the system 100. For example, in the illustrated embodiment the system 600 includes a catheter assembly 610 fluidly coupled to (i) a valve 602 and (ii) a tubing assembly 620 via a hub or side port 604.

[0061] In the illustrated embodiment, the catheter assembly 610 defines a single lumen that can be used to provide both aspiration and irrigation. That is, the catheter assembly 610 can include only a single elongate member 614 (e.g., a sheath, a catheter, a shaft) extending distally from the valve 602 and the hub 604 and defining the lumen. The lumen can terminate at a distal opening 619 (e.g., an aspiration and irrigation opening). The elongate member 614 can have a size of between about 6–30 French, such as a size of 6 French, 8 French, 12 French, 16 French, 20 French, 24 French, 26 French, or 30 French. The lumen of the elongate member 614 is fluidly coupled to (i) the valve 602 and (ii) the tubing assembly 620 via the hub 604. The valve 602 can be an actuated access valve as described in detail above with reference to Figures 1A–1C that is configured to maintain fluid control during a body cavity treatment procedure by inhibiting or

preventing fluid flow in the proximal direction through the valve 602 as various components such as delivery sheaths, pull members, guidewires, interventional devices, mechanical disruptor assemblies, other aspiration catheters, and so on, are inserted through the valve 602 to be delivered through the elongate member 614 to a treatment site in a body cavity. In some embodiments, the lumen of the elongate member 614 has a constant or substantially constant diameter extending from the distal opening 619 to the valve 602. That is, for example, the elongate member 614 does not have a tapered or reduced diameter portion at the distal end portion thereof or elsewhere along the length of the elongate member 614. In some aspects of the present technology, this can maximize aspiration flow rates throughout the lumen of the elongate member 614.

[0062] The tubing assembly 620 can fluidly couple the lumen of the elongate member 614 to a pressure source assembly 640 and/or an irrigation assembly (not shown). For example, in the illustrated embodiment the tubing assembly 620 includes one or more tubing sections 622 (individually labeled as a first tubing section 622a and a second tubing section 622b), at least one fluid control device 624 (e.g., a valve, a stopcock), and at least one connector 626 (e.g., a Toomey tip connector, a quick-release connector) for fluidly coupling the tubing assembly 620 to the pressure source assembly 640, the irrigation assembly, and/or other suitable components.

[0063] The pressure source assembly 640 can comprise a pressure source 642, such as a syringe 642 having a barrel 643 and a plunger 644 slidable through the barrel 643, and an aspiration flow control assembly 645 fluidly coupled to the barrel 643 of the syringe 642. In some embodiments, the syringe 642 includes a lock mechanism 641 configured to selectively lock the plunger 644 relative to the barrel 643 (e.g., in a withdrawn position). Accordingly, the syringe 642 can be an automatically-locking syringe and can include some features that are at least generally similar in structure and function, or identical in structure and function, to those of the automatically-locking syringes disclosed in U.S. Patent Application No. 17/396,426, filed August 6, 2021, and titled “AUTOMATICALLY-LOCKING VACUUM SYRINGES, AND ASSOCIATED SYSTEMS AND METHODS,” which is incorporated herein by reference in its entirety.

[0064] The aspiration flow control assembly 645 can include a body 650 having (i) a first connector 646 (partially obscured in Figure 6) configured to be coupled to the connector 626 of the tubing assembly 620, (ii) a second connector 647 configured to be coupled to the syringe 642 (e.g., to a tip thereof), and (iii) a third connector 648 configured to be coupled to a waste reservoir

660 and, more particularly, to at least one tube 661 of the waste reservoir 660 fluidly coupled to a waste collection bag 662 or other fluid reservoir of the waste reservoir 660. The body 650 can define one or more lumens that fluidly couple the first through third connector 646–648. In the illustrated embodiment, the aspiration flow control assembly 645 further includes a first one-way valve 651 (shown schematically in Figure 6) in the flow path between the first connector 646 and the second connector 647, and a second one-way valve 652 (shown schematically in Figure 6) in the flow path between the second connector 647 and the third connector 648. The first one-way valve 651 is positioned to permit fluid flow from the tubing assembly 620 and the lumen of the elongate member 614 through the aspiration flow control assembly 645 to the barrel 643 of the syringe 642 (e.g., from the first connector 646 to and through the second connector 647), while inhibiting fluid flow from the syringe 642 to the tubing assembly 620 (e.g., from the second connector 647 to and through the first connector 646). The second one-way valve 652 is positioned to permit fluid flow from the barrel 643 of the syringe 642 through the aspiration flow control assembly 645 to the waste reservoir 660 (e.g., from the second connector 647 to and through the third connector 648), while inhibiting fluid flow from the waste reservoir 660 to the syringe 642 (e.g., from the third connector 648 to and through the second connector 647).

[0065] Accordingly, withdrawal of the plunger 644 through the barrel 643 generates negative pressure in the barrel 643 that draws fluid through the distal opening 619 and the lumen of the elongate member 614, through the tubing assembly 620, through the aspiration flow control assembly 645 (e.g., through the first connector 646, the first one-way valve 651, and the second connector 647), and into the barrel 643 of the syringe 642. During withdrawal of the plunger 644, the second one-way valve 652 inhibits (e.g., blocks) backward fluid flow from the waste reservoir 660 into the barrel 643 of the syringe 642. Conversely, depression of the plunger 644 through the barrel 643 generates positive pressure in the barrel 643 that forces fluid from the barrel 643 through the aspiration flow control assembly 645 (e.g., through the second connector 647, the second one-way valve 652, and the third connector 648) and into the waste reservoir 660 (e.g., through the tube 661 and into the collection bag 662). During depression of the plunger 644, the first one-way valve 651 inhibits (e.g., blocks) fluid flow from the barrel 643 into the tubing assembly 620 and the lumen of the elongate member 614.

[0066] In some embodiments, the pressure source assembly 640 can be decoupled from the connector 626 of the tubing assembly 620 (e.g., with the fluid control device 624 in a closed position) and the irrigation assembly can be coupled to the connector 626 to fluidly couple the irrigation assembly to the lumen of the elongate member 614. In some embodiments, the

irrigation assembly can include a syringe or other pressure source and a reservoir of irrigation fluid (e.g., as described in detail above with reference to Figures 2A and 2B). The pressure source can be activated (e.g., a plunger of the syringe depressed) to drive the irrigation fluid through the tubing assembly 620, through the lumen of the elongate member 614, and out of the distal opening 619 of the elongate member 614. In some embodiments, the irrigation assembly can alternatively or additionally be coupled to a port 625 of the fluid control device 624 that provides a fluid connection to the tubing assembly 620 and the lumen of the elongate member 614. In such embodiments, the pressure source of the irrigation assembly can be activated to drive the irrigation fluid through the port 625, through the tubing assembly 620, through the lumen of the elongate member 614, and out of the distal opening 619 of the elongate member 614.

[0067] In operation, the catheter assembly 610 can be introduced into a patient through a percutaneous opening (e.g., an opening in the abdomen, an opening in an intercostal space) and advanced such that a distal portion of the catheter assembly 610 (e.g., the distal opening 619 of the elongate member 614) is positioned within and/or proximate to a cavity within the body of the patient. The pressure source assembly 640 can be coupled to the tubing assembly 620 and the fluid control device 624 can be opened to fluidly connect the pressure source assembly 620 to the lumen of the elongate member 614. The plunger 644 of the syringe 642 can then be withdrawn to draw fluid from the lumen of the elongate member 614 to aspirate material from within the cavity into the barrel 643. The plunger 644 can then be depressed to drive the material from the barrel 643 into the collection bag 662. In some embodiments, the plunger 644 can be repeatedly withdrawn and subsequently depressed (e.g., pumped) to aspirate the cavity and expel the aspirated material into the collection bag 662. In some aspects of the present technology, the collection bag 662 provides a sealed receptacle for the aspirated material that allows for a cleaner procedure by reducing mess, foul odor, exposure to infected material, and/or the like. In some embodiments, the fluid control device 624 can be closed during withdrawal of the plunger 644 such that a vacuum is generated (e.g., pre-charged) within the barrel 643 of the syringe 642. The fluid control device 624 can subsequently be opened to apply the vacuum to the lumen of the elongate member 614 and generate a suction/aspiration pulse through the lumen to aspirate the material within the cavity.

[0068] At any point during the procedure, the fluid control device 624 can be closed and the pressure source assembly 640 decoupled from the tubing assembly 620. The irrigation assembly can then be coupled to the tubing assembly 620, the fluid control device 624 opened,

and the irrigation assembly activated to drive irrigation fluid into the lumen of the elongate member 614 and out of the distal opening 619 into the cavity of the patient. Multiple irrigation passes/cycles can be performed. Alternatively or additionally, the pressure source assembly 640 can remain coupled to the tubing assembly 620 and the irrigation assembly can be coupled to the port 625 to provide irrigation through the lumen of the elongate member 614. Irrigation and aspiration can be provided in any order and repeated as needed, such as aspiration first then irrigation, irrigation first then aspiration, one or more cycles of aspiration followed by one or more cycles of irrigation, one or more cycles of irrigation followed by one or more cycles of aspiration, and so on.

[0069] In some embodiments, a distal portion of the elongate member 614 can be curved to facilitate placement and positioning within a cavity of a patient. Figure 7A, for example, is a side view of the catheter assembly 610 in accordance with additional embodiments of the present technology. In the illustrated embodiment, the elongate member 614 has a distal curved portion 718 (e.g., a distal curved end portion, a distal curved region, a distal curved end portion, a curved distal tip, and/or the like) configured (e.g., heat set) to deflect away from a longitudinal axis Z of the catheter assembly 610. In the illustrated embodiment, the distal curved portion 718 has a generally curved shape and can bend away from the longitudinal axis Z by a bend angle A of between about 30–90 degrees (e.g., about 80 degrees), between about 165–195 degrees (e.g., about 180 degrees) or greater than 195 degrees (e.g., between about 250–290 degrees, about 270 degrees). Accordingly, the distal curved portion 718 can have a curvature ranging from a full pigtail to a minor angle. The curvature of the distal curved portion 718 offsets the distal opening 619 from the longitudinal axis Z. During a procedure to treat a cavity of a patient, the elongate member 614 can be torqued (e.g., rotated) to control the position of the distal opening 619 within the cavity to provide directed aspiration and/or irrigation.

[0070] In some embodiments, the distal curved portion 718 can move between (i) a relaxed position in which the distal curved portion 718 has the curved shape illustrated in Figure 7A and (ii) a constrained position in which the distal curved portion 718 is more closely aligned with the longitudinal axis Z (e.g., with the bend angle A reduced). Figure 7B, for example, is a side view of the of the catheter assembly 610 with a dilator 708 inserted through the valve 602 and through the lumen of the elongate member 614 in accordance with embodiments of the present technology. In the illustrated embodiment, the dilator 708 includes a proximal coupling portion 709 secured to and/or mated to a corresponding portion of the valve 602. The dilator 708 extends entirely through the lumen of the elongate member 614 and out of the distal opening 619. When

inserted through the lumen of the elongate member 614, the dilator 708 can constrain the distal curved portion 718 as shown in Figure 7B to reduce the bend angle A (Figure 7A) and more closely align the distal curved portion 718 with the longitudinal axis Z (Figure 7A). Alternatively, a guidewire (not shown) can constrain the distal curved portion 718 to reduce the bend angle A (Figure 7A) and more closely align the distal curved portion 718 with the longitudinal axis Z (Figure 7A). In some embodiments, the dilator 708 and/or the valve 702 can be of the type disclosed in U.S. Patent Application No. 18/156,944, filed January 19, 2023, and titled “CLOT TREATMENT SYSTEMS WITH DILATOR LOCKING MECHANISMS, AND ASSOCIATED DEVICES AND METHODS,” which is incorporated herein by reference in its entirety.

[0071] Referring to Figures 7A and 7B, the distal curved portion 718 can be shaped using a heat setting process or other suitable process to have the curved shape illustrated in Figure 7A or another curved shape (e.g., a full pigtail shape, a Tiger curve shape, a Jacky curve shape, an Amplatz left shape, an LCB shape, an RCB shape, a Judkins left shape, a Judkins right shape, a Multipurpose A2 shape, an IM shape, a 3D LIMA shape, a IM VB-1 shape, and so on.). For example, as is known in the art of heat setting shape memory structures, a fixture, mandrel, or mold may be used to hold the distal curved portion 718 in its desired shape, and then the distal curved portion 718 can be subjected to an appropriate heat treatment such that a shape memory material (e.g., metal, nitinol, steel) structure used to form the elongate member 614 (e.g., a braid, a coil, etc.) assume or are otherwise shape-set to the outer contour of the mandrel or mold. The heat setting process may be performed in an oven or fluidized bed, as is well-known. Therefore, the heat setting process can impart a desired shape, geometry, bend, and/or curve in one or more super-elastic and/or shape memory material or materials used to form the elongate member 614. Accordingly, the distal curved portion 718 may be radially constrained without plastic deformation as shown in Figure 7B and will self-expand on release of the radial constraint to the position illustrated in Figure 7A. In some embodiments, the distal curved portion 718 and/or the elongate member 614 can include some features that are at least generally similar in structure and function, or identical in structure and function, to those of the catheters disclosed in U.S. Patent Application Publication No. 17/529,018, filed November 17, 2021, and titled “CATHETERS HAVING SHAPED DISTAL PORTIONS, AND ASSOCIATED SYSTEMS AND METHODS,” which is incorporated herein by reference in its entirety.

[0072] In some embodiments, the elongate member 614 can have one or more apertures formed at and/or proximal to the distal curved portion 718. Figures 8A and 8B, for example, are

enlarged side views of a distal portion of the elongate member 614 of the catheter assembly 610 in accordance with embodiments of the present technology. The elongate member 614 has a first size (e.g., 24 French) in Figure 8A, and a second size (e.g., 16 French) smaller than the first size in Figure 8B. Referring to Figures 8A and 8B, the elongate member 614 includes/defines one or more (e.g., a plurality of) apertures 890 (e.g., holes, side holes) fluidly coupled to the lumen of the elongate member 614. In the illustrated embodiment, the apertures 890 can be circumferentially aligned relative to the longitudinal axis Z (Figure 6) and spaced apart from one another relative to the longitudinal axis Z proximal of the distal curved portion 718. In other embodiments, some or all of the apertures 890 can be circumferentially distributed, spaced in different manners, formed in/at the distal curved portion 718 and/or other portions of the elongate member 614, etc. Referring to Figures 6, 8A, and 8B, when the lumen of the elongate member 614 is aspirated via the aspiration source assembly 620, the aspiration pressure can be applied through the apertures 890 and/or through the distal opening 619. Likewise, when the lumen of the elongate member 614 is irrigated via the irrigation assembly, the irrigation fluid can be injected through the apertures 890 and/or through the distal opening 619. In some aspects of the present technology, the apertures 890 can reduce the likelihood of clogging of the elongate member 614 and reduce the aspiration force from each of the apertures 890 and/or the distal opening 619.

[0073] Referring to Figures 8A and 8B, in some embodiments the catheter assembly 610 can include a cover or other feature (not shown) that can be manipulated intraprocedurally to cover one or more of the apertures 890. For example, another elongate member, sheath, etc., can be advanced through the lumen of the elongate member 614 and/or over an outer surface of the elongate member 614 to cover the apertures 890. Covering the apertures 890 can increase a resultant aspiration force at the distal opening 619. The cover may include one or more apertures that align with the apertures 890 of the elongate member 614 to selectively control which of apertures 890 through which the resultant aspiration force should be applied. Likewise, some or all of the cover apertures (not shown) can be circumferentially distributed and/or spaced in different manners on the cover. Additionally, another elongate shaft, member, sheath, etc., can be advanced distally through the lumen of the elongate member 614 and/or over an outer surface of the elongate member 614 to more closely align the distal curved portion 718 with the longitudinal axis Z (Figure 7A). The cover, or elongate shaft, may be operably coupled to a handle (not shown) with an actuator coupled to the elongate shaft. The actuator can be manipulated to move the elongate shaft relative to longitudinal axis Z.

[0074] Several aspects of the present technology are set forth in the following examples:

1. A system for aspirating and irrigating a body cavity, comprising:
a catheter assembly comprising—
an outer elongate member defining an outer lumen; and
an inner elongate member extending at least partially through the outer elongate member and defining an inner lumen having a distal opening, wherein a distal portion of the outer elongate member is fluidly sealed to the inner elongate member, and wherein the outer elongate member includes an aperture positioned proximal of the distal portion;
an aspiration source fluidly coupled to the inner lumen and configured to aspirate the inner lumen; and
an irrigation source fluidly coupled to the outer lumen and configured to flow an irrigation fluid through the outer lumen and out of the aperture.
2. The system of example 1 wherein the inner elongate member is coaxial with the outer elongate member.
3. The system of example 1 or example 2 wherein the aspiration source is a first syringe, and wherein the irrigation source is a second syringe.
4. The system of any one of examples 1–3 wherein the aperture is one of a plurality of apertures positioned circumferentially about the outer elongate member.
5. The system of any one of examples 1–4, further comprising an aspiration flow control assembly fluidly coupled between the aspiration source and the inner lumen, wherein the aspiration flow control is further fluidly coupled to a waste reservoir, and wherein the aspiration flow control assembly is configured to—
when the aspiration source is actuated in a first manner, permit fluid flow from the inner lumen to the aspiration source while blocking fluid flow from the waste reservoir to the aspiration source, and

when the aspiration source is actuated in a second manner different than the first manner, permit fluid flow from the aspiration source to the waste reservoir while blocking fluid flow from the aspiration source to the inner lumen.

6. The system of example 5 wherein the aspiration source is a syringe having a plunger, wherein the first manner is withdrawal of the plunger, and wherein the second manner is depression of the plunger.

7. The system of any one of examples 1–6, further comprising an irrigation flow control assembly fluidly coupled between the irrigation source and the outer lumen, wherein the irrigation flow control assembly is further fluidly coupled to an irrigation reservoir configured to hold an irrigation fluid, and wherein the irrigation flow control assembly is configured to—

when the irrigation source is actuated in a first manner, permit flow of the irrigation fluid from the irrigation reservoir to the irrigation source while blocking fluid flow from the outer lumen to the irrigation source, and

when the irrigation source is actuated in a second manner different than the first manner, permit the irrigation fluid to flow from the irrigation source into the outer lumen while blocking flow of the irrigation fluid from the irrigation source into the irrigation reservoir.

8. The system of example 7 wherein the irrigation source is a syringe having a plunger, wherein the first manner is withdrawal of the plunger, and wherein the second manner is depression of the plunger.

9. The system of any one of examples 1–8, further comprising:
an aspiration flow control assembly fluidly coupled between the aspiration source and the inner lumen, wherein the aspiration flow control assembly is further fluidly coupled to a waste reservoir, and wherein the aspiration flow control assembly is configured to—

when the aspiration source is actuated in a first manner, permit fluid flow from the inner lumen to the aspiration source while blocking fluid flow from the waste reservoir to the aspiration source, and

when the aspiration source is actuated in a second manner different than the first manner, permit fluid flow from the aspiration source to the waste reservoir while blocking fluid flow from the aspiration source to the inner lumen; and

an irrigation flow control assembly fluidly coupled between the irrigation source and the outer lumen, wherein the irrigation flow control assembly is further fluidly coupled to an irrigation reservoir configured to hold an irrigation fluid, and wherein the irrigation flow control assembly is configured to—

when the irrigation source is actuated in a third manner, permit flow of the irrigation fluid from the irrigation reservoir to the irrigation source while blocking fluid flow from the outer lumen to the irrigation source, and

when the irrigation source is actuated in a fourth manner different than the third manner, permit the irrigation fluid to flow from the irrigation source into the outer lumen while blocking flow of the irrigation fluid from the irrigation source into the irrigation reservoir.

10. The system of example 9 wherein the aspiration source is a first syringe having a first plunger, wherein the first manner is withdrawal of the first plunger, wherein the second manner is depression of the second plunger, wherein the irrigation source is a second syringe having a second plunger, wherein the third manner is withdrawal of the second plunger, and wherein the fourth manner is depression of the second plunger.

11. The system of example 10 wherein the first plunger and the second plunger are mechanically coupled and configured to move together during withdrawal and depression.

12. The system of any one of examples 1–11, further comprising:

an aspiration flow control assembly fluidly coupled between the aspiration source and the inner lumen, wherein the aspiration flow control assembly comprises:

a first connector configured to be fluidly coupled to the inner lumen;

a second connector configured to be fluidly coupled to a waste reservoir;

a first one-way valve positioned between the first connector and the aspiration source, wherein the first one-way valve is positioned to (a) permit fluid flow through the first connector from the inner lumen to the aspiration

- source and (b) inhibit fluid flow through the first connector from the aspiration source to the inner lumen; and
- a second one-way valve positioned between the second connector and the aspiration source, wherein the second one-way valve is positioned to (a) permit fluid flow through the second connector from the aspiration source to the waste reservoir and (b) inhibit fluid flow through the second connector from the waste reservoir to aspiration source.
13. The system of example 12 wherein—
the aspiration source comprises a syringe having a plunger;
withdrawal of the plunger is configured to aspirate material from the cavity through the inner lumen;
during withdrawal of the plunger, the first one-way valve is positioned to permit flow of the material through the first connector into the syringe and the second one-way valve is positioned to inhibit flow from the waste reservoir to the syringe;
depression of the plunger is configured to flow the aspirated material from the syringe to the waste reservoir; and
during depression of the plunger, the first-one way valve is positioned to inhibit flow of the aspirated material through the first connector into the inner lumen and the second one-way valve is positioned to permit flow of the aspirated material from the syringe through the second connector into the waste reservoir.
14. The system of any one of examples 1–13, further comprising:
an irrigation flow control assembly fluidly coupled between the irrigation source and the outer lumen, wherein the aspiration flow control assembly comprises:
a first connector configured to be fluidly coupled to the outer lumen;
a second connector configured to be fluidly coupled to an irrigation reservoir;
a first one-way valve positioned between the first connector and the irrigation source, wherein the first one-way valve is positioned to (a) permit fluid flow through the first connector from the irrigation source to the outer

lumen and (b) inhibit fluid flow through the first connector from the inner lumen to the irrigation source; and

a second one-way valve positioned between the second connector and the irrigation source, wherein the second one-way valve is positioned to (a) permit fluid flow through the second connector from the irrigation reservoir to the irrigation source and (b) inhibit fluid flow through the second connector from the irrigation source to the irrigation reservoir.

15. The system of example 14 wherein—

the irrigation source comprises a syringe having a plunger;

withdrawal of the plunger is configured to at least partially fill the syringe with an irrigation fluid from the irrigation reservoir;

during withdrawal of the plunger, the first one-way valve is positioned to inhibit flow through the first connector into the syringe and the second one-way valve is positioned to permit flow of the irrigation fluid from the irrigation reservoir to the syringe;

depression of the plunger is configured to flow the irrigation fluid from the syringe to the outer lumen; and

during depression of the plunger, the first-one way valve is positioned to permit flow of the irrigation fluid through the first connector into the outer lumen and the second one-way valve is positioned to inhibit flow of the irrigation fluid from the syringe through the second connector into the irrigation reservoir.

16. The system of any one of examples 1–15, further comprising:

an aspiration flow control assembly fluidly coupled between the aspiration source and the inner lumen, wherein the aspiration flow control assembly comprises:

a first connector configured to be fluidly coupled to the inner lumen;

a second connector configured to be fluidly coupled to a waste reservoir;

a first one-way valve positioned between the first connector and the aspiration source, wherein the first one-way valve is positioned to (a) permit fluid flow through the first connector from the inner lumen to the aspiration

source and (b) inhibit fluid flow through the first connector from the aspiration source to the inner lumen; and

a second one-way valve positioned between the second connector and the aspiration source, wherein the second one-way valve is positioned to (a) permit fluid flow through the second connector from the aspiration source to the waste reservoir and (b) inhibit fluid flow through the second connector from the waste reservoir to aspiration source; and

an irrigation flow control assembly fluidly coupled between the irrigation source and the outer lumen, wherein the aspiration flow control assembly comprises:

a third connector configured to be fluidly coupled to the outer lumen;

a fourth connector configured to be fluidly coupled to an irrigation reservoir;

a third one-way valve positioned between the third connector and the irrigation source, wherein the third one-way valve is positioned to (a) permit fluid flow through the third connector from the irrigation source to the outer lumen and (b) inhibit fluid flow through the third connector from the inner lumen to the irrigation source; and

a fourth one-way valve positioned between the fourth connector and the irrigation source, wherein the fourth one-way valve is positioned to (a) permit fluid flow through the fourth connector from the irrigation reservoir to the irrigation source and (b) inhibit fluid flow through the fourth connector from the irrigation source to the irrigation reservoir.

17. The system of example 16 wherein—

the aspiration source is a first syringe having a first plunger;

withdrawal of the first plunger is configured to aspirate material from the cavity through the inner lumen;

during withdrawal of the first plunger, the first one-way valve is positioned to permit flow of the material through the first connector into the first syringe and the second one-way valve is positioned to inhibit flow from the waste reservoir to the first syringe;

depression of the first plunger is configured to flow the aspirated material from the first syringe to the waste reservoir; and

during depression of the first plunger, the first-one way valve is positioned to inhibit flow of the aspirated material through the first connector into the inner lumen and the second one-way valve is positioned to permit flow of the aspirated material from the first syringe through the second connector into the waste reservoir;

the irrigation source is a second syringe having a second plunger;

withdrawal of the second plunger is configured to at least partially fill the second syringe with an irrigation fluid from the irrigation reservoir;

during withdrawal of the second plunger, the third one-way valve is positioned to inhibit flow through the third connector into the second syringe and the fourth one-way valve is positioned to permit flow of the irrigation fluid from the irrigation reservoir to the second syringe;

depression of the second plunger is configured to flow the irrigation fluid from the second syringe to the outer lumen; and

during depression of the second plunger, the third-one way valve is positioned to permit flow of the irrigation fluid through the third connector into the outer lumen and the fourth one-way valve is positioned to inhibit flow of the irrigation fluid from the second syringe through the fourth connector into the irrigation reservoir.

18. The system of example 17 wherein the first plunger and the second plunger are mechanically coupled and configured to move together.

19. The system of any one of examples 1–18 wherein the inner elongate member is a reinforced catheter, and wherein the outer elongate member is a tube formed from a plastic material.

20. A method of treating material within a body cavity of a patient, the method comprising:

percutaneously inserting a catheter assembly into the patient such that the distal portion of the catheter assembly is within the cavity;

aspirating material from the cavity through an inner lumen of the catheter assembly; and

flowing an irrigation fluid through an outer lumen of the catheter assembly, out of an outer aperture in the catheter assembly, and into the cavity to irrigate the cavity, wherein the outer lumen is coaxial with the inner lumen.

21. The method of example 20, further comprising:
inserting a mechanical disruptor element through the inner lumen;
expanding the mechanical disruptor element within the cavity; and
engaging the mechanical disruptor element with the material within the cavity to mechanically disrupt the material.

22. The method of example 20 or example 21 wherein aspirating the material from the cavity comprises activating a syringe fluidly coupled to the inner lumen.

23. The method of any one of examples 20–22 wherein flowing the irrigation fluid through the outer lumen comprises activating a syringe fluidly coupled to the outer lumen.

24. The method of any one of examples 20–23 wherein aspirating the material from the cavity comprises withdrawing a plunger of an aspiration syringe fluidly coupled to the inner lumen, and wherein flowing the irrigation fluid through the outer lumen comprises depressing a plunger of an irrigation syringe fluidly coupled to the outer lumen.

25. The method of example 24 wherein the method further comprises:
withdrawing the plunger of the irrigation syringe to draw the irrigation fluid into the irrigation syringe; and
depressing the plunger of the aspiration syringe to expel the aspirated material from the aspiration syringe.

26. The method of example 25 wherein the method further comprises:
simultaneously withdrawing the plunger of the aspiration syringe to aspirate the material from the cavity and withdrawing the plunger of the irrigation syringe to draw the irrigation fluid into the irrigation syringe; and

simultaneously depressing the plunger of the aspiration syringe to expel the aspirated material from the aspiration syringe and depressing the plunger of the irrigation syringe to flow the irrigation fluid into the cavity to irrigate the cavity.

27. The method of example 26 wherein the plunger of the aspiration syringe and the plunger of the irrigation syringe are mechanically linked to move together.

28. A system for aspirating and irrigating a body cavity, comprising:
a catheter assembly comprising—

an outer elongate member defining an outer lumen; and

an inner elongate member extending at least partially through the outer elongate member and defining an inner lumen having a distal opening, wherein a distal portion of the outer elongate member is fluidly sealed to the inner elongate member, and wherein the outer elongate member includes an aperture positioned proximal of the distal portion;

an aspiration syringe fluidly coupled to the inner lumen and configured to aspirate the inner lumen; and

an irrigation syringe fluidly coupled to the outer lumen and configured to flow an irrigation fluid through the outer lumen and out of the aperture.

29. The system of example 28 wherein the aspiration syringe and the irrigation syringe are mechanically linked to be actuated in synchronization.

30. A method of using the system of any one of examples 1–19, 28, or 29 to treat material within a body cavity of a patient.

31. An aspiration flow control assembly for use within an aspiration and irrigation system according to any one of examples 5, 6, 9–13, or 16–18.

32. An irrigation flow control assembly for use within an aspiration and irrigation system according to any one of examples 7–11 or 14–18.

33. A combined aspiration flow control assembly and irrigation flow control assembly for use within an aspiration and irrigation system according to any one of examples 9–11 or 16–18.

[0075] The above detailed descriptions of embodiments of the technology are not intended to be exhaustive or to limit the technology to the precise form disclosed above. Although specific embodiments of, and examples for, the technology are described above for illustrative purposes, various equivalent modifications are possible within the scope of the technology as those skilled in the relevant art will recognize. For example, although steps are presented in a given order, alternative embodiments may perform steps in a different order. The various embodiments described herein may also be combined to provide further embodiments.

[0076] From the foregoing, it will be appreciated that specific embodiments of the technology have been described herein for purposes of illustration, but well-known structures and functions have not been shown or described in detail to avoid unnecessarily obscuring the description of the embodiments of the technology. Where the context permits, singular or plural terms may also include the plural or singular term, respectively.

[0077] Moreover, unless the word “or” is expressly limited to mean only a single item exclusive from the other items in reference to a list of two or more items, then the use of “or” in such a list is to be interpreted as including (a) any single item in the list, (b) all of the items in the list, or (c) any combination of the items in the list. Additionally, the term “comprising” is used throughout to mean including at least the recited feature(s) such that any greater number of the same feature and/or additional types of other features are not precluded. It will also be appreciated that specific embodiments have been described herein for purposes of illustration, but that various modifications may be made without deviating from the technology. Further, while advantages associated with some embodiments of the technology have been described in the context of those embodiments, other embodiments may also exhibit such advantages, and not all embodiments need necessarily exhibit such advantages to fall within the scope of the technology. Accordingly, the disclosure and associated technology can encompass other embodiments not expressly shown or described herein.

CLAIMS

I/We claim:

1. A system for aspirating and irrigating a body cavity, comprising:
a catheter assembly comprising—
an outer elongate member defining an outer lumen; and
an inner elongate member extending at least partially through the outer elongate member and defining an inner lumen having a distal opening, wherein a distal portion of the outer elongate member is fluidly sealed to the inner elongate member, and wherein the outer elongate member includes an aperture positioned proximal of the distal portion;
an aspiration source fluidly coupled to the inner lumen and configured to aspirate the inner lumen; and
an irrigation source fluidly coupled to the outer lumen and configured to flow an irrigation fluid through the outer lumen and out of the aperture.
2. The system of claim 1 wherein the inner elongate member is coaxial with the outer elongate member.
3. The system of claim 1 wherein the aspiration source is a first syringe, and wherein the irrigation source is a second syringe.
4. The system of claim 1 wherein the aperture is one of a plurality of apertures positioned circumferentially about the outer elongate member.
5. The system of any one of claim 1, further comprising an aspiration flow control assembly fluidly coupled between the aspiration source and the inner lumen, wherein the aspiration flow control is further fluidly coupled to a waste reservoir, and wherein the aspiration flow control assembly is configured to—
when the aspiration source is actuated in a first manner, permit fluid flow from the inner lumen to the aspiration source while blocking fluid flow from the waste reservoir to the aspiration source, and

when the aspiration source is actuated in a second manner different than the first manner, permit fluid flow from the aspiration source to the waste reservoir while blocking fluid flow from the aspiration source to the inner lumen.

6. The system of claim 5 wherein the aspiration source is a syringe having a plunger, wherein the first manner is withdrawal of the plunger, and wherein the second manner is depression of the plunger.

7. The system of claim 1, further comprising an irrigation flow control assembly fluidly coupled between the irrigation source and the outer lumen, wherein the irrigation flow control assembly is further fluidly coupled to an irrigation reservoir configured to hold an irrigation fluid, and wherein the irrigation flow control assembly is configured to—

when the irrigation source is actuated in a first manner, permit flow of the irrigation fluid from the irrigation reservoir to the irrigation source while blocking fluid flow from the outer lumen to the irrigation source, and

when the irrigation source is actuated in a second manner different than the first manner, permit the irrigation fluid to flow from the irrigation source into the outer lumen while blocking flow of the irrigation fluid from the irrigation source into the irrigation reservoir.

8. The system of claim 7 wherein the irrigation source is a syringe having a plunger, wherein the first manner is withdrawal of the plunger, and wherein the second manner is depression of the plunger.

9. The system of claim 1, further comprising:
an aspiration flow control assembly fluidly coupled between the aspiration source and the inner lumen, wherein the aspiration flow control assembly is further fluidly coupled to a waste reservoir, and wherein the aspiration flow control assembly is configured to—

when the aspiration source is actuated in a first manner, permit fluid flow from the inner lumen to the aspiration source while blocking fluid flow from the waste reservoir to the aspiration source, and

when the aspiration source is actuated in a second manner different than the first manner, permit fluid flow from the aspiration source to the waste reservoir while blocking fluid flow from the aspiration source to the inner lumen; and

an irrigation flow control assembly fluidly coupled between the irrigation source and the outer lumen, wherein the irrigation flow control assembly is further fluidly coupled to an irrigation reservoir configured to hold an irrigation fluid, and wherein the irrigation flow control assembly is configured to—

when the irrigation source is actuated in a third manner, permit flow of the irrigation fluid from the irrigation reservoir to the irrigation source while blocking fluid flow from the outer lumen to the irrigation source, and

when the irrigation source is actuated in a fourth manner different than the third manner, permit the irrigation fluid to flow from the irrigation source into the outer lumen while blocking flow of the irrigation fluid from the irrigation source into the irrigation reservoir.

10. The system of claim 9 wherein the aspiration source is a first syringe having a first plunger, wherein the first manner is withdrawal of the first plunger, wherein the second manner is depression of the second plunger, wherein the irrigation source is a second syringe having a second plunger, wherein the third manner is withdrawal of the second plunger, and wherein the fourth manner is depression of the second plunger.

11. The system of claim 10 wherein the first plunger and the second plunger are mechanically coupled and configured to move together during withdrawal and depression.

12. The system of claim 1, further comprising:

an aspiration flow control assembly fluidly coupled between the aspiration source and the inner lumen, wherein the aspiration flow control assembly comprises:

a first connector configured to be fluidly coupled to the inner lumen;

a second connector configured to be fluidly coupled to a waste reservoir;

a first one-way valve positioned between the first connector and the aspiration source, wherein the first one-way valve is positioned to (a) permit fluid flow through the first connector from the inner lumen to the aspiration

- source and (b) inhibit fluid flow through the first connector from the aspiration source to the inner lumen; and
- a second one-way valve positioned between the second connector and the aspiration source, wherein the second one-way valve is positioned to (a) permit fluid flow through the second connector from the aspiration source to the waste reservoir and (b) inhibit fluid flow through the second connector from the waste reservoir to aspiration source.
13. The system of claim 12 wherein—
- the aspiration source comprises a syringe having a plunger;
- withdrawal of the plunger is configured to aspirate material from the cavity through the inner lumen;
- during withdrawal of the plunger, the first one-way valve is positioned to permit flow of the material through the first connector into the syringe and the second one-way valve is positioned to inhibit flow from the waste reservoir to the syringe;
- depression of the plunger is configured to flow the aspirated material from the syringe to the waste reservoir; and
- during depression of the plunger, the first-one way valve is positioned to inhibit flow of the aspirated material through the first connector into the inner lumen and the second one-way valve is positioned to permit flow of the aspirated material from the syringe through the second connector into the waste reservoir.
14. The system of claim 1, further comprising:
- an irrigation flow control assembly fluidly coupled between the irrigation source and the outer lumen, wherein the aspiration flow control assembly comprises:
- a first connector configured to be fluidly coupled to the outer lumen;
- a second connector configured to be fluidly coupled to an irrigation reservoir;
- a first one-way valve positioned between the first connector and the irrigation source, wherein the first one-way valve is positioned to (a) permit fluid flow through the first connector from the irrigation source to the outer

lumen and (b) inhibit fluid flow through the first connector from the inner lumen to the irrigation source; and

a second one-way valve positioned between the second connector and the irrigation source, wherein the second one-way valve is positioned to (a) permit fluid flow through the second connector from the irrigation reservoir to the irrigation source and (b) inhibit fluid flow through the second connector from the irrigation source to the irrigation reservoir.

15. The system of claim 14 wherein—

the irrigation source comprises a syringe having a plunger;

withdrawal of the plunger is configured to at least partially fill the syringe with an irrigation fluid from the irrigation reservoir;

during withdrawal of the plunger, the first one-way valve is positioned to inhibit flow through the first connector into the syringe and the second one-way valve is positioned to permit flow of the irrigation fluid from the irrigation reservoir to the syringe;

depression of the plunger is configured to flow the irrigation fluid from the syringe to the outer lumen; and

during depression of the plunger, the first-one way valve is positioned to permit flow of the irrigation fluid through the first connector into the outer lumen and the second one-way valve is positioned to inhibit flow of the irrigation fluid from the syringe through the second connector into the irrigation reservoir.

16. The system of claim 1, further comprising:

an aspiration flow control assembly fluidly coupled between the aspiration source and the inner lumen, wherein the aspiration flow control assembly comprises:

a first connector configured to be fluidly coupled to the inner lumen;

a second connector configured to be fluidly coupled to a waste reservoir;

a first one-way valve positioned between the first connector and the aspiration source, wherein the first one-way valve is positioned to (a) permit fluid flow through the first connector from the inner lumen to the aspiration

source and (b) inhibit fluid flow through the first connector from the aspiration source to the inner lumen; and

a second one-way valve positioned between the second connector and the aspiration source, wherein the second one-way valve is positioned to (a) permit fluid flow through the second connector from the aspiration source to the waste reservoir and (b) inhibit fluid flow through the second connector from the waste reservoir to aspiration source; and

an irrigation flow control assembly fluidly coupled between the irrigation source and the outer lumen, wherein the aspiration flow control assembly comprises:

a third connector configured to be fluidly coupled to the outer lumen;

a fourth connector configured to be fluidly coupled to an irrigation reservoir;

a third one-way valve positioned between the third connector and the irrigation source, wherein the third one-way valve is positioned to (a) permit fluid flow through the third connector from the irrigation source to the outer lumen and (b) inhibit fluid flow through the third connector from the inner lumen to the irrigation source; and

a fourth one-way valve positioned between the fourth connector and the irrigation source, wherein the fourth one-way valve is positioned to (a) permit fluid flow through the fourth connector from the irrigation reservoir to the irrigation source and (b) inhibit fluid flow through the fourth connector from the irrigation source to the irrigation reservoir.

17. The system of claim 16 wherein—

the aspiration source is a first syringe having a first plunger;

withdrawal of the first plunger is configured to aspirate material from the cavity through the inner lumen;

during withdrawal of the first plunger, the first one-way valve is positioned to permit flow of the material through the first connector into the first syringe and the second one-way valve is positioned to inhibit flow from the waste reservoir to the first syringe;

depression of the first plunger is configured to flow the aspirated material from the first syringe to the waste reservoir; and

during depression of the first plunger, the first-one way valve is positioned to inhibit flow of the aspirated material through the first connector into the inner lumen and the second one-way valve is positioned to permit flow of the aspirated material from the first syringe through the second connector into the waste reservoir;

the irrigation source is a second syringe having a second plunger;

withdrawal of the second plunger is configured to at least partially fill the second syringe with an irrigation fluid from the irrigation reservoir;

during withdrawal of the second plunger, the third one-way valve is positioned to inhibit flow through the third connector into the second syringe and the fourth one-way valve is positioned to permit flow of the irrigation fluid from the irrigation reservoir to the second syringe;

depression of the second plunger is configured to flow the irrigation fluid from the second syringe to the outer lumen; and

during depression of the second plunger, the third-one way valve is positioned to permit flow of the irrigation fluid through the third connector into the outer lumen and the fourth one-way valve is positioned to inhibit flow of the irrigation fluid from the second syringe through the fourth connector into the irrigation reservoir.

18. The system of claim 17 wherein the first plunger and the second plunger are mechanically coupled and configured to move together.

19. The system of claim 1 wherein the inner elongate member is a reinforced catheter, and wherein the outer elongate member is a tube formed from a plastic material.

20. A method of treating material within a body cavity of a patient, the method comprising:

percutaneously inserting a catheter assembly into the patient such that the distal portion of the catheter assembly is within the cavity;

aspirating material from the cavity through an inner lumen of the catheter assembly; and

flowing an irrigation fluid through an outer lumen of the catheter assembly, out of an outer aperture in the catheter assembly, and into the cavity to irrigate the cavity, wherein the outer lumen is coaxial with the inner lumen.

21. The method of claim 20, further comprising:
inserting a mechanical disruptor element through the inner lumen;
expanding the mechanical disruptor element within the cavity; and
engaging the mechanical disruptor element with the material within the cavity to mechanically disrupt the material.

22. The method of claim 20 wherein aspirating the material from the cavity comprises activating a syringe fluidly coupled to the inner lumen.

23. The method of claim 20 wherein flowing the irrigation fluid through the outer lumen comprises activating a syringe fluidly coupled to the outer lumen.

24. The method of claim 20 wherein aspirating the material from the cavity comprises withdrawing a plunger of an aspiration syringe fluidly coupled to the inner lumen, and wherein flowing the irrigation fluid through the outer lumen comprises depressing a plunger of an irrigation syringe fluidly coupled to the outer lumen.

25. The method of claim 24 wherein the method further comprises:
withdrawing the plunger of the irrigation syringe to draw the irrigation fluid into the irrigation syringe; and
depressing the plunger of the aspiration syringe to expel the aspirated material from the aspiration syringe.

26. The method of claim 25 wherein the method further comprises:
simultaneously withdrawing the plunger of the aspiration syringe to aspirate the material from the cavity and withdrawing the plunger of the irrigation syringe to draw the irrigation fluid into the irrigation syringe; and

simultaneously depressing the plunger of the aspiration syringe to expel the aspirated material from the aspiration syringe and depressing the plunger of the irrigation syringe to flow the irrigation fluid into the cavity to irrigate the cavity.

27. The method of claim 26 wherein the plunger of the aspiration syringe and the plunger of the irrigation syringe are mechanically linked to move together.

28. A system for aspirating and irrigating a body cavity, comprising:
a catheter assembly comprising—

an outer elongate member defining an outer lumen; and

an inner elongate member extending at least partially through the outer elongate member and defining an inner lumen having a distal opening, wherein a distal portion of the outer elongate member is fluidly sealed to the inner elongate member, and wherein the outer elongate member includes an aperture positioned proximal of the distal portion;

an aspiration syringe fluidly coupled to the inner lumen and configured to aspirate the inner lumen; and

an irrigation syringe fluidly coupled to the outer lumen and configured to flow an irrigation fluid through the outer lumen and out of the aperture.

29. The system of claim 28 wherein the aspiration syringe and the irrigation syringe are mechanically linked to be actuated in synchronization.

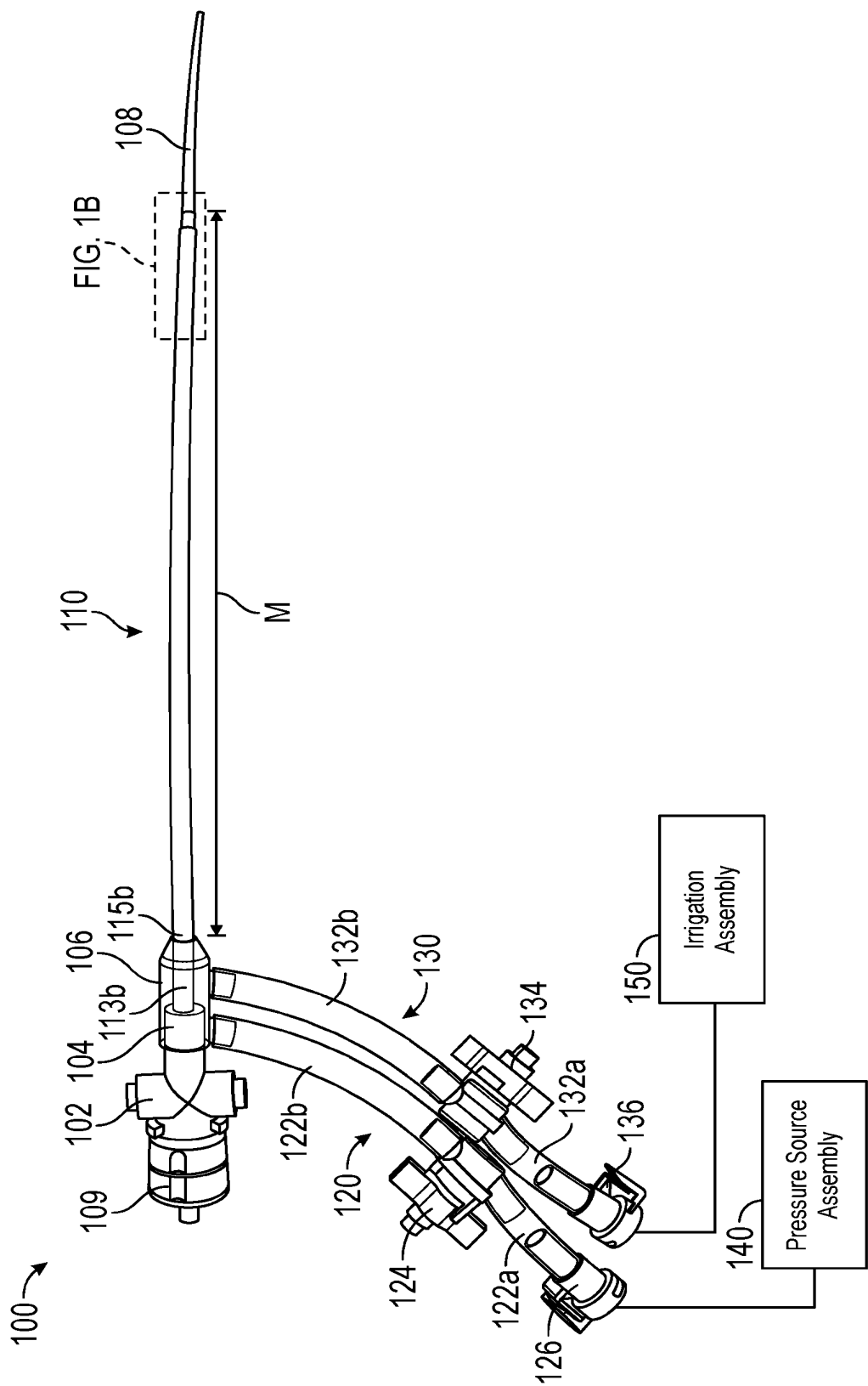


FIG. 1A

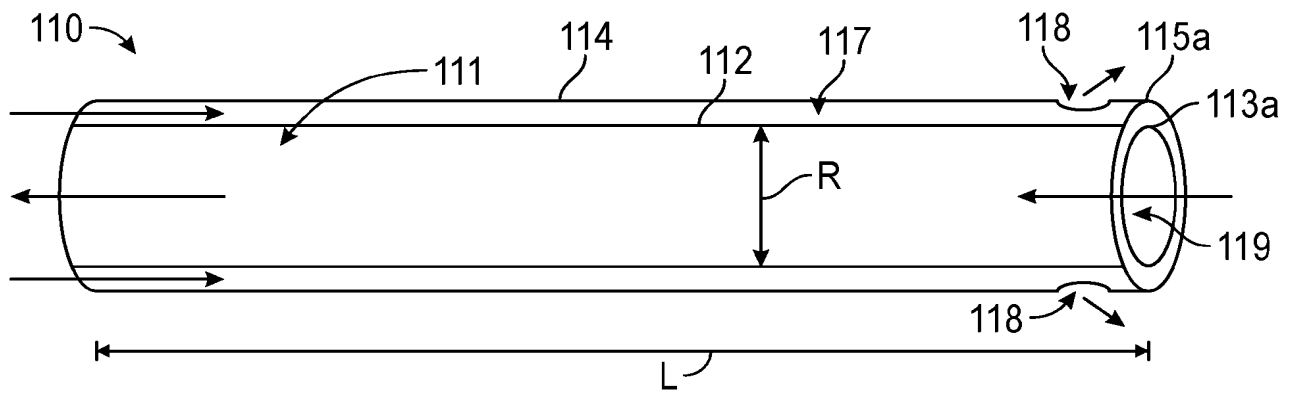


FIG. 1B

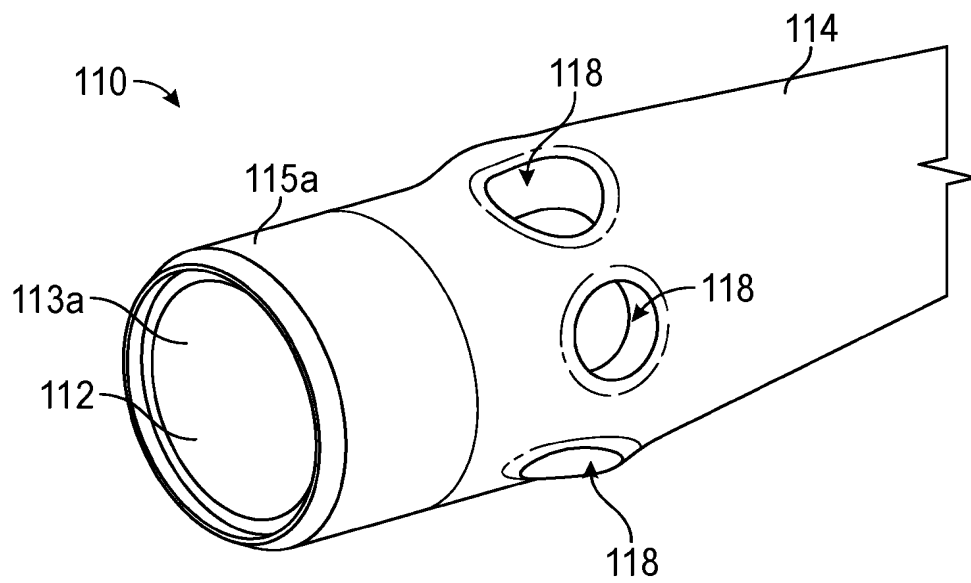


FIG. 1C

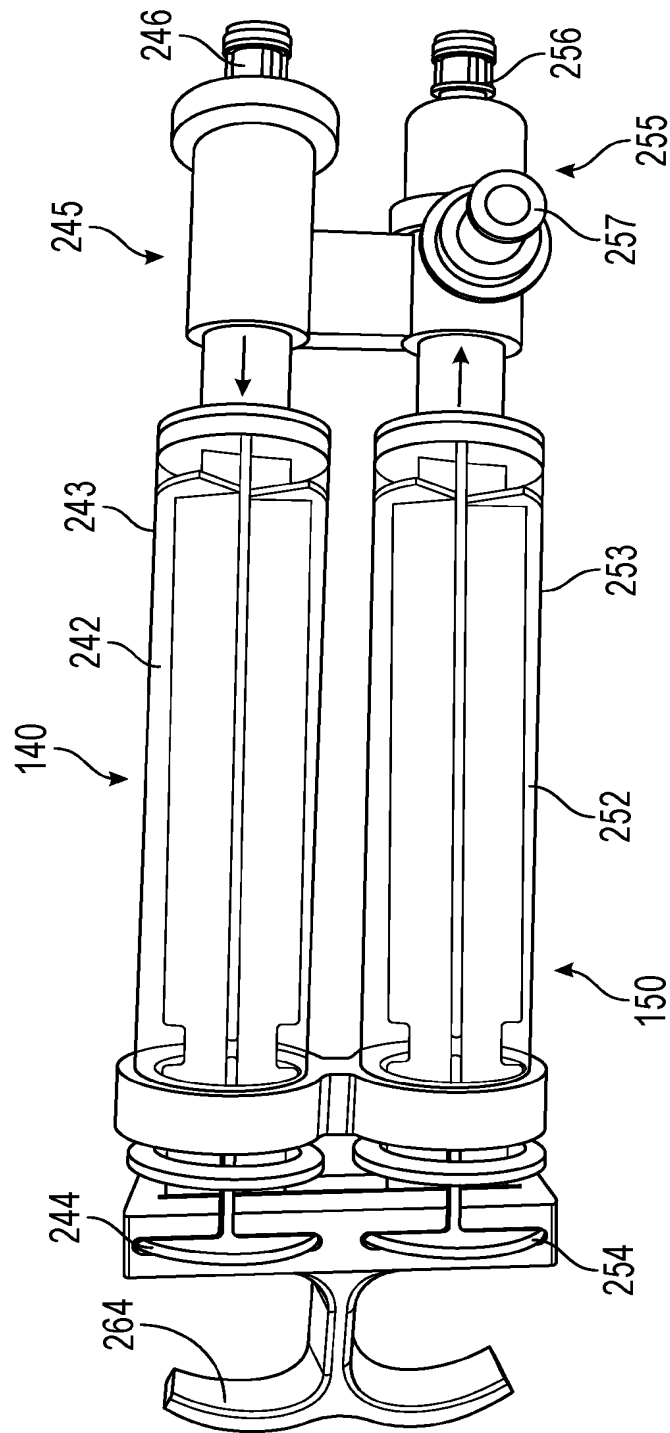
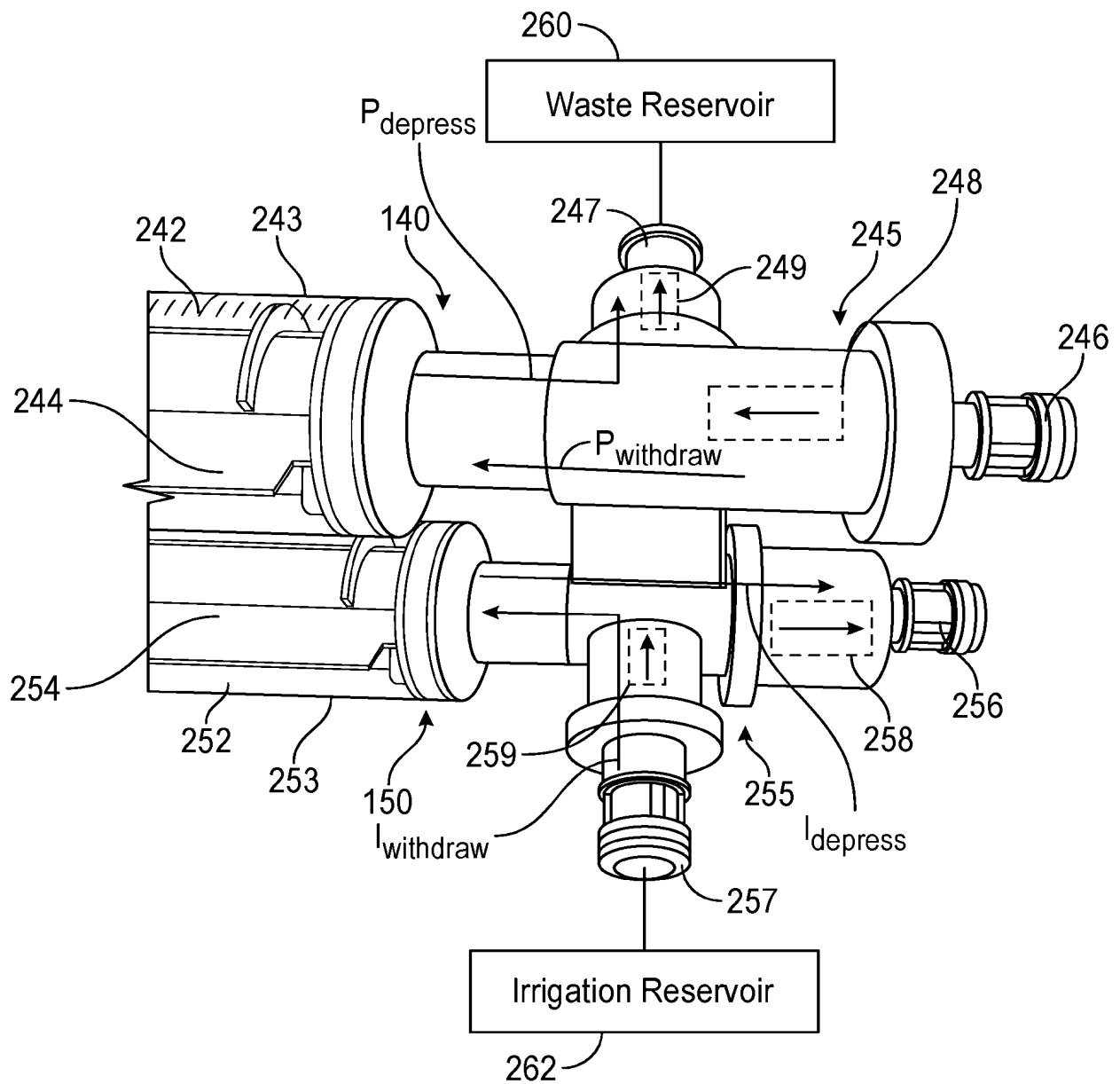


FIG. 2A

**FIG. 2B**

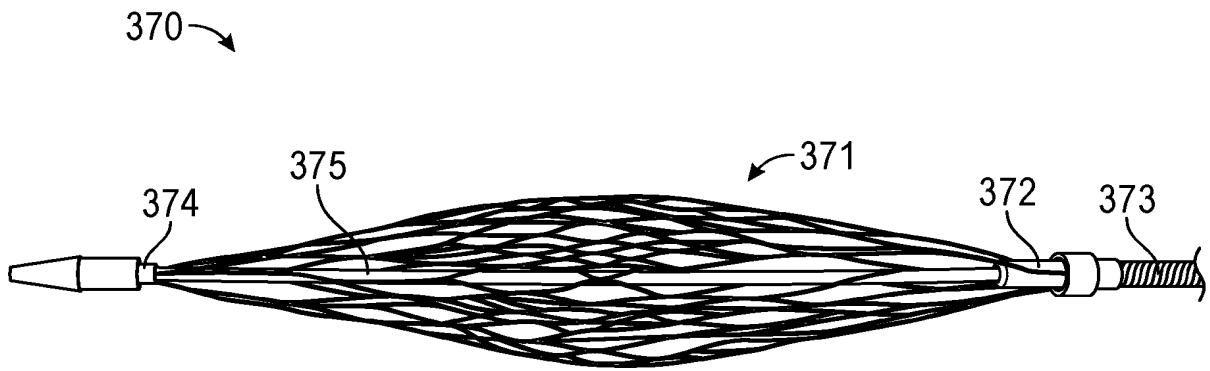


FIG. 3A

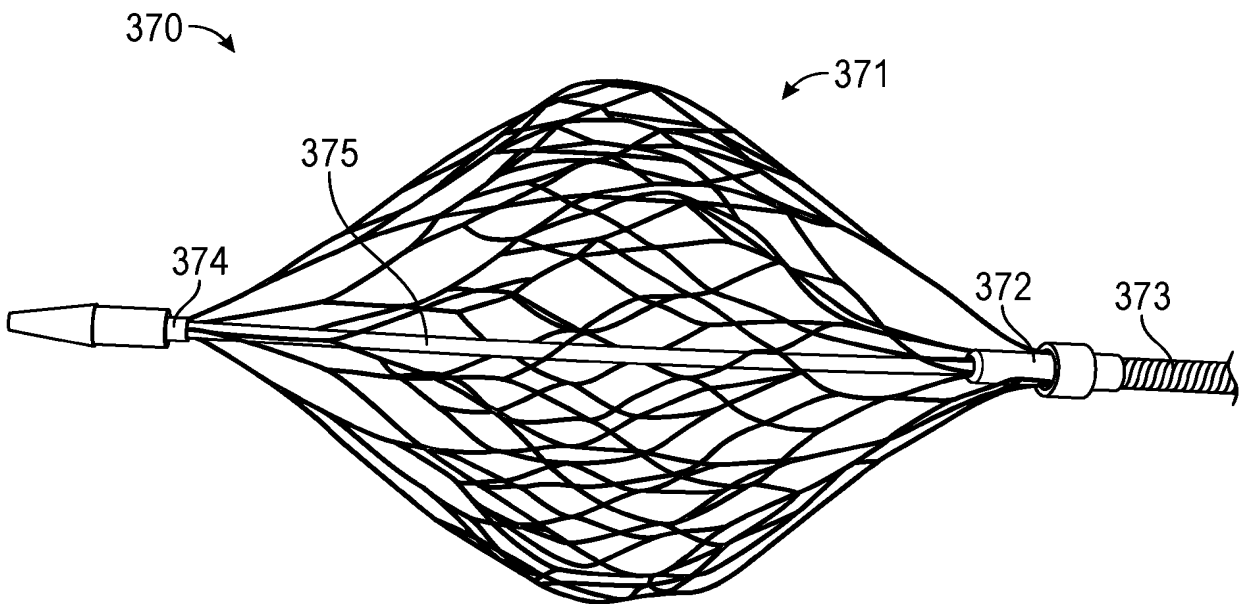


FIG. 3B

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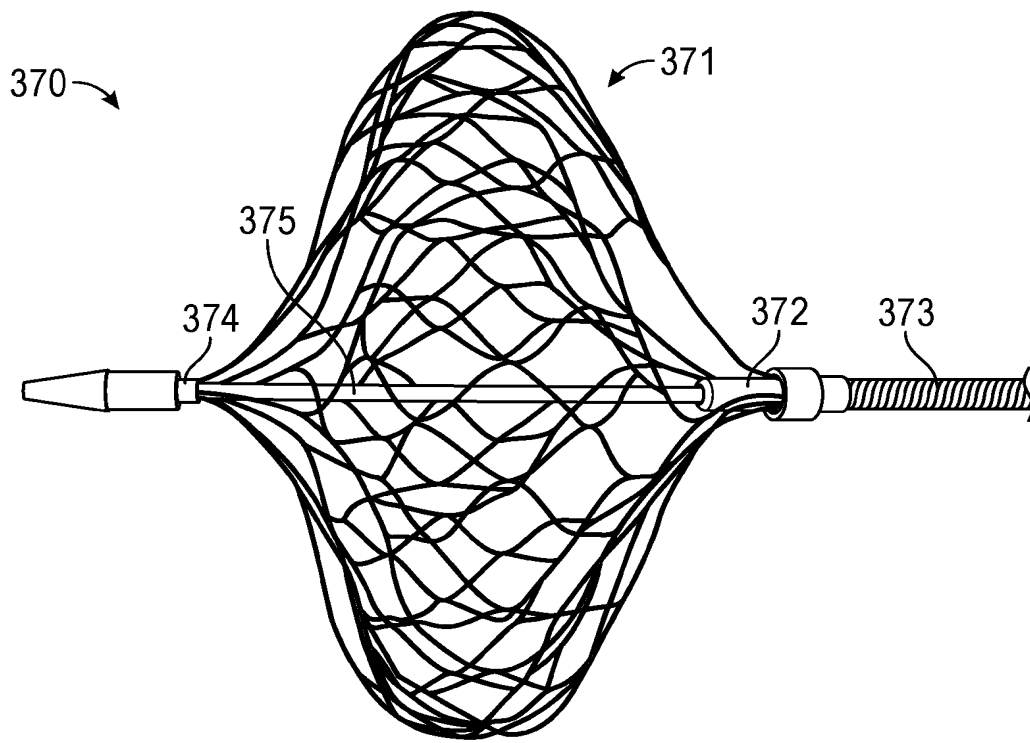


FIG. 3C

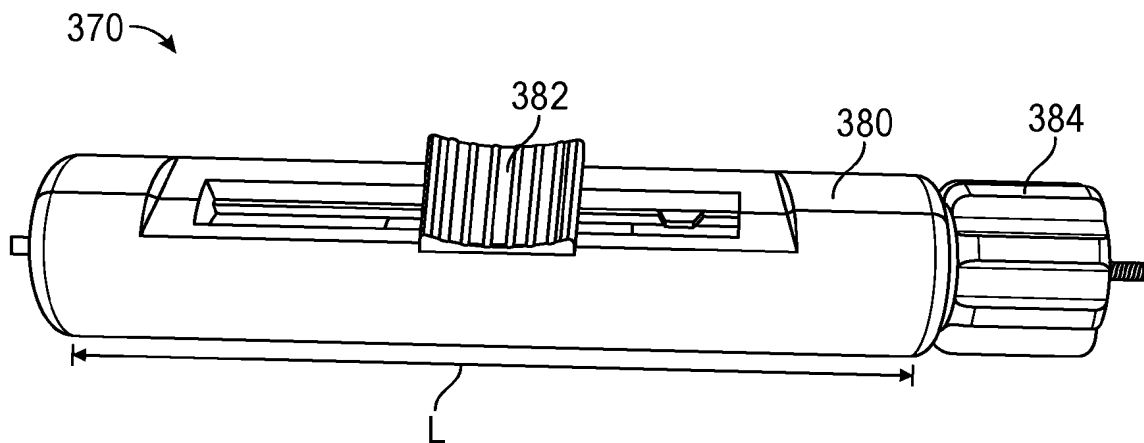
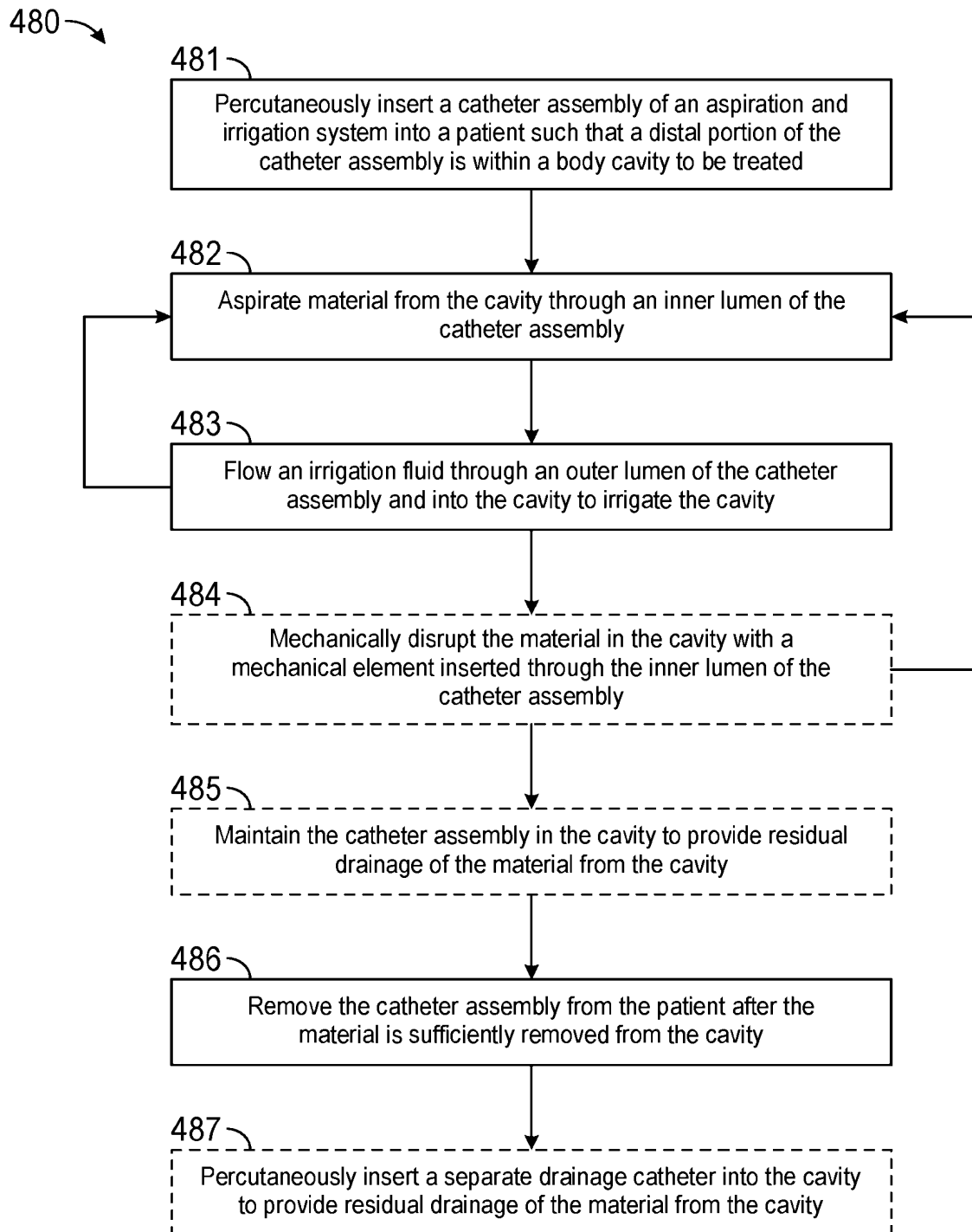


FIG. 3D

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**FIG. 4**

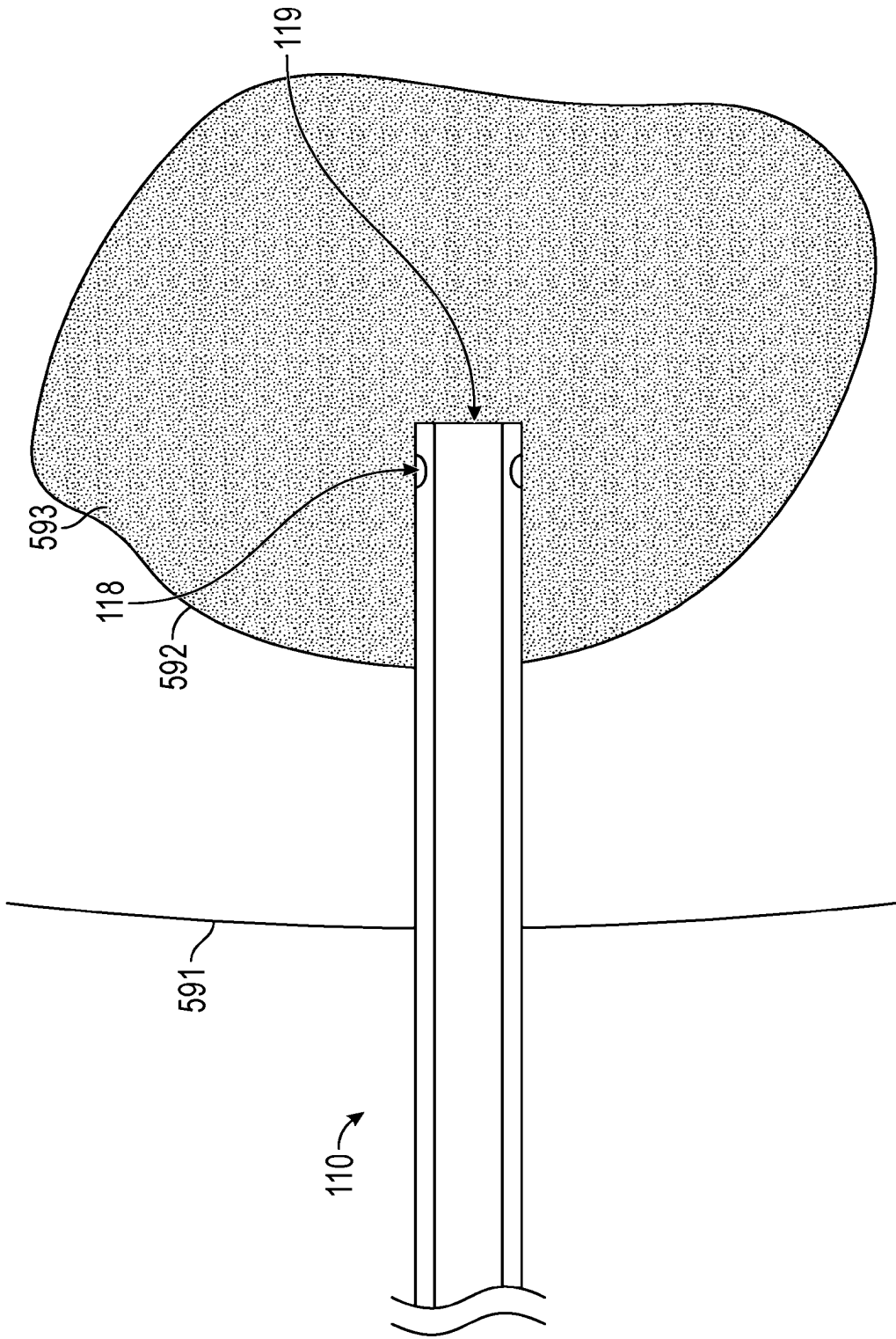


FIG. 5A

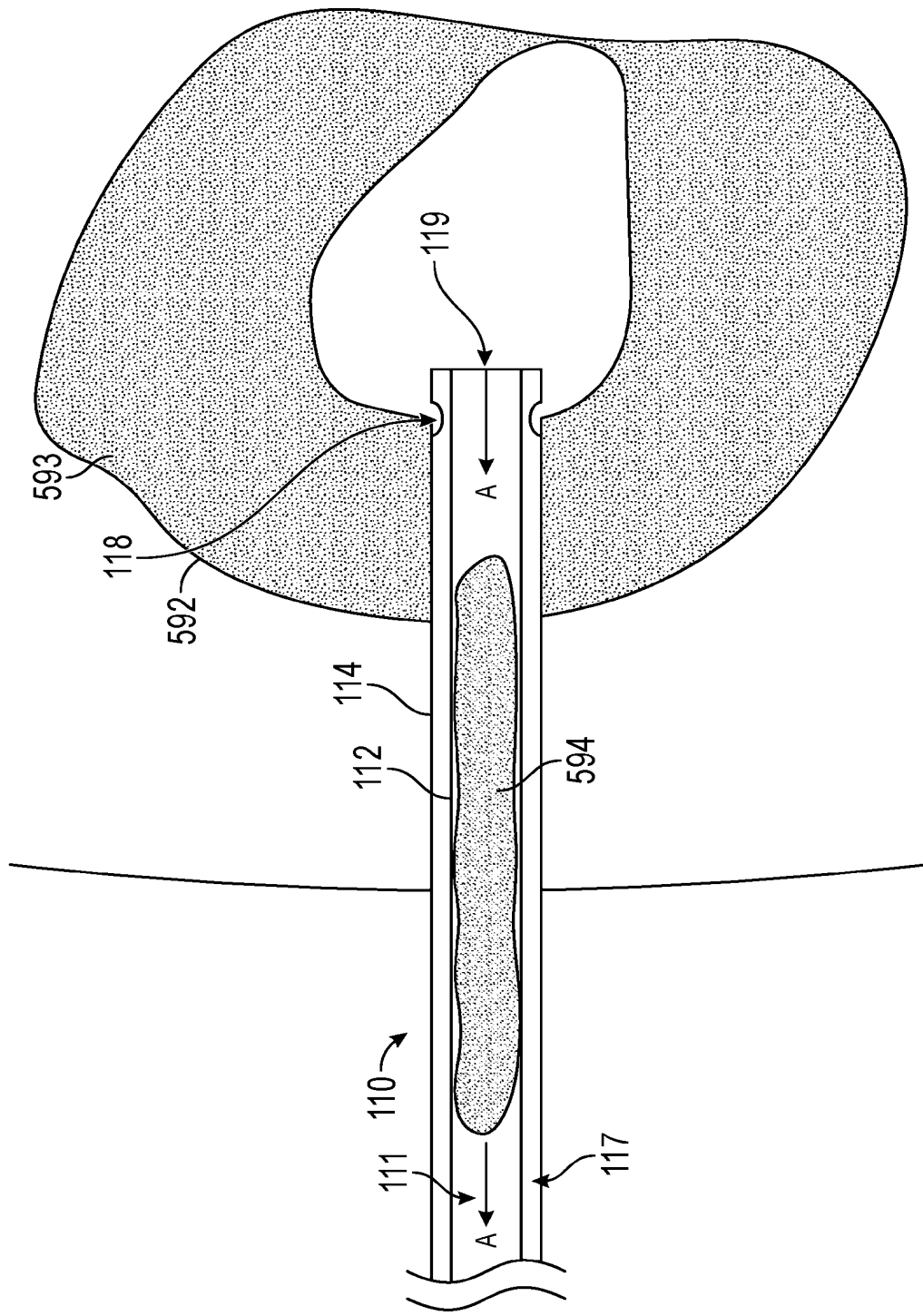


FIG. 5B

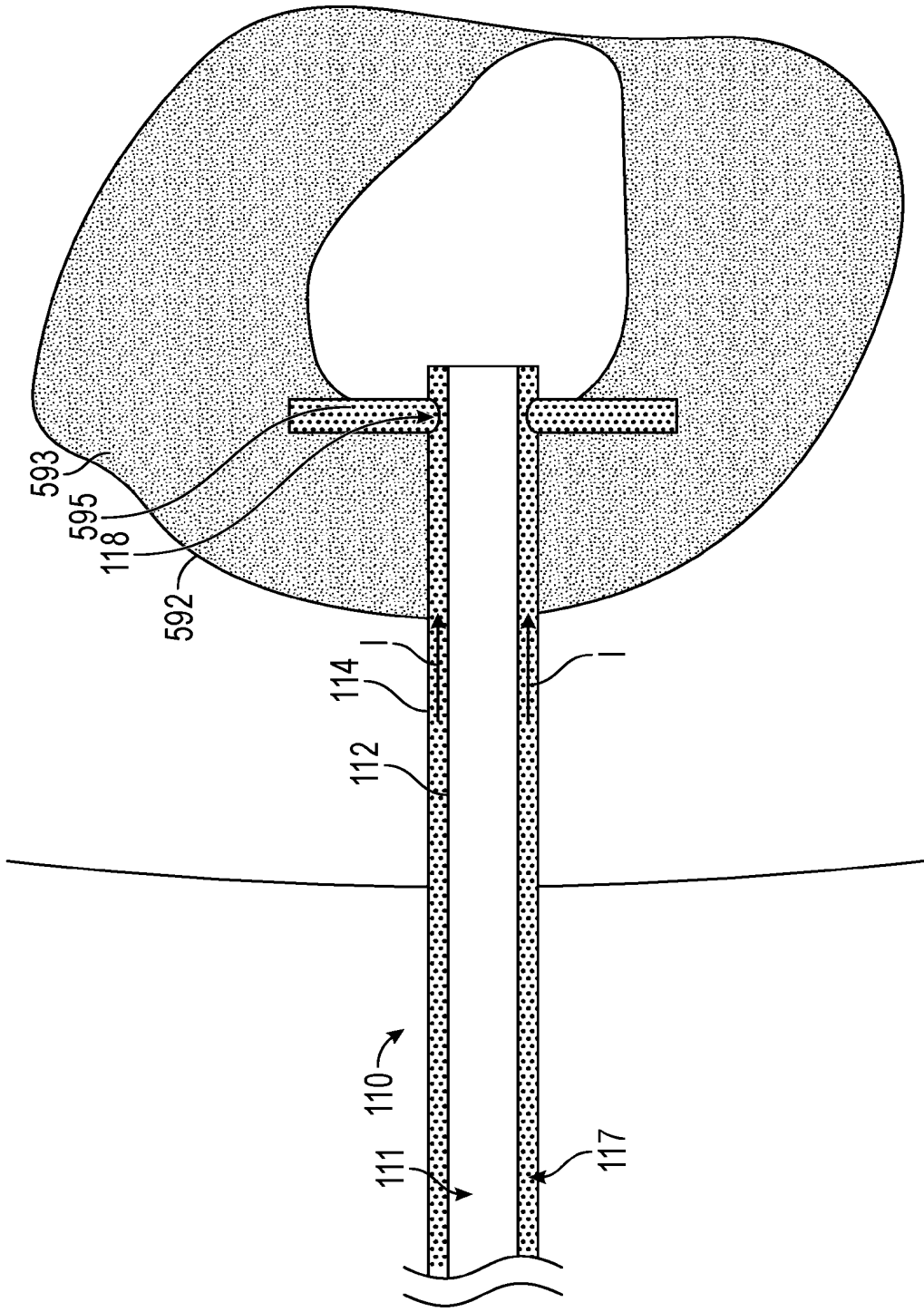


FIG. 5C

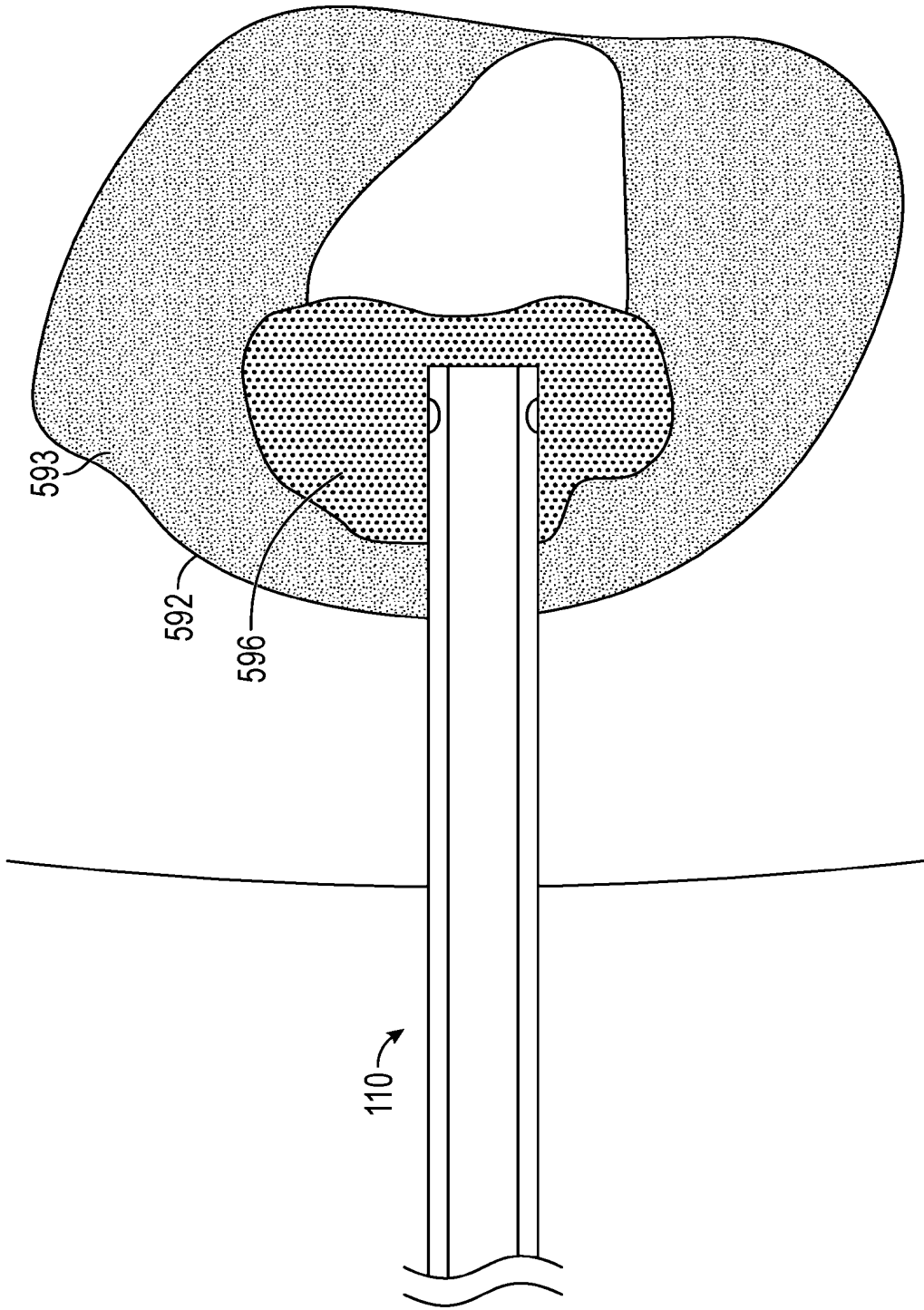


FIG. 5D

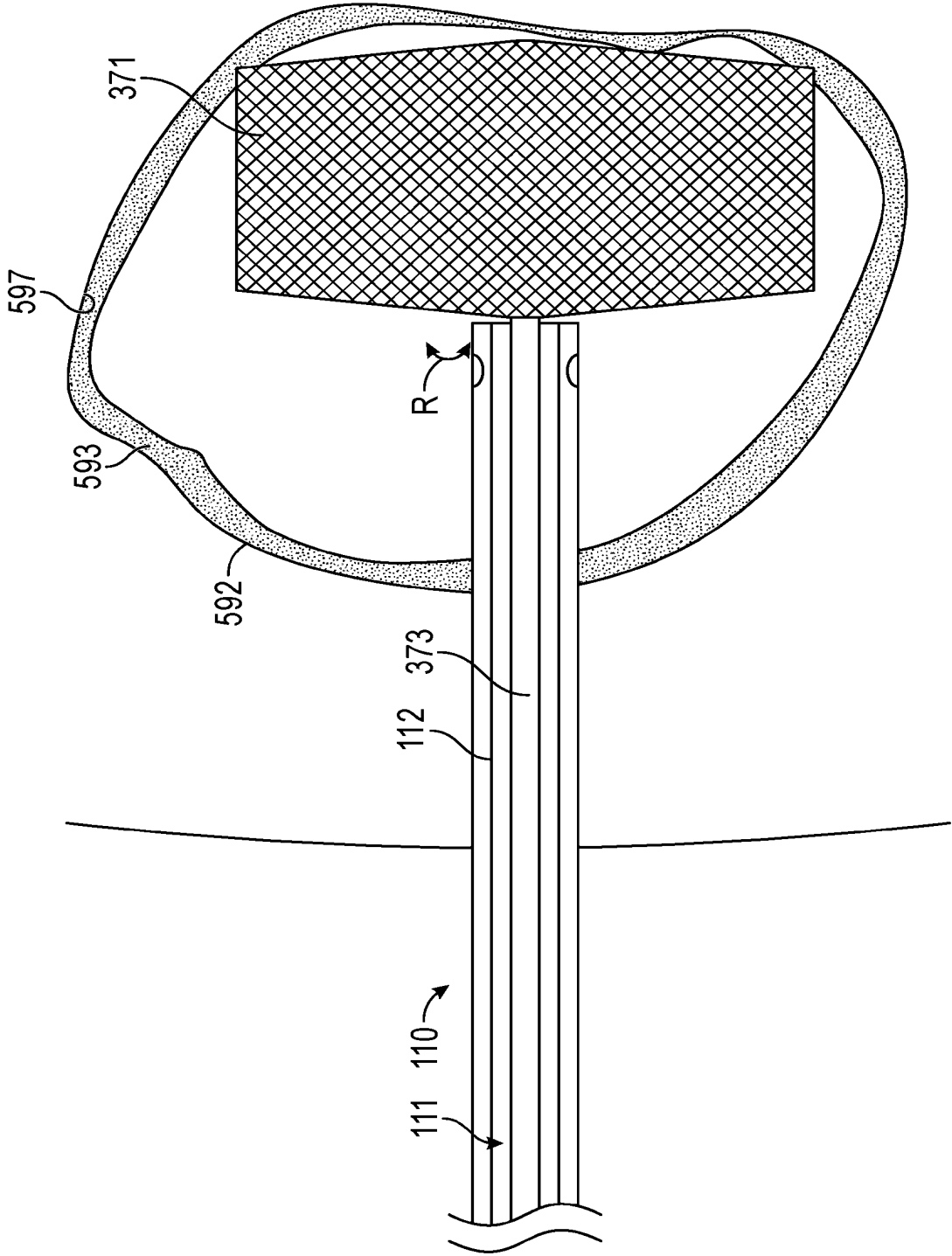


FIG. 5E

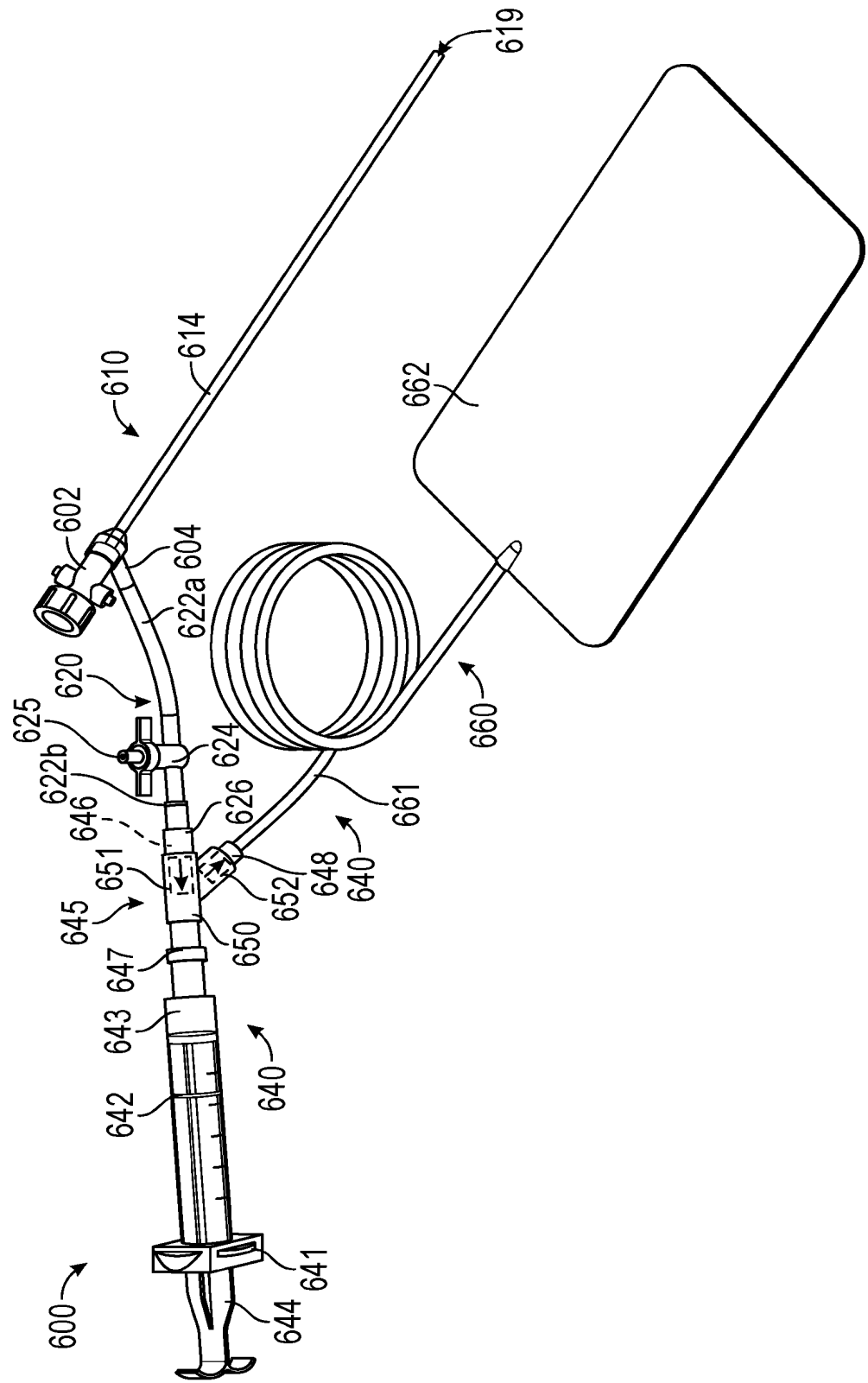


FIG. 6

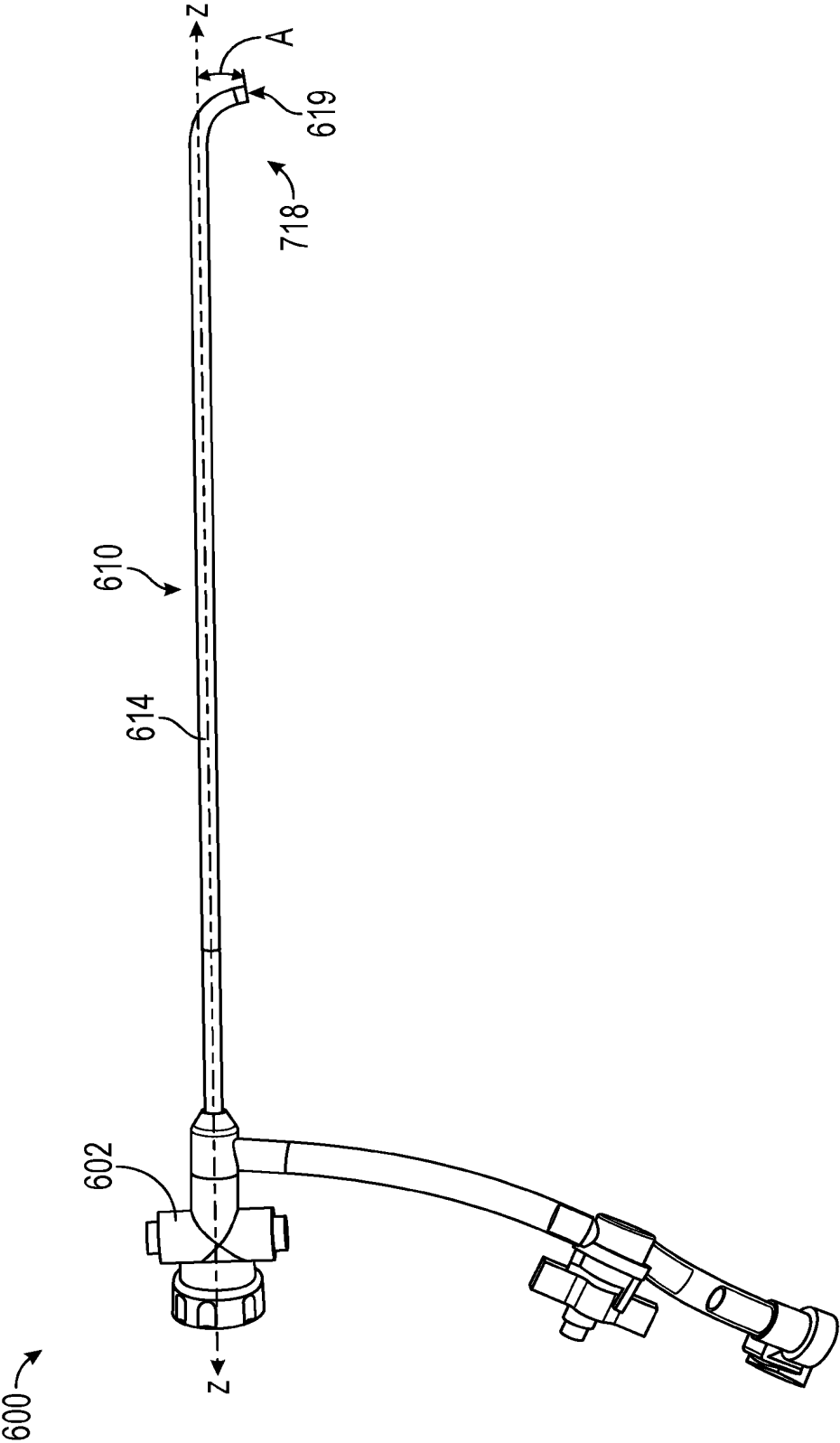
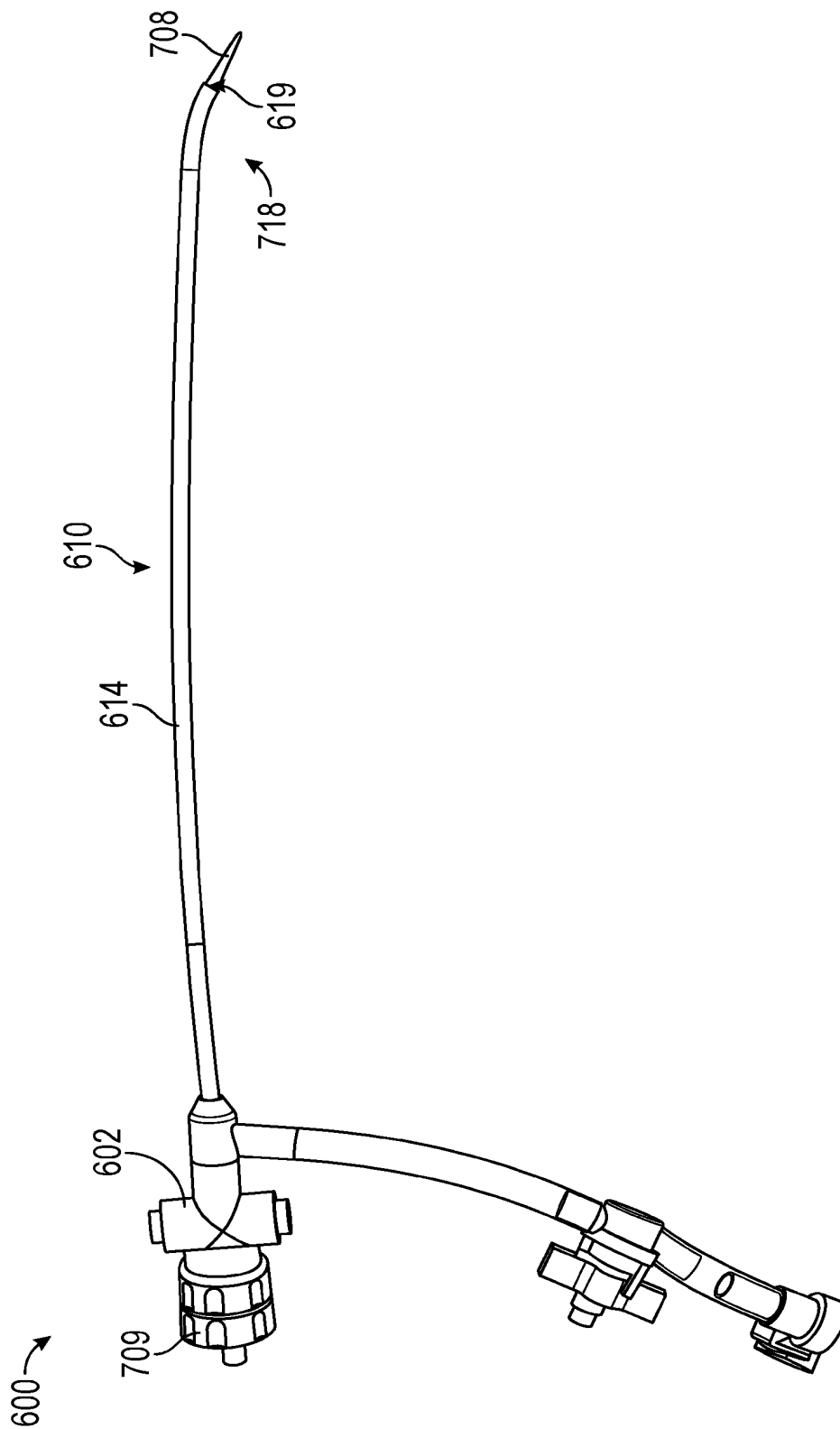
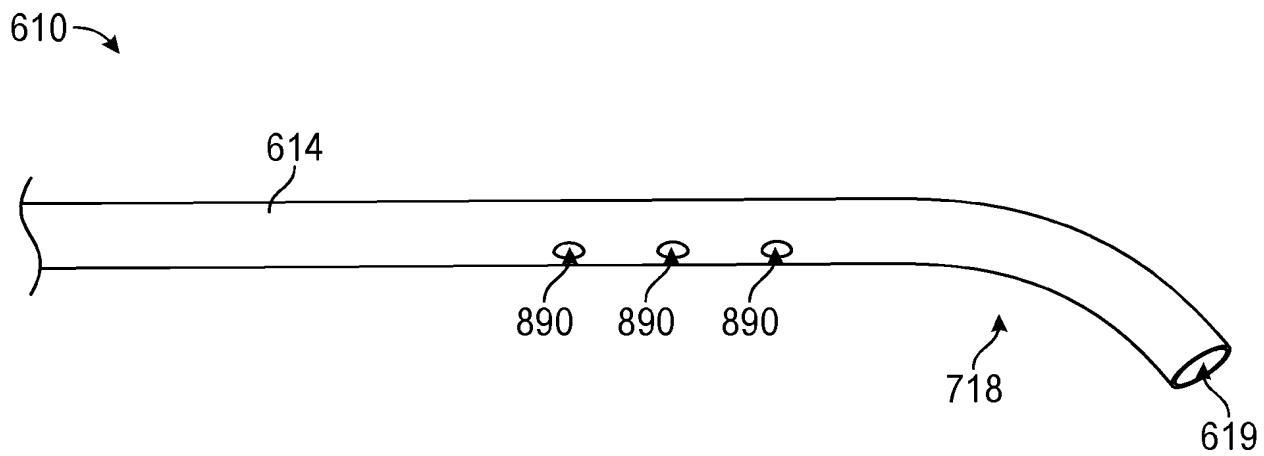
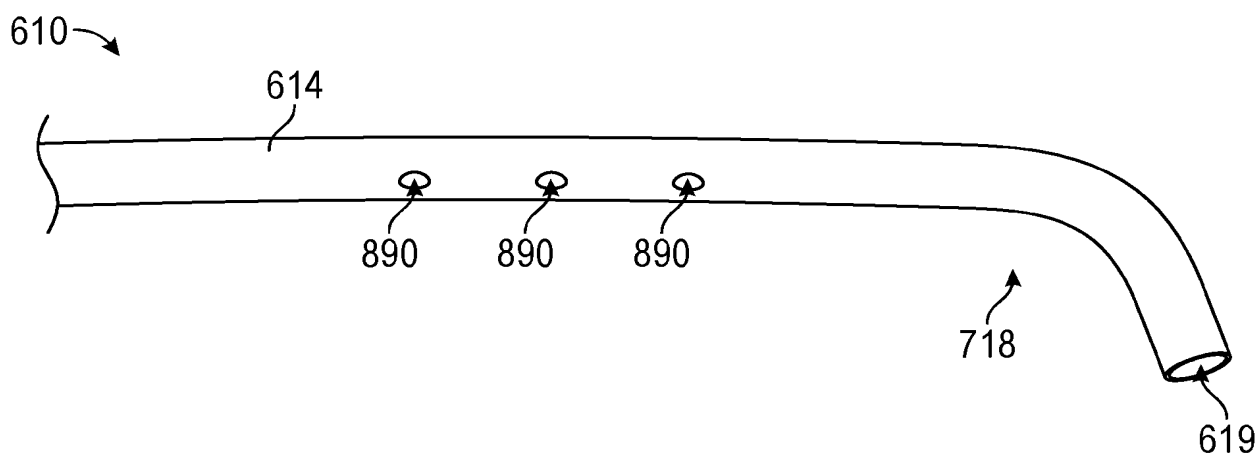


FIG. 7A



**FIG. 8A****FIG. 8B**



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NOTICE OF ALLOWANCE AND FEE(S) DUE

25096 7590 06/28/2024
PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

EXAMINER

NGUYEN, TUAN VAN

ART UNIT

PAPER NUMBER

3771

DATE MAILED: 06/28/2024

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/358,837	07/25/2023	Richard Quick	111552.8023.US06	6598

TITLE OF INVENTION: SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	09/30/2024

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 the USPTO patent electronic filing system.

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)

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 the USPTO patent electronic filing system or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

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nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	09/30/2024

EXAMINER	ART UNIT	CLASS-SUBCLASS
NGUYEN, TUAN VAN	3771	606-200000

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,

1 _____

(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.

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 the USPTO patent electronic filing system ☐ 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

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

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.

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.

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. _____



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25096	7590	06/28/2024	EXAMINER	
PERKINS COIE LLP - SEA General PATENT-SEA P.O. BOX 1247 SEATTLE, WA 98111-1247			NGUYEN, TUAN VAN	
			ART UNIT	PAPER NUMBER
			3771	

DATE MAILED: 06/28/2024

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. The United States Patent and Trademark Office (USPTO) collects the information in this record under authority of 35 U.S.C. 2. The USPTO's system of records is used to manage all applicant and owner information including name, citizenship, residence, post office address, and other information with respect to inventors and their legal representatives pertaining to the applicant's/owner's activities in connection with the invention for which a patent is sought or has been granted. The applicable Privacy Act System of Records Notice for the information collected in this form is COMMERCE/PAT-TM-7 Patent Application Files, available in the Federal Register at 78 FR 19243 (March 29, 2013).

<https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf>

Routine uses of the information in this record may include disclosure to:

- 1) law enforcement, in the event that the system of records indicates a violation or potential violation of law;
- 2) a federal, state, local, or international agency, in response to its request;
- 3) a contractor of the USPTO having need for the information in order to perform a contract;
- 4) the Department of Justice for determination of whether the Freedom of Information Act (FOIA) requires disclosure of the record;
- 5) a Member of Congress submitting a request involving an individual to whom the record pertains, when the individual has requested the Member's assistance with respect to the subject matter of the record;
- 6) a court, magistrate, or administrative tribunal, in the course of presenting evidence, including disclosures to opposing counsel in the course of settlement negotiations;
- 7) the Administrator, General Services Administration (GSA), or their designee, during an inspection of records conducted by GSA under authority of 44 U.S.C. 2904 and 2906, in accordance with the GSA regulations and any other relevant (i.e., GSA or Commerce) directive, where such disclosure shall not be used to make determinations about individuals;
- 8) 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));
- 9) the Office of Personnel Management (OPM) for personnel research purposes; and
- 10) the Office of Management and Budget (OMB) for legislative coordination and clearance.

If you do not furnish the information requested on this form, the USPTO may not be able to process and/or examine your submission, which may result in termination of proceedings, abandonment of the application, and/or expiration of the patent.

Notice of Allowability	Application No. 18/358,837	Applicant(s) Quick et al.	
	Examiner TUAN V NGUYEN	Art Unit 3771	AIA (FITF) Status Yes

-- 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 the Request for Continued Examination filed March 12, 2024.
☐ 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 1-30. 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)	5. ☒ Examiner's Amendment/Comment
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date ____.	6. ☒ Examiner's Statement of Reasons for Allowance
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material ____.	7. ☐ Other ____.
4. ☒ Interview Summary (PTO-413), Paper No./Mail Date. ____.	

/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771	
--	--

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on March 12, 2024 has been entered.

Terminal Disclaimer

The terminal disclaimer filed on June 21, 2024 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent No. 11,849,963 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on March 12, 2024 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Allowable Subject Matter

Claims 1-30 allowed.

Please see Notice of Allowability issued on December 29, 2023 for examiner's statement of reasons for allowance.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TUAN V NGUYEN whose telephone number is (571)272-5962. The examiner can normally be reached Monday - Friday 8:30 AM - 5:30 PM.

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, Jackie Ho can be reached on 571-272-4696. 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.

/TUAN V NGUYEN/
Primary Examiner, Art Unit 3771

<i>Examiner-Initiated Interview Summary</i>	Application No. 18/358,837	Applicant(s) Quick et al.		
	Examiner TUAN V NGUYEN	Art Unit 3771	AIA (First Inventor to File) Status Yes	Page 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	Title	Type
TUAN V NGUYEN	Primary Examiner	Telephonic
MATTHEW WILLIAMS	Attorney of Record	

Date of Interview: 18 June 2024

Issues Discussed:

Non-statutory Double Patenting

In a telephonic interview with applicant's representative on June 18, 2024, a nonstatutory double patenting rejection between the pending claims of the present application and the U.S. Patent No. 11,849,963 was discussed. Applicant agreed to file a Terminal Disclaimer to overcome the nonstatutory double patenting rejection.

/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771	
<p>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</p> <p>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</p>	

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of 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.

Issue Classification 	Application/Control No. 18/358,837	Applicant(s)/Patent Under Reexamination Quick et al.	
	Examiner TUAN V NGUYEN	Art Unit 3771	

CPC						
Symbol					Type	Version
A61B	/	17	/	22031	F	2013-01-01
A61M	/	25	/	0082	I	2013-01-01
A61B	/	17	/	22	I	2013-01-01
A61M	/	39	/	06	I	2013-01-01
A61B	/	17	/	221	I	2013-01-01
A61B	/	2017	/	22042	A	2013-01-01
A61M	/	2210	/	12	A	2013-01-01
A61B	/	2017	/	22079	A	2013-01-01
A61B	/	2017	/	22094	A	2013-01-01
A61B	/	2017	/	22034	A	2013-01-01
A61B	/	2017	/	00907	A	2013-01-01
A61B	/	2217	/	005	A	2013-01-01

CPC Combination Sets					
Symbol				Type	Set

NONE (Assistant Examiner) _____ (Date) _____		Total Claims Allowed: 30	
/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771 (Primary Examiner) _____ (Date) _____		14 June 2024	O.G. Print Claim(s) 1
			O.G. Print Figure 1A

Issue Classification 	Application/Control No. 18/358,837	Applicant(s)/Patent Under Reexamination Quick et al.
	Examiner TUAN V NGUYEN	Art Unit 3771

INTERNATIONAL CLASSIFICATION			
CLAIMED			
A61B	/	17	/ 00
A61B	/	17	/ 22
NON-CLAIMED			
	/		/

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	30	
/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771 (Primary Examiner)	14 June 2024 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1A

Issue Classification 	Application/Control No. 18/358,837	Applicant(s)/Patent Under Reexamination Quick et al.
	Examiner TUAN V NGUYEN	Art Unit 3771

☐ 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
1	1	10	10	22	19	12	28								
2	2	11	11	23	20	13	29								
3	3	15	12	24	21	14	30								
4	4	16	13	25	22										
5	5	17	14	26	23										
6	6	18	15	27	24										
7	7	19	16	28	25										
8	8	20	17	29	26										
9	9	21	18	30	27										

NONE	Total Claims Allowed:	
(Assistant Examiner)	(Date)	30
/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771	14 June 2024	O.G. Print Claim(s)
(Primary Examiner)	(Date)	1
		O.G. Print Figure
		1A

<i>Search Notes</i> 	Application/Control No. 18/358,837	Applicant(s)/Patent Under Reexamination Quick et al.
	Examiner TUAN V NGUYEN	Art Unit 3771

CPC - Searched*		
Symbol	Date	Examiner
A61B17/22031,22,221,220758,320725	10/19/2023	TN
A61B2017/22034,22042,22079,22094	10/19/2023	TN
A61M1/60,0001,0003	10/19/2023	TN
A61M2039/027	10/19/2023	TN

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
Group/subgroups combined with text (see search history printout)	10/19/2023	TN
Search update (see search history printout)	12/08/2023	TN
Search update (see search history printout)	06/14/2024	TN

/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771	
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<i>Search Notes</i> 	Application/Control No. 18/358,837	Applicant(s)/Patent Under Reexamination Quick et al.
	Examiner TUAN V NGUYEN	Art Unit 3771

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
Text search	USPAT; US_PGPUB	12/08/2023	TN
Text search	USPAT; US_PGPUB	06/14/2024	TN

/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771	
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Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

U.S. PATENTS AND PUBLICATIONS						
Examiner Initial*	Cite No	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	
	1.	20240082540	03-14-2024	Brodt et al.		
	2.	11925369	03-12-2024	Hauser		
	3.	11937838	03-26-2024	Cox et al.		
	4.	11937834	03-26-2024	Dinh		
	5.	11865291	01-09-2024	Merritt et al.		
	6.	11963861	04-23-2024	Strauss et al.		
	7.	3863624	02-04-1975	Gram		
	8.	3661144	05-09-1972	Jensen et al.		
	9.	20160128857	05-12-2016	Kao		
	10.	9566179	02-14-2017	Andreas et al.		
	11.	20150366690	12-24-2015	Lumauig		
	12.	20190366049	12-05-2019	Hannon et al.		
	13.					
	14.					
	15.					
FOREIGN PATENT DOCUMENTS						
Examiner Initial*	Cite No	Foreign Document Number ³	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
	1.	JP2007-222658 (Counterpart: WO1998/050103)	09-06-2007	EMBOL-X, INC.		
	2.	JP05694718	04-01-2015	TRUMO KABUSHIKI KAISHA		
	3.					
NON-PATENT LITERATURE DOCUMENTS						
Examiner Initials*	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
	1.	English translation of Japanese Office Action mailed January 19, 2024 for Japanese Application No. 2022-160947, 8 pages.				
	2.	International Search Report and Written Opinion for International App. No. PCT/US2024/010875; Applicant: Inari Medical, Inc., Date of Mailing: April 26, 2024, 15 pages.				

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

3.		
4.		
5.		
EXAMINER SIGNATURE		
Examiner Signature	/TUAN V NGUYEN/	Date Considered 06/14/2024
<p>*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p>		
<p>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.</p>		
<p>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.</p>		

CERTIFICATION STATEMENT
<p>Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):</p> <p>☐ 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. See 37 CFR 1.97(e) (1).</p> <p>OR</p> <p>☐ 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).</p> <p>☐ See attached certification statement.</p> <p>☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.</p> <p>☒ None</p> <p>It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references. This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling;</p>

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

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	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

or (iv) the cited information is, or is considered to be, material to patentability. In addition, Applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.

COPIES OF REFERENCES

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

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	/Matthew S. Williams/	Date (YYYY-MM-DD)	2024-04-30
Name/Print	Matthew S. Williams	Registration Number	77,516

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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.**

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L224	40	(inari WITH medical) AND (quick WITH richard)	(US-PGPUB; USPAT)	OR	ON	ON	2024/04/08 12:46 PM
L225	17	(inari WITH medical) AND (quick WITH richard)	(USPAT)	OR	ON	ON	2024/04/08 12:46 PM
L226	30	(quick WITH richard) AND clot	(USPAT)	OR	ON	ON	2024/04/08 12:49 PM
L227	9	(quick WITH richard) AND hemostasis WITH valve AND filament\$4	(US-PGPUB; USPAT)	OR	ON	ON	2024/04/08 01:19 PM
L228	116	("2449497" "3191600" "3324855" "3430631" "3520300" "3610242" "3675653").pn. OR ("3785380").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2024/04/08 04:50 PM
L229	32	("3863624").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2024/04/17 04:06 PM
L230	1	("3661144").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/04/23 04:10 PM
L231	37	("3661144").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2024/04/23 04:16 PM
L236	10	("20240082540" "11925369" "11937838" "1182091" "3863624" "3661144" "20160128857" "9566179" "20150366690" "20190366049").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/05/29 09:00 AM
L237	11	("20240082540" "1192539" "11937838" "11937834" "11865291" "3863624" "3661144" "20160128857" "9866179" "20150366690" "20190366049").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/14 03:11 PM

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N91	2	(aspiration SAME system AND vacuum	(US-PGPUB; USPAT)	OR	ON	ON	2024/05/29 09:06 AM

		WITH source AND connection WITH tubing AND catheter AND filter WITH chamber SAME tubing SAME housing AND port AND fluid WITH connector AND fluid WITH path AND filter WITH chamber SAME vacuum WITH source AND flow WITH controller AND hemostasis WITH valve SAME second WITH path).clm.					
N92	2	(aspiration SAME system AND vacuum WITH source AND connection WITH tubing AND catheter AND filter WITH chamber SAME tubing SAME housing AND port AND fluid WITH connector AND fluid WITH path AND filter WITH chamber SAME vacuum WITH source AND flow WITH controller AND hemostasis WITH valve SAME second WITH path).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/05/29 09:06 AM
N93	2	(aspiration SAME system AND vacuum WITH source AND connection WITH tubing AND catheter AND filter WITH chamber SAME tubing SAME housing AND port AND fluid WITH connector AND fluid WITH path AND filter WITH chamber SAME vacuum WITH source AND flow WITH controller AND hemostasis WITH valve SAME second WITH path).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/05/29 09:06 AM
N94	1	(aspiration AND vacuum AND connection SAME tubing AND filter WITH chamber SAME housing AND first WITH end AND second WITH end AND	(US-PGPUB; USPAT)	OR	ON	ON	2024/05/29 09:06 AM

		port SAME first WITH end AND fluid WITH connector SAME second WITH end AND filter SAME flow WITH path AND catheter SAME vacuum SAME filter WITH chamber AND flow WITH controller SAME second WITH flow AND check WITH valve SAME connector SAME filter).clm.					
N95	1	(aspiration AND vacuum AND connection SAME tub\$4 SAME vacuum AND filter WITH chamber SAME housing AND first WITH end AND second WITH end AND port SAME first WITH end AND fluid WITH connector SAME second WITH end AND filter SAME flow WITH path AND catheter SAME vacuum SAME filter WITH chamber AND flow WITH controller SAME second WITH flow AND check WITH valve SAME connector SAME filter).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/05/29 09:06 AM
N96	2	(aspiration SAME system AND vacuum WITH source AND connection WITH tubing AND catheter AND filter WITH chamber SAME tubing SAME housing AND port AND fluid WITH connector AND fluid WITH path AND filter WITH chamber SAME vacuum WITH source AND flow WITH controller AND hemostasis WITH valve SAME second WITH path).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/05/29 09:06 AM
N97	1	(aspiration AND vacuum AND connection SAME tub\$4 SAME vacuum AND	(US-PGPUB; USPAT)	OR	ON	ON	2024/05/29 09:06 AM

		filter WITH chamber SAME housing AND first WITH end AND second WITH end AND port SAME first WITH end AND fluid WITH connector SAME second WITH end AND filter SAME flow WITH path AND catheter SAME vacuum SAME filter WITH chamber AND flow WITH controller SAME second WITH flow AND check WITH valve SAME connector SAME filter).clm.					
N98	1	(aspiration AND vacuum AND connection SAME tub\$4 SAME vacuum AND filter WITH chamber SAME housing AND first WITH end AND second WITH end AND port SAME first WITH end AND fluid WITH connector SAME second WITH end AND filter SAME flow WITH path AND catheter SAME vacuum SAME filter WITH chamber AND flow WITH controller SAME second WITH flow AND check WITH valve SAME connector SAME filter).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/14 03:16 PM
N99	2	(aspiration SAME system AND vacuum WITH source AND connection WITH tubing AND catheter AND filter WITH chamber SAME tubing SAME housing AND port AND fluid WITH connector AND fluid WITH path AND filter WITH chamber SAME vacuum WITH source AND flow WITH controller AND hemostasis WITH valve SAME second WITH path).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/14 03:16 PM

N100	1	(aspiration AND vacuum AND connection SAME tub\$4 SAME vacuum AND filter WITH chamber SAME housing AND first WITH end AND second WITH end AND port SAME first WITH end AND fluid WITH connector SAME second WITH end AND filter SAME flow WITH path AND catheter SAME vacuum SAME filter WITH chamber AND flow WITH controller SAME second WITH flow AND check WITH valve SAME connector SAME filter).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/14 03:16 PM
N101	2	(aspiration SAME system AND vacuum WITH source AND connection WITH tubing AND catheter AND filter WITH chamber SAME tubing SAME housing AND port AND fluid WITH connector AND fluid WITH path AND filter WITH chamber SAME vacuum WITH source AND flow WITH controller AND hemostasis WITH valve SAME second WITH path).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/14 03:16 PM
N102	0	(vacuum SAME aspiration AND housing SAME chamber AND cap SAME aspirat\$4 AND flow WITH path SAME cap AND catheter SAME flexible SAME port SAME housing AND flow WITH regulator AND first WITH operator SAME actuation WITH mechanism AND second WITH operator AND filter SAME housing SAME flow WITH path).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2024/06/14 03:16 PM

Bibliographic Data

Application No: 18/358,837

Foreign Priority claimed: ☐ Yes ☒ No

35 USC 119 (a-d) conditions met: ☐ Yes ☐ No ☐ Met After Allowance

Verified and Acknowledged: /TUAN V NGUYEN/

Examiner's Signature

Initials

Title:

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
07/25/2023	606	3771	111552.8023.US06
RULE			

APPLICANTS

Inari Medical, Inc., Irvine, CA, UNITED STATES

INVENTORS

Richard Quick,
Benjamin Edward Merritt,
Paul Lubock,
John Coleman Thress,

CONTINUING DATA

This application is a CON of 17865307 07/14/2022 PAT 11849963
17865307 is a CON of 17498642 10/11/2021 PAT 12016580
17498642 is a CON of 16258344 01/25/2019 PAT 11154314
16258344 has PRO of 62622691 01/26/2018

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

08/09/2023

STATE OR COUNTRY

ADDRESS

PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247
UNITED STATES

FILING FEE RECEIVED

\$6,360

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

U.S. PATENTS AND PUBLICATIONS					
Examiner Initial*	Cite No	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	8529596	09-10-2013	Grandfield et al.	
	2.	8632584	01-21-2014	Henkes et al.	
	3.	8795317	08-05-2014	Grandfield et al.	
	4.	9072537	07-07-2015	Grandfield et al.	
	5.	10426644	10-01-2019	Shrivastava et al.	
	6.	10456151	10-29-2019	Slee et al.	
	7.	11337714	05-24-2022	Ferrera et al.	
	8.	20030004536	01-02-2003	Boylan et al.	
	9.	20110009950	01-13-2011	Grandfield et al.	
	10.	20190216476	07-18-2019	Barry et al.	
	11.	20230047682	02-16-2023	Deaton et al.	
	12.	20210154433	05-27-2021	Casey et al.	
	13.	20180235742	08-23-2018	Fields et al.	
	14.	20200078029	03-12-2020	Hansen et al.	
	15.	20030191425	10-09-2003	Rosenblatt et al.	
	16.	20060149219	07-06-2006	Calderon	
	17.	20120143123	06-07-2012	Agnew	
	18.	20200324079	10-15-2020	Jalgaonkar et al.	
	19.	20050080398	04-14-2005	Markel et al.	
	20.	11969332	04-30-2024	Merritt et al.	
	21.	11969333	04-30-2024	Merritt et al.	
	22.	11969331	04-30-2024	Merritt et al.	
	23.	11969178	04-30-2024	Hauser	
	24.	11974910	05-07-2024	Merritt et al.	
	25.	11974909	05-07-2024	Merritt et al.	
	26.	11980537	05-14-2024	Merritt et al.	
	27.	11986382	05-21-2024	Merritt et al.	
	28.	11266825	03-08-2022	Peter et al.	
	29.	20220296797	09-22-2022	Chawla	
	30.	8187465	05-29-2012	Nierich	

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

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	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

31.	10994063	05-04-2021	Fisher et al.	
32.	20230052964	02-16-2023	Singh et al.	
33.	20230248502	08-10-2023	Buck et al.	
34.	8439858	05-14-2013	Huang et al.	
35.	10967111	04-06-2021	Iida	
36.	11607483	03-21-2023	Iida	
37.	9827364	11-28-2017	Peticca et al.	
38.	11998436	06-04-2024	Merritt et al.	
39.	12016580	06-25-2024	Quick et al.	
40.	20240157041	05-16-2024	Zikry et al.	
41.				
42.				
43.				
44.				

FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number ³	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
	1.	EP2231256	05-30-2018	Vortex Medical		
	2.	EP2394680	12-14-2011	CARDIONOVA S.R.L.		
	3.	EP2540328	10-02-2013	Eurosets S.R.L.		
	4.	WO2023069874	04-27-2023	IMPERATIVE CARE, INC.		
	5.					
	6.					

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	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
	1.	International Search Report and Written Opinion for International App. No. PCT/US2023/079428; Applicant: Inari Medical, Inc., Date of Mailing: May 29, 2024, 18 pages.	
	2.		
	3.		
	4.		
	5.		

Doc code: IDS

PTO/SB/08a (01-10)

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	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

EXAMINER SIGNATURE			
Examiner Signature	/TUAN V NGUYEN/	Date Considered	06/21/2024
<p>*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p>			
<p>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.</p>			
<p>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.</p>			

CERTIFICATION STATEMENT
<p>Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):</p> <p>☐ 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. See 37 CFR 1.97(e) (1).</p> <p>OR</p> <p>☐ 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).</p> <p>☐ See attached certification statement.</p> <p>☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.</p> <p>☒ None</p> <p>It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references. This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, Applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.</p>

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

COPIES OF REFERENCES

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

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	/Matthew S. Williams/	Date (YYYY-MM-DD)	2024-06-20
Name/Print	Matthew S. Williams	Registration Number	77,516

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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.**

Application Number * 18/358,837 *	Application/Control No. 18/358,837	Applicant(s)/Patent under Reexamination Quick et al.	
	Examiner NGUYEN, TUAN VAN	Art Unit 3771	
Document Code - DISQ		Internal Document - DO NOT MAIL	

TERMINAL DISCLAIMER	☒ APPROVED	☐ DISAPPROVED
Date Filed: <u>21 June 2024</u>	This patent is subject to a Terminal Disclaimer	

Approved/Disapproved by:
/KIMBERLY R WHITE/ Technology Center: <u>OPLC</u> Telephone: <u>(571)272-6179</u> _____



UNITED STATES
PATENT AND TRADEMARK OFFICE

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

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
18/358,837

RECEIPT DATE / TIME
06/21/2024 01:06:42 PM Z ET

ATTORNEY DOCKET #
111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	6598	FILED BY	JiYoung Anderson
PATENT CENTER #	66064375	FILING DATE	07/25/2023
CUSTOMER #	25096	FIRST NAMED INVENTOR	Richard Quick
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Matthew Williams

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
Terminal Disclaimer - 111552.8023.US06.pdf	2	Terminal Disclaimer Filed	633 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
Terminal Disclaimer - 111552.8023.US06.pdf	4EA35D32E1F6859C020F272FCA56952002C7C8453A0FBCE7A B72FF1D61F7FE3328A7F4299BBBD033761F3F895BDD578A29C 2945CCECE3AD1ABB203C533340E592

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 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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**TERMINAL DISCLAIMER TO OBIATE A DOUBLE PATENTING
REJECTION OVER A "PRIOR" PATENT**Docket Number (Optional)
111552.8023.US06

In re Application of: Richard Quick

Application No.: 18/358,837

Filed: 2023-07-25

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS
For:

The applicant, Inari Medical, Inc., owner of 100 percent interest 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** No. 11,849,963 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The applicant 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 applicant 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
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ The undersigned is the applicant. If the applicant is an assignee, the undersigned is authorized to act on behalf of the assignee.

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

2. ☒ The undersigned is an attorney or agent of record. Reg. No. 77,516

/Matthew S. Williams/2024-06-21

Signature

Date

Matthew S. Williams

Typed or printed name

Associate

Title

(206) 359-3343

Telephone Number

- ☒ Terminal disclaimer fee under 37 CFR 1.20(d) included.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

This collection of information is required by 37 CFR 1.321. 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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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.
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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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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.



ELECTRONIC PAYMENT RECEIPT

APPLICATION #
18/358,837

RECEIPT DATE / TIME
06/21/2024 01:06:42 PM Z ET

ATTORNEY DOCKET #
111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 6598

FILED BY JiYoung Anderson

PATENT CENTER # 66064375

AUTHORIZED BY Matthew Williams

CUSTOMER # 25096

FILING DATE 07/25/2023

CORRESPONDENCE ADDRESS -

FIRST NAMED INVENTOR Richard Quick

Payment Information

PAYMENT METHOD
CARD / 5111

PAYMENT TRANSACTION ID
E20246KD07098558

PAYMENT AUTHORIZED BY
JiYoung Anderson

FEE CODE	DESCRIPTION	ITEM PRICE(\$)	QUANTITY	ITEM TOTAL(\$)
1814	STATUTORY DISCLAIMER, INCLUDING TERMINAL DISCLAIMER	170.00	1	170.00
TOTAL AMOUNT:				\$170.00

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

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 #
18/358,837

RECEIPT DATE / TIME
06/20/2024 05:24:32 PM Z ET

ATTORNEY DOCKET #
111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

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under 35 USC 111(a)

PATENT # -

CONFIRMATION # 6598

FILED BY JiYoung Anderson

PATENT CENTER # 66052419

FILING DATE 07/25/2023

CUSTOMER # 25096

FIRST NAMED INVENTOR Richard Quick

CORRESPONDENCE ADDRESS -

AUTHORIZED BY Matthew Williams

Documents

TOTAL DOCUMENTS: 6

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
FOR_EP2394680A1.pdf	12	Foreign Reference	374 KB
FOR_EP2231256B1.pdf	29	Foreign Reference	506 KB
FOR_EP2540328A1.pdf	12	Foreign Reference	896 KB
FOR_WO2023069874A1.pdf	56	Foreign Reference	12120 KB
2024.6.20 - IDS SB08 - 111552-8023.US06.pdf	4	Information Disclosure Statement (IDS) Form (SB08)	137 KB

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NPL_ISR_WO_PCTUS20237
9428_May_30_2024_18page
s - uspto.pdf

18

Non Patent Literature

3160 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
FOR_EP2394680A1.pdf	71278BB01426D4686FB29650A5C7F2429B51E0514F15BD7F77 048CC1FEDDF56383D284EB82BEE9990E482B7495782E6EADE 3625FF661531ACC9279B71A8A08DB
FOR_EP2231256B1.pdf	4550B52783B1FD14C3733B6978758EBE6E0CE6D5B7D701D8D E4AF20135F9248796208499814EA6371ADDEF13B26A5A75EFA 7C9E7F0D9ECC358A3466360632FD1
FOR_EP2540328A1.pdf	8954664AEFBC46F4335588836D90C09276F8DA5CD570218A2D 89260257C1013914915D067266A8ED7C791C66F5C749819A95 C32FC8343F24016D6A6B6966BD11
FOR_WO2023069874A1.pdf	F6C2C34AF0BCFDA7441216104FE9014154E74F5089B0FB2AE 4AE602E5290BA914CF87C19A2E6F74D70D3C96D541DE34BD0 5752C286FFA45E5DE69CD3F03200BA
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NPL_ISR_WO_PCTUS2023794 28_May_30_2024_18pages - uspto.pdf	B1CA80A38C4A5FB725A98769DAE5E1CE7D32AE36B2E1FB75 F1536625258E430477FF57853AF7E3438382FFF11A77ECABC7 3E12A93A6B56930781D44DC9089C49

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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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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

U.S. PATENTS AND PUBLICATIONS					
Examiner Initial*	Cite No	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	8529596	09-10-2013	Grandfield et al.	
	2.	8632584	01-21-2014	Henkes et al.	
	3.	8795317	08-05-2014	Grandfield et al.	
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	5.	10426644	10-01-2019	Shrivastava et al.	
	6.	10456151	10-29-2019	Slee et al.	
	7.	11337714	05-24-2022	Ferrera et al.	
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	12.	20210154433	05-27-2021	Casey et al.	
	13.	20180235742	08-23-2018	Fields et al.	
	14.	20200078029	03-12-2020	Hansen et al.	
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	16.	20060149219	07-06-2006	Calderon	
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	18.	20200324079	10-15-2020	Jalgaonkar et al.	
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	20.	11969332	04-30-2024	Merritt et al.	
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	23.	11969178	04-30-2024	Hauser	
	24.	11974910	05-07-2024	Merritt et al.	
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	28.	11266825	03-08-2022	Peter et al.	
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	Attorney Docket Number	111552-8023.US06

31.	10994063	05-04-2021	Fisher et al.	
32.	20230052964	02-16-2023	Singh et al.	
33.	20230248502	08-10-2023	Buck et al.	
34.	8439858	05-14-2013	Huang et al.	
35.	10967111	04-06-2021	Iida	
36.	11607483	03-21-2023	Iida	
37.	9827364	11-28-2017	Peticca et al.	
38.	11998436	06-04-2024	Merritt et al.	
39.	12016580	06-25-2024	Quick et al.	
40.	20240157041	05-16-2024	Zikry et al.	
41.				
42.				
43.				
44.				

FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number ³	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
	1.	EP2231256	05-30-2018	Vortex Medical		
	2.	EP2394680	12-14-2011	CARDIONOVA S.R.L.		
	3.	EP2540328	10-02-2013	Eurosets S.R.L.		
	4.	WO2023069874	04-27-2023	IMPERATIVE CARE, INC.		
	5.					
	6.					

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	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
	1.	International Search Report and Written Opinion for International App. No. PCT/US2023/079428; Applicant: Inari Medical, Inc., Date of Mailing: May 29, 2024, 18 pages.	
	2.		
	3.		
	4.		
	5.		

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	Attorney Docket Number	111552-8023.US06

EXAMINER SIGNATURE			
Examiner Signature		Date Considered	
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<p>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.</p>			
<p>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.</p>			

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COPIES OF REFERENCES

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

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	/Matthew S. Williams/	Date (YYYY-MM-DD)	2024-06-20
Name/Print	Matthew S. Williams	Registration Number	77,516

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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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U.S. PATENTS AND PUBLICATIONS						
Examiner Initial*	Cite No	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	
	1.	20240082540	03-14-2024	Brodt et al.		
	2.	11925369	03-12-2024	Hauser		
	3.	11937838	03-26-2024	Cox et al.		
	4.	11937834	03-26-2024	Dinh		
	5.	11865291	01-09-2024	Merritt et al.		
	6.	11963861	04-23-2024	Strauss et al.		
	7.	3863624	02-04-1975	Gram		
	8.	3661144	05-09-1972	Jensen et al.		
	9.	20160128857	05-12-2016	Kao		
	10.	9566179	02-14-2017	Andreas et al.		
	11.	20150366690	12-24-2015	Lumauig		
	12.	20190366049	12-05-2019	Hannon et al.		
	13.					
	14.					
	15.					
FOREIGN PATENT DOCUMENTS						
Examiner Initial*	Cite No	Foreign Document Number ³	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
	1.	JP2007-222658 (Counterpart: WO1998/050103)	09-06-2007	EMBOL-X, INC.		
	2.	JP05694718	04-01-2015	TRUMO KABUSHIKI KAISHA		
	3.					
NON-PATENT LITERATURE DOCUMENTS						
Examiner Initials*	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
	1.	English translation of Japanese Office Action mailed January 19, 2024 for Japanese Application No. 2022-160947, 8 pages.				
	2.	International Search Report and Written Opinion for International App. No. PCT/US2024/010875; Applicant: Inari Medical, Inc., Date of Mailing: April 26, 2024, 15 pages.				

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APPLICATION #
18/358,837

RECEIPT DATE / TIME
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ATTORNEY DOCKET #
111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	6598	FILED BY	JiYoung Anderson
PATENT CENTER #	65324806	FILING DATE	07/25/2023
CUSTOMER #	25096	FIRST NAMED INVENTOR	Richard Quick
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Matthew Williams

Documents

TOTAL DOCUMENTS: 5

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2024.4.30 - IDS SB08 - 111552-8023US6.pdf	3	Information Disclosure Statement (IDS) Form (SB08)	134 KB
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FOR_JP5694718.pdf	8	Foreign Reference	284 KB
NPL_JP_OA_EN_translation _2022_160947_Jan_19_2024 _8pages.pdf	8	Non Patent Literature	127 KB
NPL_ISR - PCT-US-2024_010875 - April 26 2024	15	Non Patent Literature	2964 KB

- 15 pages.pdf

FOR_JP2007222658A_Count erpart_WO1998050103.pdf	90	Foreign Reference	3566 KB
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DOCUMENT	MESSAGE DIGEST(SHA-512)
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NPL_JP_OA_EN_translation_2 022_160947_Jan_19_2024_8p ages.pdf	376A2DFAF672ACD93E2F86D89CD4F08C133CCA3E28867A62 11A6F9A667C3EE658F9E4786C9C22929DBE11F2AE990DD7C5 CC0D6FDF2BE15333816EBB59B28F01A
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FOR_JP2007222658A_Counter part_WO1998050103.pdf	3C370D1151F8651AEE32765A2505D70EFBE3E98BFA8FFF7B4 6B11200A8C12E09107F0BB73ECF2DFD0CFF30405E8FA07962 24E9639F546A76A4C188C2BD1528E0

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APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR/ PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
18/358,837	07/25/2023	Quick et al.	111552.8023.US06

PERKINS COIE LLP - SEA General PATENT-SEA P.O. BOX 1247 SEATTLE, WA 98111-1247		EXAMINER	
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DATE MAILED: 27 April 2024

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Dated: April 27th, 2024

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To: MATTHEW S. WILLIAMS PERKINS COIE LLP P.O. BOX 1247 SEATTLE, WA 98111-1247
RECEIVED PATENT DOCKETING MAR 05 2024 PERKINS COIE LLP

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 111552-8040WO00	Date of mailing <i>(day/month/year)</i> FEB 28 2024
International application No. PCT/US 23/73765	International filing date <i>(day/month/year)</i> 08 September 2023 (08.09.2023)
Applicant INARI MEDICAL, INC.	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

How? Directly to the International Bureau preferably through ePCT, or on paper to:
The International Bureau of WIPO, 34, chemin des Colombettes, 1211 Geneva 20, Switzerland

For more detailed instructions, see the PCT Applicant's Guide, International Phase, paragraphs 9.004 -- 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.
3. ☐ With regard to any protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.
 - ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. These comments will be made available to the public after international publication. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established.

Shortly after the expiration of 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within 19 months from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later); otherwise, the applicant must, within 20 months from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices. In respect of other designated Offices, the time limit of 30 months (or later) will apply even if no demand is filed within 19 months. For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide, National Chapters*.

Within 22 months from the priority date, the applicant may request that a supplementary international search be carried out by a different International Searching Authority that offers this service (Rule 45bis.1). The procedure for requesting supplementary international search is described in the *PCT Applicant's Guide, International Phase, paragraphs 8.006-8.032*.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer <div style="text-align: right;">Kari Rodriguez</div> Telephone No. PCT Helpdesk: 571-272-4300
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 111552-8040W000		FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US 23/73765	International filing date (day/month/year) 08 September 2023 (08.09.2023)	(Earliest) Priority Date (day/month/year) 09 September 2022 (09.09.2022)
Applicant INARI MEDICAL, INC.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

☒ the international application in the language in which it was filed.

☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found unsearchable (see Box No. II).

3. ☐ Unity of invention is lacking (see Box No. III).

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

a. the figure of the drawings to be published with the abstract is Figure No. 3C

☒ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 23/73765

A. CLASSIFICATION OF SUBJECT MATTER

IPC - INV. A61M 25/00 (2024.01)

ADD. B29C 53/58, B29C 53/60, B29L 31/00 (2024.01)

CPC - INV. A61M 25/005, A61M 25/0012

ADD. A61M 25/0053, B29C 53/58, B29C 53/60, B29L 2031/7542

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

See Search History document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

See Search History document

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/0131387 A1 (PURSLEY) 16 June 2005 (16.06.2005), entire document	1-21, 23-24, 29-35, 37-39
Y		22, 25-28, 36
Y	US 5,951,538 A (NITA et al.) 14 September 1999 (14.09.1999), entire document, especially Fig. 2A-2F; col 11, in 8; col 12, in 6-14, 47	22
Y	US 2022/0151647 A1 (Inari Medical, Inc.) 19 May 2022 (19.05.2022), entire document, especially Fig. 3A; para [0028], [0033]-[0035].	25
Y	US 11,213,356 B2 (Auris Health, Inc) 04 January 2022 (04.01.2022), specifically Fig. 33B; col 51, in 42-58	26-28, 36
A	US 7,905,877 B1 (JIMENEZ et al.) 15 March 2011 (15.03.2011), entire document	1-39
A	US 2001/0041881 A1 (SARGE et al.) 15 November 2001 (15.11.2001), entire document	1-39

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"D" document cited by the applicant in the international application

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

26 January 2024

Date of mailing of the international search report

FEB 28 2024

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents 199
P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-8300

Authorized officer

Karl Rodriguez

Telephone No. PCT Helpdesk: 571-272-4300

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To: MATTHEW S. WILLIAMS
PERKINS COIE LLP
P.O. BOX 1247
SEATTLE, WA 98111-1247

**RECEIVED
PATENT DOCKETING**

MAR 05 2024

PERKINS COIE LLP

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year)

FEB 28 2024

Applicant's or agent's file reference
111552-8040WO00

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/US 23/73765

International filing date (day/month/year)

08 September 2023 (08.09.2023)

Priority date (day/month/year)

09 September 2022 (09.09.2022)

International Patent Classification (IPC) or both national classification and IPC

IPC - INV. A61M 25/00 (2024.01)

ADD. B29C 53/58, B29C 53/60, B29L 31/00 (2024.01)

CPC - INV. A61M 25/005, A61M 25/0012

ADD. A61M 25/0053, B29C 53/58, B29C 53/60, B29L 2031/7542

Applicant INARI MEDICAL, INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1460, Alexandria, Virginia 22313-1460
Facsimile No. 571-273-8300

Date of completion of this opinion

29 January 2024
200

Authorized officer

Karl Rodriguez
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WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 23/73765

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:



the international application in the language in which it was filed.



a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(b)).

3. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this opinion has been established on the basis of a sequence listing:



forming part of the international application as filed.



furnished subsequent to the international filing date for the purposes of international search (Rule 13ter.1(a)),



accompanied by a statement to the effect that the sequence listing does not go beyond the disclosure in the international application as filed.

4. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this opinion has been established to the extent that a meaningful opinion could be formed without a WIPO Standard ST.26 compliant sequence listing.

5. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 23/73765

Box No. V Reasoned statement under Rule 43bis.1(s)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-39	YES
	Claims	None	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-39	NO
Industrial applicability (IA)	Claims	1-39	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1-21, 23-24, 28-34, 37-39 lack an inventive step under PCT Article 33(3) as being obvious over US 2005/0131387 A1 to Pursley.

As per claim 1, Pursley teaches a catheter (a catheter having fibrous reinforcement, Abstract), comprising:

a longitudinal axis (axis running through center of 41 from left most edge to rightmost edge, Fig. 10);

a plurality of wires (40, Fig. 10; group of filaments 40, para [0043]), wherein the wires are coiled about the longitudinal axis spaced apart from another in a first direction to form a first coil layer (see filaments of 40 spaced apart and wrapped around longitudinal axis of 41 in the first direction of right to left, Fig. 10; 40 are wound on 41 simultaneously... filament group spacing, para [0043]), Pursley does not specifically teach and wherein the wires are coiled about the longitudinal axis spaced apart from one another in a second direction, opposite the first direction, over the first coil layer to form a second coil layer over the first coil layer; and

an outer sheath over the plurality of wires.

However, in another embodiment, Pursley further teaches a longitudinal axis (longitudinal axis of 11 and 12, Fig. 2 and 4) and a single wire (13, Fig. 3; a single filament 13, para [0036]), wherein the single wire is coiled about the longitudinal axis in a first direction (see 13 coiled around 12 from 14 to 18 to form 19, Fig. 3; proximal end 14... distal end 18... winding 19, para [0036]) to form a first coil layer (20, Fig. 4; a first pass 20, para [0038]), and wherein the single wire is coiled about the longitudinal axis spaced apart from one another in a second direction, opposite the first direction (see 13 coiled around 12 moving away from 18, Fig. 5; when 20 is completed, the filament source reverses its direction, para [0038]), over the first coil layer to form a second coil layer over the first coil layer (see 21 over 20, Fig. 6; a second pass 21 of the filament winding is then applied over 12 and over the first pass 20, para [0038]); and an outer sheath over the plurality of wires (23, Fig. 7; 20, 21 form a first fibrous layer 22... plastic coating 23 is applied over the first fibrous layer 22, para [0039]). Accordingly, it would have been obvious to a person having ordinary skill in the art to apply the full process of the second pass and the outer sheath of the second embodiment of Pursley on the plurality of wires of the first embodiment of Pursley, in order to fully complete the catheter creation process when utilizing a plurality of wires.

As per claim 2, Pursley teaches the catheter of claim 1, further comprising an inner liner (12, Fig. 2; catheter 10 can be formed... on a core substrate 12 that forms an inner liner, para [0035]), wherein the wires are coiled over the inner liner (see 13 coiled over 12, Fig. 5; winding 13 around 12, para [0036]).

As per claim 3, Pursley teaches the catheter of claim 1 wherein the wires in the first coil layer have a helical arrangement (see helical arrangement of first pass 20, Fig. 3) having a first orientation (see first orientation from moving from 14 to 18, Fig. 3), and wherein the wires in the second coil layer have a helical arrangement (see helical arrangement of second pass 21, Fig. 5) having a second orientation opposite the first orientation (see second orientation moving away from 18, Fig. 5; when 20 is completed, the filament source reverses its direction of axial movement... a second pass 21 of the filament winding is then applied over 12... as the filament source moves back to 14, para [0038]).

As per claim 4, Pursley teaches the catheter of claim 1 wherein the wires each include a continuous end portion (see end of wire coiling at distal end of 18, Fig. 5; As a result, the filament winding 19 is continuous from its initial anchor at proximal end 14, to the end of first pass 20 at the distal end 18 of 12, and then back to the end of the second pass 21 at the proximal end 14, para [0039]) at which the wire switches from the first direction to the second direction (see switch in direction from Fig. 3 to Fig. 5) and transitions from the first coil layer to the second coil layer (filament winding 19 is continuous, para [0039]; see 20 above 21 at distal end 18, Fig. 6).

As per claim 5, Pursley teaches the catheter of claim 1 wherein the wires each include a self-terminating end portion (see self-terminating end portion where coiling changes direction, Fig. 5; As a result, the filament winding 19 is continuous from its initial anchor at proximal end 14, to the end of first pass 20 at the distal end 18 of 12, and then back to the end of the second pass 21 at the proximal end 14, para [0039]) at which the wire switches from the first direction to the second direction (see switch in direction from Fig. 3 to Fig. 5) and transitions from the first coil layer to the second coil layer (filament winding 19 is continuous, para [0039]; see 20 above 21 at distal end 18, Fig. 6).

--- See continuation box ---

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 23/3765

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Regarding claims 26-28, the terms "the inner coil layer" and "the outer coil layer" are confusing and lack proper antecedent basis on claim 1 from which claims 26-28 are dependent. Accordingly, the terms "the inner coil layer" and "the outer coil layer" have been corrected to "the first coil layer" and "the second coil layer" respectively, for which proper antecedent basis is provided by claim 1.

Regarding claim 32, the terms "the first coil layer" and "the second coil layer" are confusing and lack proper antecedent basis on claim 29 from which claim 32 is dependent. Accordingly, the term "the first coil layer" and "the second coil layer" has been corrected to "the inner coil layer" and "the outer coil layer" respectively, for which proper antecedent basis is provided by claim 29.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 23/73765

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box V.2 - Citations and explanations

As per claim 6, Pursley teaches the catheter of claim 1 wherein the wires have a first pitch in the first coil layer (the filament winding 19 can have a variable pitch, para [0038]) and a second pitch in the second coil layer (the second pass 21 of the winding 19 can be applied with a variable pitch, para [0038]), and wherein the first pitch and the second pitch are the same (the second pass 21 of the winding 19 can be applied with a variable pitch similar to the first pass 20, para [0038]; see similar varying pitch between 20 and 21, Fig. 5 and Fig. 6).

As per claim 7, Pursley teaches the catheter of claim 1 wherein the wires have a first pitch in the first coil layer (a first pass 20 of the filament winding 19... can have a constant pitch, para [0038]) and a second pitch in the second coil layer (the second pass 21 of the winding 19 can be applied with a variable pitch, para [0038]), and wherein the first pitch and the second pitch are the different (reasonably assuming the first pitch and the second pitch would be different with the first pitch being constant and second pitch being variable).

As per claim 8, Pursley teaches the catheter of claim 1 wherein the wires have a first pitch in the first coil layer (see pitch of 19 as it is forming the first pass 20, Fig. 3) and a second pitch in the second coil layer (see pitch of 19 as it is forming the second pass 21, Fig. 5), and wherein the first pitch and/or the second pitch varies along the longitudinal axis (see how pitch of 20 and 21 gets larger moving from 16 to 14, Fig. 5 and 6; filament winding 19 can have a variable pitch, para [0038]).

As per claim 9, Pursley teaches the catheter of claim 1 wherein the wires are further (a) coiled about the longitudinal axis in the first direction to form a third coil layer over the second coil layer (the filament for the first additional layer 32 is anchored in the proximal end, and then the filament is wound over the first fibrous layer 31 at the filament source is moved axially along the core member from the proximal end to the distal position, para [0040]; first fibrous layer 31 of the catheter can be formed using the same process used to form the first layer 22 in catheter 10, para [0040]; see first pass of 32 over second pass of 31, Fig. 8) and (b) coiled about the longitudinal axis in the second direction over the third coil layer to form a fourth coil layer over the third coil layer (see second pass of 32 over first pass of 32, Fig. 9; as the filament source is moved axially along the core member from the proximal end to a distal portion and then back to the proximal end, para [0040]).

As per claim 10, Pursley teaches the catheter of claim 9 wherein the wires each include (a) a first self-terminating end portion (see self-terminating end portion where coiling changes direction, Fig. 8; As a result, the filament winding 19 is continuous from its initial anchor at proximal end 14, to the end of first pass 20 at the distal end 18 of 12, and then back to the end of the second pass 21 at the proximal end 14, para [0038]; see analogous end portion near 36, Fig. 8 and 9) at which the wire switches from the first direction to the second direction (see switch in direction from Fig. 3 to Fig. 5; 31 can be formed using the same process used to form 22 in catheter 10, para [0040]) and transitions from the first coil layer to the second coil layer (filament winding 19 is continuous, para [0039]; see 20 above 21 at distal end 18, Fig. 8; 31 can be formed using the same process used to form 22 in catheter 10, para [0040]), but Pursley does not specifically teach (b) a second self-terminating end portion at which the wire switches from the second direction to the first direction and transitions from the second coil layer to the third coil layer. However, Pursley does further teach the filament winding is continuous (para [0039]) and multiple fibrous reinforcement layers can be formed by repeating the process (para [0040]). Accordingly, it would have been obvious to a person having ordinary skill in the art to make four layers continuously instead of two layers (Note: having four layers would mean having two sets of continuous wire layers wherein the first and third coil layers are coiled in a first direction and the second and fourth coil layers are coiled in a second direction, and the wire being continuous would mean there is a second self-terminating connection from the second to the third layer while still following the tapering shape as shown in Fig. 8 and 9).

As per claim 11, Pursley teaches the catheter of claim 10 wherein the first self-terminating end portions are positioned at a distal end portion of the catheter (left most end of 30, Fig. 8 and 9; see transition from first to second layer at left most end of 30, Fig. 8), and wherein the second self-terminating end portions are positioned at a proximal end portion of the catheter (right most end of 30, Fig. 8 and 9; see where right most dot of the second pass of 31 is near and would transition to the right most dot of the right most dot of the first pass of 32 at the right most end of 30, Fig. 9).

As per claim 12, Pursley teaches the catheter of claim 10 wherein the first self-terminating end portions are at a different position along the longitudinal axis relative to the second self-terminating end portions (see first self-terminating end portions at the left most end of the longitudinal axis while the second self-terminating end is at the right most end, Fig. 9).

As per claim 13, Pursley teaches the catheter of claim 9 wherein the third coil layer extends only partially over the second coil layer along the longitudinal axis (see first pass of 32 only partially covering the second pass of 31, Fig. 9; the distal end of the first additional layer 32 can be an intermediate point along the catheter between the proximal and distal ends, para [0041]).

As per claim 14, Pursley teaches the catheter of claim 9, but Pursley does not specifically teach wherein the third coil layer extends entirely over the second coil layer along the longitudinal axis. However, Pursley does teach the distal end end of the first additional layer does not have to be in the middle of the catheter (can be an intermediate point, para [0041]) and that the additional layers can be applied over the first layer to impart different properties (para [0040]). Accordingly, it would have been obvious to a person having ordinary skill in the art to extend the third coil layer entirely over the second coil layer, in order to fully reinforce the entire length of the catheter instead of only a portion when full additional reinforcement is required.

--- See continuation box ---

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box V.2 - Citations and explanations

As per claim 15, Pursley teaches the catheter of claim 1 wherein the wires are first wires, and further comprising a plurality of second wires (see second set of single wire 32, Fig. 8 and 9; can be a plurality of wires as evidenced by a different embodiment of Pursley, Fig. 10; the filament for the first additional layer 32 is anchored in the proximal end, para [0040]; reasonably assuming additional layer 32 is made of a separate wire since it is detailed to be anchored again), wherein the second wires are (a) coiled about the longitudinal axis in the first direction to form a third coil layer over the second coil layer (the filament for the first additional layer 32 is anchored in the proximal end, and then the filament is wound over the first fibrous layer 31 at the filament source is moved axially along the core member from the proximal end to the distal position, para [0040]; first fibrous layer 31 of the catheter can be formed using the same process used to form the first layer 22 in catheter 10, para [0040]; see first pass of 32 over second pass of 31, Fig. 9) and (b) coiled about the longitudinal axis in the second direction over the third coil layer to form a fourth coil layer over the third coil layer (see second pass of 32 over first pass of 32, Fig. 9; as the filament source is moved axially along the core member from the proximal end to a distal portion and then back to the proximal end, para [0040]).

As per claim 16, Pursley teaches the catheter of claim 15 wherein the first wires each include a first self-terminating end portion (see self-terminating end portion where coiling changes direction, Fig. 8; As a result, the filament winding 19 is continuous from its initial anchor at proximal end 14, to the end of first pass 20 at the distal end 18 of 12, and then back to the end of the second pass 21 at the proximal end 14, para [0039]; see analogous end portion near 36, Fig. 8 and 9) at which the wire switches from the first direction to the second direction (see switch in direction from Fig. 3 to Fig. 5; 31 can be formed using the same process used to form 22 in catheter 10, para [0040]) and transitions from the first coil layer to the second coil layer (filament winding 19 is continuous, para [0039]; see 20 above 21 at distal end 18, Fig. 8; 31 can be formed using the same process used to form 22 in catheter 10, para [0040]), and wherein the second wires each include a second self-terminating end portion (see self-terminating end portion near 34 of first additional layer 32 where coiling changes directions, Fig. 8; each additional fibrous layer can be formed in a manner similar to first layer 31, para [0040]) at which the second wire switches from the first direction to the second direction and transitions from the third coil layer to the fourth coil layer (first additional layer 32 is anchored in the proximal end, and then the filament is wound over the first fibrous layer as the filament source is moved axially along the core member from the proximal end to a distal portion and then back to the proximal portion, para [0040]; filament winding is continuous, para [0039]; see second pass of 32 over the first pass of 32, Fig. 9; each additional fibrous layer can be formed in a manner similar to first layer 31, para [0040]).

As per claim 17, Pursley teaches the catheter of claim 16, but Pursley does not specifically teach wherein the first self-terminating end portions are positioned at a same position along the longitudinal axis relative to the second self-terminating end portions. However, Pursley does teach the distal end end of the first additional layer (34, Fig. 8; distal end 34 of the first additional layer 32, para [0041]) does not have to be in the middle of the catheter (can be an intermediate point, para [0041]) and that the additional layers can be applied over the first layer to impart different properties (para [0040]). Accordingly, it would have been obvious to a person having ordinary skill in the art to extend the third coil layer entirely over the second coil layer which would position the first and second self-terminating portions at the same position, in order to fully reinforce the entire length of the catheter instead of only a portion when full additional reinforcement along the entire catheter is required.

As per claim 18, Pursley teaches the catheter of claim 16 wherein the first self-terminating end portions and the second self-terminating end portions are positioned at a distal end portion (see distal end portion between 35 and 36, Fig. 8 and 9; distal end 35 of the second additional layer 33, para [0041]) of the catheter (see first and second self-terminating end portions between 35 and 36 and catheter 30, Fig. 8 and 9).

As per claim 19, Pursley teaches the catheter of claim 18 wherein the first self-terminating end portions are positioned at a different position along the longitudinal axis relative to the second self-terminating end portions (see first self-terminating end portions of 31 further to the left of the longitudinal axis of 30 relative to the second self-terminating end portions, Fig. 8 and 9).

As per claim 20, Pursley teaches the catheter of claim 15 wherein the third coil layer extends only partially over the second coil layer along the longitudinal axis (see first pass of 32 only partially covering the second pass of 31, Fig. 9; the distal end of the first additional layer 32 can be an intermediate point along the catheter between the proximal and distal ends, para [0041]).

As per claim 21, Pursley teaches the catheter of claim 15, but Pursley does not specifically teach wherein the third coil layer extends entirely over the second coil layer along the longitudinal axis. However, Pursley does teach the distal end end of the first additional layer does not have to be in the middle of the catheter (can be an intermediate point, para [0041]) and that the additional layers can be applied over the first layer to impart different properties (para [0040]). Accordingly, it would have been obvious to a person having ordinary skill in the art to extend the third coil layer entirely over the second coil layer, in order to fully reinforce the entire length of the catheter instead of only a portion when full additional reinforcement is required.

As per claim 23, Pursley teaches the catheter of claim 1 wherein the plurality of wires comprises 4 wires (group of filaments 40 can be supplied from a plurality of filament sources 42, 43, 44, and 45, para [0043]; see 4 filaments comprising 40, Fig. 10).

As per claim 24, Pursley teaches the catheter of claim 1, but Pursley does not specifically teach wherein the plurality of wires comprises 12 wires. While Pursley does not specifically teach wherein the plurality of wires comprises 12 wires, it is well known in the art that duplication and elimination of parts could have been used to have arrive at 12 wires. Accordingly, it would have been obvious to a person having ordinary skill in the art to have arrived at 12 wires for Pursley's plurality of wires, in order to have made the creation process faster for a catheter needing more reinforcement that would come with additional wires.

--- See continuation box ---

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box V.2 - Citations and explanations

As per claim 29, Pursley teaches a method of manufacturing a catheter (a method of making a catheter 10, para [0035]), the method comprising:

coiling [a plurality] of wires (13 coils to form 19, Fig. 3; a single filament 13... filament winding 19, para [0036]) about a mandrel (11, Fig. 1; mandrel 11, para [0035]) in a first direction (see 13 coiled around 12 from 14 to 18 to form 19, Fig. 3; proximal end 14... distal end 18, para [0036]; 12... slid over mandrel 11, para [0035]) to form an inner coil layer (20, Fig. 4; a first pass 20, para [0038]); coiling the wires about the mandrel in a second direction opposite the first direction (see 13 coiled around 12 moving away from 18, Fig. 5; when 20 is completed, the filament source reverses its direction, para [0038]; 12... slid over mandrel 11, para [0035]) to form an outer coil layer over the inner coil layer (see 21 over 20, Fig. 6; a second pass 21 of the filament winding is then applied over 12 and over the first pass 20, para [0038]); positioning an outer sheath (23, Fig. 7; plastic coating 23, para [0039]) over the inner and outer coil layers (first and second passes 20, 21 of filament winding 19 form a first fibrous layer 22... plastic coating 23 is applied over 22... 23 can be formed by applying a polymer material in a particulate preform over an outer surface of the core member 12 and fibrous layer 22, para [0039]); and coupling the outer sheath to the inner and outer coil layers (see 23 coupled to 20 and 21, Fig. 7; 23 can be applied by laminating a plastic tube over an outer surface of the core member 12 and the fibrous layer 22, para [0039]), but Pursley does not specifically teach coiling a plurality of wires. In an alternative embodiment, Pursley teaches coiling a plurality of wires (see filaments of 40 spaced apart and wrapped around core member 41, Fig. 10; group of filaments 40, para [0043]). Accordingly, it would have been obvious to a person having ordinary skill in the art to apply the group of filaments of the alternative embodiment of Pursley on method of the first embodiment Pursley, in order to in order to have made the creation process faster for a catheter needing more reinforcement that would come with additional filaments.

As per claim 30, Pursley teaches the method of claim 29 wherein the method further comprises positioning an inner liner (12, Fig. 2; catheter 10 can be formed... on a core substrate 12 that forms an inner liner, para [0035]) over the mandrel (core substrate 12 that forms an inner lining of catheter 10 and is slid over mandrel 11 as shown in Fig. 2, para [0035]), and wherein coiling the wires about the mandrel in the first direction includes coiling the wires over the inner liner in the first direction (see 13 coiled around 12 from 14 to 18 to form 19, Fig. 3; proximal end 14... distal end 18, para [0036]) to form the inner coil layer over the inner liner (see 20 formed over 12, Fig. 4; a first pass 20, para [0038]).

As per claim 31, Pursley teaches the method of claim 30 wherein coupling the outer sheath to the inner and outer coil layers includes fusing the outer sheath and the inner liner together (plastic coating 23 can be applied by laminating a plastic tube over an outer surface of the core member 12, para [0039]; see 23 in direct contact with 12, unlabeled, Fig. 7; reasonably assuming laminating a plastic tube on a core substrate of the inner liner would result in some form of fusing or else the plastic coating would slide and rotate around the inner liner).

As per claim 32, Pursley teaches the method of claim 29 wherein the wires in the inner coil layer (Corrected -- see Box VIII) have a helical arrangement (see helical arrangement of first pass 20, Fig. 3) having a first orientation (see first orientation from moving from 14 to 18, Fig. 3), and wherein the wires in the outer coil layer (Corrected -- see Box VIII) have a helical arrangement (see helical arrangement of second pass 21, Fig. 5) having a second orientation opposite the first orientation (see second orientation moving away from 18 and the opposing orientations of 20 and 21, Fig. 5; when 20 is completed, the filament source reverses its direction of axial movement... a second pass 21 of the filamentwinding is then applied over 12... as the filament source moves back to 14, para [0038]).

As per claim 33, Pursley teaches the method of claim 29 wherein coiling the wires about the mandrel in the first direction to form the inner coil layer includes varying a pitch between the wires in the first direction (filament winding 19 can have a variable pitch in which the turns of the winding 19 become closer together near the distal end 18, para [0036]; see pitch of 20 decreasing towards 18, Fig. 3 and 4).

As per claim 34, Pursley teaches the method of claim 29 wherein coiling the wires about the mandrel in the second direction to form the outer coil layer includes varying a pitch between the wires in the second direction (the second pass 21 of the winding 19 can be applied with a variable pitch similar to the first pass 20, para [0038]; see pitch of 21 increasing towards 14, Fig. 5 and 6).

As per claim 37, Pursley teaches the method of claim 29 wherein coiling the wires about the mandrel in the second direction includes forming a continuous end portion (see end of wire coiling at distal end of 18, Fig. 5; As a result, the filament winding 19 is continuous from its initial anchor at proximal end 14, to the end of first pass 20 at the distal end 18 of 12, and then back to the end of the second pass 21 at the proximal end 14, para [0038]) of each of the wires at which the wire switches from the first direction to the second direction (see switch in direction from Fig. 3 to Fig. 5) and transitions from the inner coil layer to the outer coil layer (filament winding 19 is continuous, para [0039]; see 20 above 21 at distal end 18, Fig. 6).

As per claim 38, Pursley teaches the method of claim 29 wherein coiling the wires about the mandrel in the second direction includes forming a self-terminating end portion (see self-terminating end portion where coiling changes direction, Fig. 5; As a result, the filament winding 19 is continuous from its initial anchor at proximal end 14, to the end of first pass 20 at the distal end 18 of 12, and then back to the end of the second pass 21 at the proximal end 14, para [0039]) of each of the wires at which the wire switches from the first direction to the second direction (see switch in direction from Fig. 3 to Fig. 5) and transitions from the inner coil layer to the outer coil layer (filament winding 19 is continuous, para [0039]; see 20 above 21 at distal end 18, Fig. 6).

--- See continuation box ---

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box V.2 - Citations and explanations

As per claim 39, Pursley teaches a catheter (a catheter having fibrous reinforcement, Abstract), comprising:
a longitudinal axis (axis running through center of 41 from left most edge to rightmost edge, Fig. 10);
a plurality of wires (40, Fig. 1; group of filaments 40, para [0043]), wherein—
the wires are coiled about the longitudinal axis in a first direction to form a first coil layer (see filaments of 40 spaced apart and wrapped around longitudinal axis of 41 in a first direction of right to left, Fig. 10; 40 are wound on 41 simultaneously... filament group spacing, para [0043]), but Pursley does not specifically teach the wires are coiled about the longitudinal axis in a second direction, opposite the first direction, over the first coil layer to form a second coil layer over the first coil layer, and the wires each include a self-terminating end portion at which the wire switches from the first direction to the second direction and transitions from the first coil layer to the second coil layer; and
an outer sheath over the wires. However, in another embodiment, Pursley further teaches a longitudinal axis (longitudinal axis of 11 and 12, Fig. 2 and 4) and a single wire (13, Fig. 3; a single filament 13, para [0036]), wherein the single wire is coiled about the longitudinal axis in a first direction (see 13 coiled around 12 from 14 to 18 to form 19, Fig. 3; proximal end 14... distal end 18... winding 19, para [0036]) to form a first coil layer (20, Fig. 4; a first pass 20, para [0038]), and wherein the single wire is coiled about the longitudinal axis spaced apart from one another in a second direction, opposite the first direction (see 13 coiled around 12 moving away from 18, Fig. 5; when 20 is completed, the filament source reverses its direction, para [0038]), over the first coil layer to form a second coil layer over the first coil layer (see 21 over 20, Fig. 6; a second pass 21 of the filament winding is then applied over 12 and over the first pass 20, para [0038]), and the wires each include a self-terminating end portion (see self-terminating end portion where coiling changes direction, Fig. 5). As a result, the filament winding 19 is continuous from its initial anchor at proximal end 14, to the end of first pass 20 at the distal end 18 of 12, and then back to the end of the second pass 21 at the proximal end 14, para [0039] at which the wire switches from the first direction to the second direction (see switch in direction from Fig. 3 to Fig. 5) and transitions from the first coil layer to the second coil layer (filament winding 19 is continuous, para [0039]; see 20 above 21 at distal end 18, Fig. 6); and
an outer sheath over the plurality of wires (23, Fig. 7, 20, 21 form a first fibrous layer 22... plastic coating 23 is applied over the first fibrous layer 22, para [0039]). Accordingly, it would have been obvious to a person having ordinary skill in the art to apply the full process of the second pass and the outer sheath of the second embodiment of Pursley on the plurality of wires of the first embodiment of Pursley, in order to fully complete the catheter creation process when utilizing a plurality of wires.

Claims 29, and 35 lack an inventive step under PCT Article 33(3) as being obvious over Pursley (Second Treatment).

As per claim 29, Pursley teaches a method of manufacturing a catheter (a method of making a catheter 10, para [0035]), the method comprising:
coiling [a plurality] of wires (13 coils to form 19, Fig. 3; a single filament 13... filament winding 19, para [0036]) about a mandrel (11, Fig. 1; mandrel 11, para [0035]) in a first direction (see 13 coiled around 12 from 14 to 18 to form 19, Fig. 3; proximal end 14... distal end 18, para [0035]; 12... slid over mandrel 11, para [0035]) to form an inner coil layer (20, Fig. 4; a first pass 20, para [0038]; see bottom layer of 31 in Fig. 9 created using same method, para [0040]);
coiling the wires about the mandrel in a second direction opposite the first direction (each additional fibrous layer 32, 33 can be formed in a manner similar to first layer 31... as the filament source is moved axially... to a distal position and then back to the proximal position, para [0040]) to
form an outer coil layer over the inner coil layer (see top layer of 32 over the bottom layer of 31, Fig. 9);
positioning an outer sheath over the inner and outer coil layers (a plastic coating can be applied over all of the fibrous layers 31-33 simultaneously, para [0041]); and
coupling the outer sheath to the inner and outer coil layers (the plastic coating can be applied by laminating a plastic tube over an outer surface of the core member and the fibrous layer, para [0039]), but Pursley does not specifically teach coiling a plurality of wires. In an alternative embodiment, Pursley teaches coiling a plurality of wires (see filaments of 40 spaced apart and wrapped around core member 41, Fig. 10; group of filaments 40, para [0043]). Accordingly, it would have been obvious to a person having ordinary skill in the art to apply the group of filaments of the alternative embodiment of Pursley on method of the first embodiment Pursley, in order to in order to have made the creation process faster for a catheter needing more reinforcement that would come with additional filaments.

As per claim 35, Pursley teaches the method of claim 29 wherein the method further comprises positioning an elongate component (see layer created by elongate member between 32 and 31, Fig. 8) over the inner coil layer (see elongate member over bottom layer of 31, Fig. 8), and wherein coiling the wires about the mandrel in the second direction to form the outer coil layer includes coiling the wires over the elongate component (see top layer of 32 coiled over the elongate member layer, Fig. 8) to secure the elongate component between the inner and outer coil layers (reasonably assuming elongate member is secured between 31 and 32 as the member would have to be placed before creation of 32 for 8 to be between 31 and 32).

— See continuation box —

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International application No.

PCT/US 23/3765

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box V.2 - Citations and explanations

Claim 22 lacks an inventive step under PCT Article 33(3) as being obvious over Pursley in view of US 5,951,539 A to Nita et al. (hereinafter 'Nita').

As per claim 22, Pursley teaches the catheter of claim 1, but Pursley does not specifically teach wherein the wires have a rectangular cross-sectional shape. In similar art, Nita teaches a ribbon (206, Fig. 2C; ribbon 206, col 11, in 8) for wrapping in a first and second direction (see 206 wrapped in a first and second direction, Fig. 2C and 2D) within an outer sheath (212/214/216/218, Fig. 2F; outer polymeric coverings 212, 214, 216, 218, col 12, in 47), analogous to the filament, wrapping, and outer sheath of Pursley (Fig. 6 and 7), wherein the wires have a rectangular cross-sectional shape (see rectangular cross-section of 206, Fig. 2C; 206 that are suitable for use in this invention are desirably... include elongated shape, the cross-section of which are... rectangular, col 12, in 8-14). Accordingly, it would have been obvious to a person having ordinary skill in the art to apply the rectangular cross-section of Nita on the wires of Pursley, in order to increase the surface area of the wires contacting the inner liner to reduce any chance of the wire slipping during the winding process.

Claim 25 lacks an inventive step under PCT Article 33(3) as being obvious over Pursley in view of US 2022/0151647 A1 to Inari Medical, Inc. (hereinafter 'Inari Medical').

As per claim 25, Pursley teaches the catheter of claim 1, further comprising an inner liner (12, Fig. 2; catheter 10 can be formed... on a core substrate 12 that forms an inner liner, para [0035]) defining an inner lumen (see inner lumen of 12 currently filled by 11, Fig. 2; 12 forms an inner lining of the catheter, para [0035]), wherein the wires are coiled over the inner liner (see 13 coiled over 12, Fig. 5; winding 13 around 12, para [0036]), but Pursley does not specifically teach wherein the lumen has a diameter of 20 French or greater. In similar art, Inari Medical teaches a catheter (126, Fig. 3A; catheter 120 includes... a distal region 126, para [0026]) with a coil (336, Fig. 3A; a coil 336, para [0033]) wrapped around the inner liner (see 336 wrapped around 232, Fig. 3A; inner liner 232, para [0033]) defining a lumen (121, Fig. 3A; lumen 121, para [0026]; 232 defines 121, para [0035]), analogous to the coil and liner of Pursley (Fig. 4 and 5), wherein the lumen has a diameter of 20 French or greater (the inner liner 232 can have a diameter D of... greater than about 20 French, para [0035]). Accordingly, it would have been obvious to a person having ordinary skill in the art to apply the inner liner diameter of Inari Medical on the inner liner of Pursley, in order to create a catheter with a diameter large enough to facilitate movement of various components through the lumen, such as aspiration catheters or delivery sheaths.

Claims 26-28 and 36 lack an inventive step under PCT Article 33(3) as being obvious over Pursley in view of US 11,213,356 B2 in view of Auris Health, Inc. (hereinafter 'Auris Health').

As per claim 26, Pursley (Second Treatment) teaches the catheter of claim 1, but Pursley does not specifically teach further comprising a lumen extending between the first coil layer and the second coil layer (Corrected -- see Box VIII). However, Pursley does further teach an elongate member between the first coil layer and the second coil layer (see layer created by elongate member between 32 and 31, Fig. 8). Additionally, in similar art, Auris Health teaches a catheter (300, Fig. 33B; elongate instrument or catheter 300, col 51, in 41-21) with an inner layer (312, Fig. 33B; inner layer of material... 312, col 51, in 45) and an outer layer (302, Fig. 33B; outer layer of material... 302, col 51, in 44, analogous to the inner coil layer and outer coil layer of Pursley (31 and 32, Fig. 8), wherein an elongate component (components of the elongate instrument 300, e.g.,... support tubes 310... one or more pull wires 314 may be disposed within lumens of 310, col 51, in 51-59; 310, Fig. 33B) is positioned between the inner layer and the outer layer (see 310 between 302 and 312, Fig. 33B; components of the elongate instrument 300 may be contained within or between 302 and 312, col 51, in 42-45). Accordingly, it would have been obvious to a person having ordinary skill in the art to apply the elongate members of Auris Health on the elongate member of Pursley, in order to provide the elongate member with a space for a pull wire to allow for increased control of the catheter by making it steerable.

As per claim 27, Pursley teaches the catheter of claim 1, but Pursley does not specifically teach further comprising a lumen extending between the second coil layer (Corrected -- see Box VIII) and the outer sheath. In similar art, Auris Health teaches a catheter (300, Fig. 33B; catheter 300, col 51, in 42) with a first layer (312, Fig. 33B; inner layer of material... 312, col 51, in 45) and a second layer (302, Fig. 33B; outer tube... 302, col 51, in 44), wherein a lumen extends between the first layer and second layer (the components of 300 may be contained within or between 302 and 312... operational tubes 304, flexible tubes 306, push tubes 308, and support tubes 310 are disposed within this minor, secondary, or peripheral lumens in the body structure of the elongate structure... one or more pull wires 314 may be disposed with lumens of the support tubes 310, col 51, in 42-58; see 314 within lumen of 310 within lumen of 306 within lumen of 304, Fig. 33B). Accordingly, it would have been obvious to a person having ordinary skill in the art to apply the intra-layer lumen of Auris Health on the second coil layer and outer sheath of Pursley, in order to allow for a space between the second coil layer and outer sheath for a pull wire to allow for increased control of the catheter by making it steerable.

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International application No.

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box V.2 - Citations and explanations

As per claim 28, Pursley teaches the catheter of claim 1, further comprising:

an inner liner (12, Fig. 2; catheter 10 can be formed... on a core substrate 12 that forms an inner liner, para [0035]), wherein the wires are coiled over the inner liner (see 13 coiled over 12, Fig. 5; winding 13 around 12, para [0036]), but Pursley does not specifically teach and a lumen extending between the first coil layer (Corrected -- see Box VIII) and the inner liner. In similar art, Auris Health teaches a catheter (300, Fig. 33B; catheter 300, col 51, in 42) with a first layer (312, Fig. 33B; inner tube 312, col 51, in 45) and a second layer (302, Fig. 33B; outer layer of material... 302, col 51, in 44), where a lumen extends between the first layer and second layer (the components of 300 may be contained with or between 302 and 312... operational tubes 304, flexible tubes 306, push tubes 308, and support tubes 310 are disposed within the minor, secondary, or peripheral lumens in the body structure of the elongate structure... one or more pull wires 314 may be disposed with lumens of the support tubes 310, col 51, in 42-58; see 314 within lumen of 310 within lumen of 308 within lumen of 304, Fig. 33B). Accordingly, it would have been obvious to a person having ordinary skill in the art to apply the intra-layer lumen of Auris Health on the inner liner before the coiling of the first coil layer of Pursley, in order to allow for a space between the inner liner and first coil for a pull wire to allow for increased control of the catheter by making it steerable.

As per claim 36, Pursley teaches the method of claim 35, but Pursley does not specifically teach wherein the elongate component comprises a lumen. In similar art, Auris Health teaches a catheter (300, Fig. 33B; elongate instrument or catheter 300, col 51, in 41-21) with an inner layer (312, Fig. 33B; inner layer of material... 312, col 51, in 45) and an outer layer (302, Fig. 33B; outer layer of material... 302, col 51, in 44, analogous to the inner coil layer and outer coil layer of Pursley (31 and 32, Fig. 8), wherein an elongate component (components of the elongate instrument 300, e.g.,... support tubes 310... one or more pull wires 314 may be disposed within lumens of 310, col 51, in 51-58; 310, Fig. 33B) comprises a lumen (see 314 within the lumen of 310, Fig. 33B; 314 may be disposed within lumens of the support tubes 310, col 51, in 57-58). Accordingly, it would have been obvious to a person having ordinary skill in the art to apply the elongate members of Auris Health on the elongate member of Pursley, in order to provide the elongate member with a space for a pull wire to allow for increased control of the catheter by making it steerable.

Claims 1-39 have industrial applicability as defined by PCT Article 33(4) because the subject can be made or used in industry.

1. SEARCH HISTORY

Application Number	PCT/US 23/73765
Search Conducted By	JJH
Search Approved By	AD
CPC/IPC Classifications Searched	CPC - INV- A61M 25/0012; A61M25/005 ADD- A61M25/0053; B29C53/58; B29C53/60; B29L2031/7542 IPC(8) – INV- A61M25/00 (2024.01) ADD- B29C53/58; B29C53/60; B29L31/00 (2024.01)
Date Conducted	26 January 2024 (26.01.2024)
Documentation Searched	CPC - INV- A61M 25/0012; A61M25/005 ADD- A61M25/0053; B29C53/58; B29C53/60; B29L2031/7542 IPC(8) – INV- A61M25/00 (2024.01) ADD- B29C53/58; B29C53/60; B29L31/00 (2024.01) USPC - 604/526; 156/172
Search Terms Used	Catheter, first, second, coil*, layers, lumen%, between, wall, multilayer, secondary, making, plurality, continuously, continuous, wound, wire%, spiral, helical, shape, cord%, double, helix, oppos*, medical, tube, back, wounded, 20, French, winding, method, manufacturing, self-terminating, double-back, double back, different, orientation, direction%, sheets, inner, outer, liner, sheath, filament%, pitch, angle, 22, 24, 26, 28, 30, 32, 34, mandrel, core, making, fuse, coupl*, vary*,
Date Conducted	26 January 2024 (26.01.2024)
Electronic Database Searched	PatBase
Files Searched	Full-text: AU BE BR CA CH CN DE DK EP ES FI FR GB IN JP KR SE TH TW US WO Bibliographic: (Europe) AT BA BE BG CH CS CY CZ DD DK EE ES FI GE GR HR HU IE IS IT LT LU LV MC MD MT NL NO PL PT RO RS SE SI SK SM TR UA YU (Asia) EA GC HK ID IL IN KZ MN MY PH RU SG SU TH TJ TW UZ VN (North America) CA CR CU DO GT HN MX NI PA SV TT (South America) AR BR CL CO EC PE UY (Australasia) AU NZ (Africa) AP DZ EG KE MA MW OA

	ZA ZM ZW
Date Conducted	26 January 2024 (26.01.2024)
Search Logic:	
1	PN=(US20050131387A1 OR US6152912A OR US5951539A OR US7905877B1 OR US10799688B2) 4
2	IPC=(A61M25/00 OR B29C53/58 OR B29C53/60 OR B29L31/00) 63,337
3	CPC=(A61M25/0012 OR A61M25/005 OR A61M25/0053 OR B29C53/58 OR B29C53/60 OR B29L2031/7542) 4,510
4	UC=(604/526 OR 156/172) 1,203
5	2 OR 3 OR 4 64,859
6	5 AND FT=(self-terminating OR continuous OR double-back OR double back) 15,120
7	6 AND FT=((oppos* OR different) NEAR(orientation% OR wind* OR direction%)) 4,450
8	7 AND FT=(layers OR sheets) 2,349
9	8 AND FT=((inner AND outer)W3(liner OR sheath OR layer)) 347
10	9 AND FT=(plurality NEAR (wire% OR cord% OR filament%)) 97
11	10 AND FT=(pitch OR angle) 88
12	11 NOT 1 88
13	9 AND FT=(20 French OR 22 French OR 24 French OR 26 French OR 28 French OR 30 French OR 32 French OR 34 French) 16
14	13 NOT (11 OR 1) 10
15	5 AND FT=(mandrel OR core) 14,285
16	15 AND FT=(coil OR helix OR helical OR spiral) 6,572
17	16 AND FT=(plurality NEAR (wire% OR cord% OR filament%)) 1,090
18	17 AND FT=(pitch OR angle) 754
19	18 AND FT=(catheter) 559
20	19 AND FT=((oppos* OR different) NEAR(orientation% OR wind* OR direction%)) 330
21	20 AND FT=(self-terminating OR continuous OR double-back OR double back) 234
22	21 AND FT=((method of manufacturing) OR (method of making)) 69
23	22 NOT (13 OR 11 OR 1) 50
24	19 AND FT=(fuse OR coupl*) 433
25	24 AND FT=((first AND second)OR(inner AND outer))NEAR(layer OR sheet)) 124
26	25 AND FT=(lumen) 119
27	26 NOT (22 OR 13 OR 11 OR 1) 82
28	FT=(plurality NEAR (wire% OR cord% OR filament%)) 256,872
29	28 AND FT=(self-terminating OR continuous OR double-back OR double back) 53,086
30	29 AND FT=((oppos* OR different) NEAR(orientation% OR wind* OR direction%)) 17,265
31	30 AND FT=((first AND second)OR(inner AND outer))NEAR(layer OR sheet)) 2,877
32	31 AND FT=(catheter) 335
33	32 AND FT=(vary*)NEAR(pitch OR angle) 40
34	33 NOT (26 OR 22 OR 13 OR 11 OR 1) 19
35	32 AND FT=(mandrel OR core) 251
36	35 AND FT=(coiling OR winding) 141
37	36 AND FT=(French) 39
38	37 NOT (34 OR 26 OR 22 OR 13 OR 11 OR 1) 17
39	FT=(coiling OR winding) 1,759,221
40	39 AND FT=((first AND second)OR(inner AND outer))NEAR(layer OR sheet)) 36,085
41	40 AND FT=(pitch OR angle) 15,514
42	41 AND FT=((oppos* OR different) NEAR(orientation% OR wind* OR direction%))

	7,509	
43	42 AND FT=(self-terminating OR continuous OR double-back OR double back)	4,321
44	43 AND FT=((method of manufacturing) OR (method of making))	1,258
45	44 AND FT=(plurality NEAR (wire% OR cord% OR filament%))	292
46	45 AND FT=(catheter)	66
47	46 NOT (37 OR 34 OR 26 OR 22 OR 13 OR 11 OR 1)	33
48	43 AND FT=(catheter)	409
49	48 AND FT=(mandrel OR core)	348
50	49 AND FT=(fuse)	54
51	50 NOT (46 OR 37 OR 34 OR 26 OR 22 OR 13 OR 11 OR 1)	30
52	PN=(US20050131387A1 OR US2005137519A1 OR US5951539A OR US10799688B2)	
53	CTB 52 OR CTF 52	664
54	53 AND FT=(plurality NEAR (wire% OR cord% OR filament%))	127
55	54 AND FT=((oppos* OR different)NEAR(orientation% OR wind* OR direction%))	
56	55 NOT (52 OR 50 OR 46 OR 37 OR 34 OR 26 OR 22 OR 13 OR 11 OR 1)	39

Electronic Database Searched	Google
Files Searched	Scholar (Articles excluding patents)
Date Conducted	26 January 2024 (26.01.2024)
Search Logic:	
catheter with first and second coiling layers (About 3,930,000 results)	
catheter with a lumen between first and second coiling layers (About 1,530,000 results)	
catheter with a lumen between layers (About 1,400,000 results)	
catheter with lumens in catheter wall (About 2,910,000 results)	
multilayer catheter wall with lumens in the catheter wall (About 92,100 results)	
catheter with a second lumen in between layers of the catheter wall (About 2,580,000 results)	
making a catheter with a secondary lumen in between layers (About 2,620,000 results)	
catheter with plurality of continuously wound wires in a spiral or helical shape (About 2,570,000 results)	
catheter with plurality of continuously wound cords in a spiral or helical shape (About 2,680,000 results)	
medical tube with first and second coiling layers (About 9,790,000 results)	

Electronic Database Searched	Google
Files Searched	Patents (US Patents/Published Applications, EPO publications, International, China, Germany, Canada)
Date Conducted	26 January 2024 (26.01.2024)
Search Logic:	
medical tube with double helix layer (More than 100,000 results)	

medical tube with opposing coils (More than 100,000 results)
catheter opposing coils (More than 100,000 results)
catheter with first coil layer that continuously coils back to make a second coil layer (About 31,500 results)
catheter with first and second wound wire layers (More than 100,000 results)
20 French catheter (More than 100,000 results)
(20 French catheter) AND (winding) (About 9,937 results)
(20 French catheter) AND (coiling layer) (About 19,209 results)
catheter with lumen between coiling layers (About 58,901 results)
method of manufacturing a catheter with a secondary lumen between wall layers (More than 100,000 results)



UNITED STATES
PATENT AND TRADEMARK OFFICE

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

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
18/358,837

RECEIPT DATE / TIME
03/12/2024 07:45:36 PM Z ET

ATTORNEY DOCKET #
111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	6598	FILED BY	JiYoung Anderson
PATENT CENTER #	64657582	FILING DATE	07/25/2023
CUSTOMER #	25096	FIRST NAMED INVENTOR	Richard Quick
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Matthew Williams

Documents

TOTAL DOCUMENTS: 7

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
RCE - 111552.8023.US06.pdf	3	Request for Continued Examination (RCE)	1628 KB
NPL_CN-Office Action 201980067623.1 mailed Jan. 31 2024 -10 pages.pdf	10	Non Patent Literature	371 KB
FOR_WO2012114633.pdf	30	Foreign Reference	1051 KB
NPL_ISR_WO_PCTUS2023 066538_Jan_4_2024_14pages.pdf	14	Non Patent Literature	5972 KB
NPL_ISR_WO_PCTUS2023 73765_FEB_28_2024_17pages.pdf	17	Non Patent Literature	11062 KB

NPL_JP_OA_EN_translation _2022_574456_Jan_23_202 4_12pages.pdf	12	Non Patent Literature	90 KB
2024.3.12 - IDS SB08 - 111552-8023US6.pdf	3	Information Disclosure Statement (IDS) Form (SB08)	128 KB

Warning: This is not a USPTO supplied IDS fillable form. Data in the form cannot be automatically loaded to other USPTO systems.

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
RCE - 111552.8023.US06.pdf	309BFE3ED28DB3814DBD852B83E00CE1C950BE323D91FCC9 EAE0F05803CE37D67C54C9EB23042F38F4D609E73106F95F6 7B7AC007EF63A6CC6F7A0EEDE2966E2
NPL_CN-Office Action 201980067623.1 mailed Jan. 31 2024 -10 pages.pdf	67A4EFF504AA331CEC2C9D259CD544739D92C7C66DC4824A 0FC1237FB36FC905AA26A95EF95F26FED5E827B5C61B45BB D219D6ACB245089061913101DC669601
FOR_WO2012114633.pdf	686B21251DE173EEDE1A69F56BB0D3888962CBEF494AD6AE 574FAFDA438BFCDCABAA90DE7E1EC169DB112EDF154EFF4 7F1D1D803B115ADD1652AAB0A55BCF2EF
NPL_ISR_WO_PCTUS202306 6538_Jan_4_2024_14pages.p f	43452CFFE399F781C5F99D65FA4B848AA463C9719275C62266 3A81E0C640AB139227D70DDF2414CD10F23F3E15D9D9828D3 58C67D9F6509A07A71A72C45B7336
NPL_ISR_WO_PCTUS202373 765_FEB_28_2024_17pages.p df	13979F54E5B2225AE208F768BB21E6E54343E0A22BEE418082 500B5F92570EEA7430C2C86EA89FC91FD1FC17F989AB857A C3441B2D247F467DCEFFA282DD86CC
NPL_JP_OA_EN_translation_2 022_574456_Jan_23_2024_12 pages.pdf	E0BF4FF27D4EEEBB71BADCC1AD30A9B577E0EB1EEE2E1C85 202503E8D603F7738A0635294E4CB8A8BC3B69E0933747C1F8 13ABBC9E8209B6CA6CDD318E79A8A2B
2024.3.12 - IDS SB08 - 111552-8023US6.pdf	66021903780FC483DE07F8397891EF01802A2DF1282296E5EA 1B41157C684B51AC00B4C73D05A7A3F4541CBC8BBB55F42C 5E05061FB2DBF586EF5021215C5948

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 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.

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To: BENJAMIN D. CASHDOLLAR PERKINS COIE LLP P.O. BOX 1247 SEATTLE, WA 98111-1247 <div style="text-align: center;"> RECEIVED PATENT DOCKETING JAN 11 2024 </div> PERKINS COIE LLP

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 111552-8042WO00	Date of mailing <i>(day/month/year)</i> <div style="text-align: center; font-size: 1.2em;">JAN 04 2024</div>
International application No. PCT/US 23/68538	International filing date <i>(day/month/year)</i> 03 May 2023 (03.05.2023)
Applicant [NAR] MEDICAL, INC.	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

How? Directly to the International Bureau preferably through ePCT, or on paper to:
The International Bureau of WIPO, 34, chemin des Colombettes, 1211 Geneva 20, Switzerland

For more detailed instructions, see the *PCT Applicant's Guide, International Phase*, paragraphs 9.004 – 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.
3. ☐ With regard to any protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.
 - ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. These comments will be made available to the public after international publication. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established.

Shortly after the expiration of 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within 19 months from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later); otherwise, the applicant must, within 20 months from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices. In respect of other designated Offices, the time limit of 30 months (or later) will apply even if no demand is filed within 19 months. For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide, National Chapters*.

Within 22 months from the priority date, the applicant may request that a supplementary international search be carried out by a different International Searching Authority that offers this service (Rule 45bis.1). The procedure for requesting supplementary international search is described in the *PCT Applicant's Guide, International Phase*, paragraphs 8.006-8.032.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer <div style="text-align: center; font-weight: bold;">Kari Rodriguez</div> Telephone No. PCT Helpdesk: 571-272-4300
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 111552-8042WO00		FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/US 23/66538	International filing date (day/month/year) 03 May 2023 (03.05.2023)	(Earliest) Priority Date (day/month/year) 04 May 2022 (04.05.2022)	
Applicant INARI MEDICAL, INC.			

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed.
☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(s)).

c. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found unsearchable (see Box No. II).

3. ☒ Unity of invention is lacking (see Box No. III).

4. With regard to the title,

- ☒ the text is approved as submitted by the applicant.
☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

- ☒ the text is approved as submitted by the applicant.
☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No. 2A
☒ as suggested by the applicant.
☐ as selected by this Authority, because the applicant failed to suggest a figure.
☐ as selected by this Authority, because this figure better characterizes the invention.
- b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 23/66538

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

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

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6A(s).

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

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

-/- see extra sheet -/-

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-8

Remark on Protest

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

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 23/06538

A. CLASSIFICATION OF SUBJECT MATTER

IPC - INV. A61M 29/00 (2023.01)

ADD. A61M 25/00 (2023.01)

CPC - INV. A61M 29/00, A61M 25/0662

ADD. A61M 2025/0687, A61M 2025/0681, A61B 2017/347

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

See Search History document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

See Search History document

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2009/0312786 A1 (Trask et al.) 17 December 2009 (17.12.2009), entire document, especially Fig 1, para [0009], para [0028]-[0034], para [0038]	1-5
X	US 2016/0220741 A1 (Route 92 Medical, Inc.) 4 August 2016 (04.08.2016), entire document, especially Fig 1, Fig 12A, para [0017]-[0018], para [0044], para [0091]-[0095]	1, 5-8
A	US 2012/0095448 A1 (Kajji) 19 April 2012 (19.04.2012), entire document	1-8
A	US 2016/0220795 A1 (Teleflex Medical Incorporated) 4 August 2016 (04.08.2016), entire document	1-8
A	US 2013/0123705 A1 (W. L. Gore & Associates, Inc.) 16 May 2013 (16.05.2013), entire document	1-8

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"D" document cited by the applicant in the international application

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

07 September 2023 (07.09.2023)

Date of mailing of the international search report

JAN 04 2024

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents

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

Facsimile No. 571-273-8300

220

Authorized officer

Karl Rodriguez

Telephone No. PCT Helpdesk: 571-272-4300

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

Group I: Claims 1-8 directed to a dilator comprising a coupling component, a tip, and body regions between the coupling component and tip having different flexibilities.

Group II: Claims 9-19 and 25-33 directed to a vascular access system comprising a valve, a catheter and a dilator.

Group III: Claims 20-24 directed to a method of treating clot material using a vascular access system.

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

SPECIAL TECHNICAL FEATURES

The invention of Group I includes the special technical features of a dilator comprising a tip; a coupling component; a first body region between the tip and the coupling component with a first flexibility profile; a second body region between the first body region and the tip with a second flexibility profile greater than the first flexibility profile, not required by the claims of Groups II or III.

The invention of Group II includes the special technical features of a catheter defining a lumen and coupled to the valve; wherein the dilator is configured to be positioned within the lumen through the valve, not required by the claims of Group I or III.

The invention of Group III includes the special technical features of positioning a dilator within a vascular access system such that a valve of the vascular access system releasably engages a notch of the dilator to inhibit further movement of the dilator relative to the vascular access system; activating a button of the valve to release the notch from the valve to allow further movement of the dilator relative to the vascular access system; and moving the dilator relative to the vascular access system and/or the vascular access system relative to the dilator, not required by the claims of Group I or II.

COMMON TECHNICAL FEATURES

Groups I-III share the common technical features of a dilator for use in a vascular access system. However, this shared technical feature does not represent a contribution over prior art as being anticipated by US 2013/0123705 A1 to W.L. Gore & Associates, Inc. (hereinafter 'Gore').

Gore discloses a dilator for use in a vascular access system (introducer assembly for a vascular treatment site including a dilator, para [0020]).

Groups II-III further share the common technical features of a vascular access system comprising a valve, wherein the valve is configured to releasably engage a notch of the dilator to inhibit movement of the dilator relative to the vascular access system when the dilator is inserted through the valve and into the vascular access system. However, this shared technical feature does not represent a contribution over prior art as being anticipated by

Gore discloses a vascular access system (see introducer sheath 10, Fig 2; introducer sheath 10, para [0014]) comprising a valve (see valve 400, Fig 2; valve 400, para [0014]), wherein the valve is configured to releasably engage a notch of the dilator (see a locking knob 500 on the valve 400 to releasably engage a notch surface 104 of dilator 100, Fig 2-3; dilator tool 100, para [0014]; 100 includes hub 102 with annular bearing surface 104, para [0015]; lock knob 500 includes a radially extending rib 520 to engage 104 to axially constrain 500 and 102 relative to each other, para [0016]; locking mechanism 300 such as knob 500 to allow selective locking of the tool 100 to the valve 400, para [0014]-[0015]) to inhibit movement of the dilator relative to the vascular access system when the dilator is inserted through the valve and into the vascular access system (the mechanism is actuatable between locked and unlocked positions to releasably axially lock 100 to the valve 400 of sheath 100, para [0019]).

Groups I-II further share the common technical features of a dilator for use in a vascular access system having a first body region with a first flexibility profile, a second body region with a second different flexibility profile, wherein the first body region and the second body region have a same diameter. However, this shared technical feature does not represent a contribution over prior art as being anticipated by US 2009/0312766 A1 to Trask et al. (hereinafter 'Trask').

Trask discloses a dilator for use in a vascular access system (see dilator 30 for use in a vascular access sheath assembly 10, Fig 1; sheath assembly 10 which includes dilator 30 to access a blood vessel, para [0028]-[0029]) having a first body region with a first flexibility profile (see region 32a, Fig 1; stiffness section 32a hence inherently having a first flexibility, para [0034]), a second body region with a second different flexibility profile (see second region 32b having a second different flexibility, Fig 1; multiple stiffness sections 32a-b which become less rigid, para [0034]), wherein the first body region and the second body region have a same diameter (see how 32a and 32b have a same diameter, Fig 1).

As the common technical features were known in the art at the time of the invention, these cannot be considered special technical features that would otherwise unify the groups.

Therefore, Groups I-III lack unity under PCT Rule 13 because they do not share a same or corresponding special technical feature.

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To: BENJAMIN D. CASHDOLLAR PERKINS COIE LLP P.O. BOX 1247 SEATTLE, WA 98111-1247
RECEIVED PATENT DOCKETING JAN 11 2024 PERKINS COIE LLP

Date of mailing (day/month/year)	JAN 04 2024
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Applicant's or agent's file reference 111552-8042WO00		FOR FURTHER ACTION See paragraphs 2 below	
International application No. PCT/US 23/66538	International filing date (day/month/year) 03 May 2023 (03.05.2023)	Priority date (day/month/year) 04 May 2022 (04.05.2022)	
International Patent Classification (IPC) or both national classification and IPC IPC - INV. A61M 29/00 (2023.01) ADD. A61M 26/00 (2023.01) CPC - INV. A61M 29/00, A61M 25/0682 ADD. A61M 2025/0687, A61M 2025/0681, A61B 2017/347			
Applicant: INARI MEDICAL, INC.			

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1480, Alexandria, Virginia 22313-1480 Facsimile No. 571-273-8300	Date of completion of this opinion 07 September 2023 (07.09.2023)	Authorized officer Karl Rodriguez PCT Help Desk Telephone No. 571-272-4300
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Form PCT/ISA/237 (cover sheet) (revised July 2022)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 22/66538

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:

- ☒ the international application in the language in which it was filed.
☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43 bis.1(b)).

3. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this opinion has been established on the basis of a sequence listing:

- a. ☐ forming part of the international application as filed.
b. ☐ furnished subsequent to the international filing date for the purposes of international search (Rule 13ter.1(s)).
☐ accompanied by a statement to the effect that the sequence listing does not go beyond the disclosure in the international application as filed.

4. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this opinion has been established to the extent that a meaningful opinion could be formed without a WIPO Standard ST.26 compliant sequence listing.

5. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 23/58538

Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has, within the applicable time limit:
- ☐ paid additional fees.
 - ☐ paid additional fees under protest and, where applicable, the protest fee.
 - ☐ paid additional fees under protest but the applicable protest fee was not paid.
 - ☒ not paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is

☐ complied with.

☒ not complied with for the following reasons:

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

Group I: Claims 1-8 directed to a dilator comprising a coupling component, a tip, and body regions between the coupling component and tip having different flexibilities.

Group II: Claims 9-10 and 25-33 directed to a vascular access system comprising a valve, a catheter and a dilator.

Group III: Claims 20-24 directed to a method of treating clot material using a vascular access system.

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

SPECIAL TECHNICAL FEATURES

The invention of Group I includes the special technical features of a dilator comprising a tip, a coupling component, a first body region between the tip and the coupling component with a first flexibility profile, a second body region between the first body region and the tip with a second flexibility profile greater than the first flexibility profile, not required by the claims of Groups II or III.

The invention of Group II includes the special technical features of a catheter defining a lumen and coupled to the valve, wherein the dilator is configured to be positioned within the lumen through the valve, not required by the claims of Group I or III.

The invention of Group III includes the special technical features of positioning a dilator within a vascular access system such that a valve of the vascular access system releasably engages a notch of the dilator to inhibit further movement of the dilator relative to the vascular access system; activating a button of the valve to release the notch from the valve to allow further movement of the dilator relative to the vascular access system; and moving the dilator relative to the vascular access system and/or the vascular access system relative to the dilator, not required by the claims of Group I or II.

COMMON TECHNICAL FEATURES

Groups I-III share the common technical features of a dilator for use in a vascular access system. However, this shared technical feature does not represent a contribution over prior art as being anticipated by US 2013/0123705 A1 to W.L. Gore & Associates, Inc. (hereinafter "Gore").

Gore discloses a dilator for use in a vascular access system (introducer assembly for a vascular treatment site including a dilator, para [0020]).

.- Continued in Supplemental Box -.-

4. Consequently, this opinion has been established in respect of the following parts of the international application:

☐ all parts.

☒ the parts relating to claims Nos. 1-8

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 23/066538

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	None	YES
	Claims	1-8	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-8	NO
Industrial applicability (IA)	Claims	1-8	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1-6 lack novelty under PCT Article 33(2) as being anticipated by US 2009/0312786 A1 to Trask et al. (hereinafter "Trask").

As to claim 1, Trask discloses a dilator (see 30, Fig 1; dilator 30, para [0028]), comprising:

a tip (see tip 38, Fig 1);
a coupling component (see hub 31, Fig 1; hub 31 to interact with a sheath 40, para [0032]);
a first body region between the tip and the coupling component (see region 32a between 31 and 38, Fig 1), wherein the first body region has a first flexibility profile (stiffness section 32a hence inherently having a first flexibility, para [0034]); and
a second body region between the first body region and the tip (see region 32b between 32a and 38, Fig 1), wherein the second body region has a second flexibility profile greater than the first flexibility profile (multiple stiffness sections 32a-b become less rigid toward the distal end 33 hence the more distal section 32b is more flexible than 32a, para [0034]),
wherein the first body region and the second body region have a same diameter (see how 32a and 32b have a same diameter, Fig 1).

As to claim 2, Trask discloses the dilator of claim 1 wherein the first body region has a first stiffness (stiffness section 32a hence inherently having a first stiffness, para [0034]), wherein the second body region has a second stiffness (stiffness section 32b hence inherently having a second stiffness, para [0034]), and wherein the first stiffness is greater than the second stiffness (multiple stiffness sections 32a-b become less rigid toward the distal end 33 hence the more proximal section 32a is stiffer than 32b, para [0034]).

As to claim 3, Trask discloses the dilator of claim 1 wherein the first body region has a first durometer (the proximal end hence 32a has a durometer of 50-80 shore D, para [0034]), wherein the second body region has a second durometer (the distal end hence 32b has a durometer of 30-70 shore D, para [0034]), and wherein the second durometer is less than the first durometer (see how the distal end has a lower durometer than the proximal end, para [0034]).

As to claim 4, Trask discloses the dilator of claim 1 wherein the first body region comprises a first material (the first section 32a has a first material blend, para [0036]), and wherein the second body region comprises a second material different than the first material (the second section 32b has a second different material blend, para [0036]).

As to claim 5, Trask discloses the dilator of claim 1, further comprising a third body region between the tip and the coupling component (the dilator may have at least two stiffness sections between the proximal and distal ends hence including a third stiffness section, para [0038]), wherein the third body region has a third flexibility profile different than the first flexibility profile or the second flexibility profile (multiple stiffness sections that become less rigid towards the distal end hence the third region has a different flexibility than the other regions, para [0038]).

Claims 1 and 6-8 lack novelty under PCT Article 33(2) as being anticipated by US 2016/0220741 A1 to Route 92 Medical, Inc. (hereinafter "Route").

As to claim 1, Route discloses a dilator (see 340, Fig 1; dilator 340, para [0044], para [0017]), comprising:

a tip (see tip 346, Fig 1, distal tip 346, para [0052]);
a coupling component (see 348, Fig 1; proximal luer adapter 348, para [0052]);
a first body region between the tip and the coupling component (see a first red region between 346 and 348, see Supplemental Fig 1), wherein the first body region has a first flexibility profile (340 has stiffer materials toward the more proximal sections hence the proximal red region has a first flexibility profile, para [0053]); and
a second body region between the first body region and the tip (see a second blue region between the red region and 346, see Supplemental Fig 1), wherein the second body region has a second flexibility profile greater than the first flexibility profile (340 has more flexible materials toward the distal end hence the distal blue region has a greater flexibility profile than the proximal red region, para [0053]),
wherein the first body region and the second body region have a same diameter (see how the red region and the blue region have the same diameter, see Supplemental Fig 1; tubular dilator 340, para [0051]).

-Continued in Supplemental Box-.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 23/06538

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

-Box IV - Lack of unity of invention -

Groups I-III further share the common technical features of a vascular access system comprising a valve, wherein the valve is configured to releasably engage a notch of the dilator to inhibit movement of the dilator relative to the vascular access system when the dilator is inserted through the valve and into the vascular access system. However, this shared technical feature does not represent a contribution over prior art as being anticipated by

Gore discloses a vascular access system (see introducer sheath 10, Fig 2; introducer sheath 10, para [0014]) comprising a valve (see valve 400, Fig 2; valve 400, para [0014]), wherein the valve is configured to releasably engage a notch of the dilator (see a locking knob 500 on the valve 400 to releasably engage a notch surface 104 of dilator 100, Fig 2-3; dilator tool 100, para [0014]; 100 includes hub 102 with annular bearing surface 104, para [0015]; lock knob 500 includes a radially extending rib 520 to engage 104 to axially constrain 500 and 102 relative to each other, para [0016]; locking mechanism 300 such as knob 500 to allow selective locking of the tool 100 to the valve 400, para [0014]-[0015]) to inhibit movement of the dilator relative to the vascular access system when the dilator is inserted through the valve and into the vascular access system (the mechanism is actuatable between locked and unlocked positions to releasably axially lock 100 to the valve 400 of sheath 100, para [0016]).

Groups I-II further share the common technical features of a dilator for use in a vascular access system having a first body region with a first flexibility profile, a second body region with a second different flexibility profile, wherein the first body region and the second body region have a same diameter. However, this shared technical feature does not represent a contribution over prior art as being anticipated by US 2009/0312766 A1 to Trask et al. (hereinafter "Trask").

Trask discloses a dilator for use in a vascular access system (see dilator 30 for use in a vascular access sheath assembly 10, Fig 1; sheath assembly 10 which includes dilator 30 to access a blood vessel, para [0028]-[0029]) having a first body region with a first flexibility profile (see region 32a, Fig 1; stiffness section 32a hence inherently having a first flexibility, para [0034]), a second body region with a second different flexibility profile (see second region 32b having a second different flexibility, Fig 1; multiple stiffness sections 32a-b which become less rigid, para [0034]), wherein the first body region and the second body region have a same diameter (see how 32a and 32b have a same diameter, Fig 1).

As the common technical features were known in the art at the time of the invention, these cannot be considered special technical features that would otherwise unify the groups.

Therefore, Groups I-III lack unity under PCT Rule 13 because they do not share a same or corresponding special technical features.

-Box V.2 - Citations and Explanations-

As to claim 6, Route discloses the dilator of claim 1, further comprising a notch positioned between the tip and the coupling component (the distal dilator portion can include detents on an outer surface configured to lock with corresponding features on an inner surface of a lumen, para [0016]; see additional views of a dilator 1340 including distal region 1360 between the tip 1346 and proximal coupling component, Fig 12A; dilator 1340 as described elsewhere, para [0094]; the entire dilator 1340 can be tubular and portion 1360 can include detents on an outer surface to lock with correspondingly shaped features of a catheter, para [0095], para [0016]).

As to claim 7, Route discloses the dilator of claim 6 wherein the notch is positioned between the first body region and the second body region (see how region 1360 including at least one of the notches is between the proximal body region and distal body region, Fig 12A, para [0017]).

As to claim 8, Route discloses the dilator of claim 6 wherein the notch is a first notch, the dilator further comprising a second notch positioned on a proximal or a distal side of the first notch (multiple detents to provide multiple points of locking connection hence further comprising a second notch either proximal or distal to the first notch, para [0017], para [0095]).

Claims 1-8 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used by industry.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient,
Continuation of:

Supplemental Fig 1

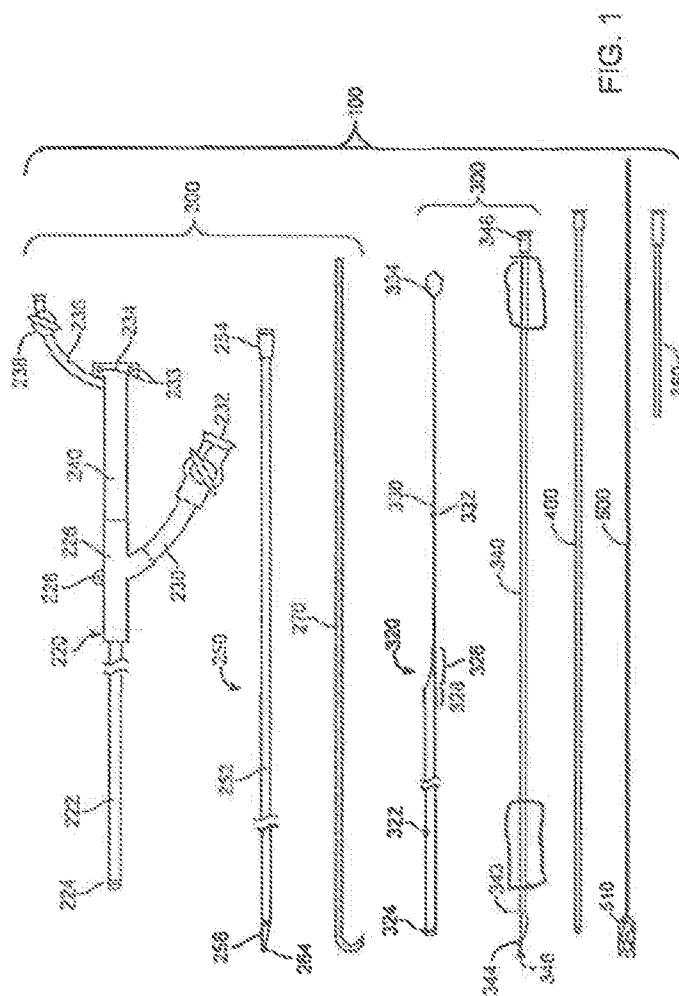


FIG. 1

SEARCH HISTORY

Application Number	PCT/US 23/66538
Search Conducted By	JBT
Search Approved By	SCL

CPC/IPC Classifications Searched	CPC - INV. A61M 29/00, A61M 25/0662; ADD. A61M 2025/0687, A61M 2025/0681, A61B 2017/347 IPC(8) - INV. A61M 29/00; ADD. A61M 25/00 (2023.01)
Date Conducted	07 September 2023 (07.09.2023)

Documentation Searched	CPC - INV. A61M 29/00, A61M 25/0662; ADD. A61M 2025/0687, A61M 2025/0681, A61B 2017/347 IPC(8) - INV. A61M 29/00; ADD. A61M 25/00 (2023.01)
Search Terms Used	Vary*, different, gradient, increas*, decreas*, stiffness, flexib*, durometer, dilator, shaft, tube, notch, notches, indent*, groove%, hardness, vascular, sheath, catheter
Date Conducted	07 September 2023 (07.09.2023)

Electronic Database Searched	PatBase
Files Searched	Full-text: AU BE BR CA CH CN DE DK EP ES FI FR GB IN JP KR SE TH TW US WO Bibliographic: (Europe) AT BA BE BG CH CS CY CZ DD DK EE ES FI GE GR HR HU IE IS IT LT LU LV MC MD MT NL NO PL PT RO RS SE SI SK SM TR UA YU (Asia) EA GC HK ID IL IN KZ MN MY PH RU SG SU TH TJ TW UZ VN (North America) CA CR CU DO GT HN MX NI PA SV TT (South America) AR BR CL CO EC PE UY (Australasia) AU NZ (Africa) AP DZ EG KE MA MW OA ZA ZM ZW
Date Conducted	07 September 2023 (07.09.2023)
Search Logic:	
#	Search query Results
1	PN=(US2009312786 AA) 1
2	CTB 1 or CTF 1 67
3	2 and FT=((vary* or different or gradient or increas* or decreas*) NEAR (stiffness or flexib* or durometer)) 25
4	3 and FT=((dilator or shaft or tube) NEAR (notch or notches or indent* or groove%)) 5
5	3 and FT=(dilator% WP ((vary* or different or gradient or increas* or decreas*) NEAR

(stiffness or flexib* or durometer))) 8
6 PN=(US2016220741 AA) 1
7 PN=(US2016220741 AA) 1
8 CTB 7 or CTF 7 891
9 8 and FT=(dilator% WP ((vary* or different or gradient or increas* or decreas*) NEAR (stiffness or flexib* or durometer))) 19
10 9 and FT=((dilator or shaft or tube) NEAR (notch or notches or indent* or groove%)) 4
11 CPC=A61M 2025/0687 196
12 11 and FT=(dilator% WP ((vary* or different or gradient or increas* or decreas*) NEAR (stiffness or flexib* or durometer))) 16
13 12 and FT=stiffness 12
14 12 and FT=(durometer or hardness) 9
15 12 and FT=((dilator or shaft or tube) NEAR (notch or notches or indent* or groove%)) 2
16 IC=A61M 29/00 12,954
17 CPC=(A61M 29/00 or A61M 25/0662 or A61M 2025/0681 or A61B 2017/347) 4,673
18 16 or 17 15,782
19 18 and FT=(dilator% WP ((vary* or different or gradient or increas* or decreas*) NEAR (stiffness or flexib* or durometer))) 155
20 19 and FT=stiffness 105
21 19 and FT=(durometer or hardness) 62
22 19 and FT=((dilator or shaft or tube) NEAR (notch or notches or indent* or groove%)) 31
23 22 not (15 or 4) 27
24 A61M 25/00 120
25 24 and FT=(dilator% WP ((vary* or different or gradient or increas* or decreas*) NEAR (stiffness or flexib* or durometer))) 1
26 IC=A61M 25/00 42,855
27 26 and FT=(dilator% WP ((vary* or different or gradient or increas* or decreas*) NEAR (stiffness or flexib* or durometer))) 128
28 27 and FT=((dilator or shaft or tube) NEAR (notch or notches or indent* or groove%)) 23
29 28 and FT=((vascular or sheath or catheter) NEAR dilator%) 20
30 FT=((vascular or sheath or catheter) NEAR dilator%) 4,044
31 30 and FT=(dilator% WP ((vary* or different or gradient or increas* or decreas*) NEAR (stiffness or flexib* or durometer))) 176
32 31 and FT=((dilator or shaft or tube) NEAR (notch or notches or indent* or groove%)) 28

Electronic Database Searched	Google
Files Searched	Google Web
Date Conducted	07 September 2023 (07.09.2023)
Search Logic:	
variable stiffness vascular access dilator About 126,000 results inari medical vascular access dilator	

About 34,100 results

vascular dilator flexible distal portion

About 1,600,000 results

Electronic Database Searched	Google
Files Searched	Patents (US Patents/Published Applications, EPO publications, International, China, Germany, Canada)
Date Conducted	07 September 2023 (07.09.2023)
Search Logic:	
dilator with varying flexibility About 8,770 results	
vascular catheter and dilator About 7,410 results	
dilator to lock to valve About 4,020 results	

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL (Submitted Only via EFS-Web)

Application Number	18/358,837	Filing Date	2023-07-25	Docket Number (if applicable)	111552.8023.US06	Art Unit	3771
First Named Inventor	Richard Quick			Examiner Name	TUAN VAN NGUYEN		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.

Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

☐ Other _____

☒ Enclosed

☐ Amendment/Reply

☒ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

☒ The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 500665

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

Signature of Registered U.S. Patent Practitioner			
Signature	/Matthew S. Williams/	Date (YYYY-MM-DD)	2024-03-12
Name	Matthew S. Williams	Registration Number	77516

This collection of information is required by 37 CFR 1.114. 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.

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 the Freedom of Information Act requires disclosure of these records.
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 inspections 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.



UNITED STATES
PATENT AND TRADEMARK OFFICE

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

ELECTRONIC PAYMENT RECEIPT

APPLICATION # 18/358,837	RECEIPT DATE / TIME 03/12/2024 07:45:36 PM Z ET	ATTORNEY DOCKET # 111552.8023.US06
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Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	6598	FILED BY	JiYoung Anderson
PATENT CENTER #	64657582	AUTHORIZED BY	Matthew Williams
CUSTOMER #	25096	FILING DATE	07/25/2023
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Richard Quick

Payment Information

PAYMENT METHOD CARD / 5111	PAYMENT TRANSACTION ID E20243BJ46219562	PAYMENT AUTHORIZED BY JiYoung Anderson
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FEE CODE	DESCRIPTION	ITEM PRICE(\$)	QUANTITY	ITEM TOTAL(\$)
1801	REQUEST FOR CONTINUED EXAMINATION (RCE) - 1ST REQUEST (SEE 37 CFR 1.114)	1360.00	1	1360.00
TOTAL AMOUNT:				\$1,360.00

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

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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

U.S. PATENTS AND PUBLICATIONS					
Examiner Initial*	Cite No	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	11918244	03-05-2024	Marchand et al.	
	2.	11918243	03-05-2024	Marchand et al.	
	3.	6059745	05-09-2000	Gelbfish	
	4.	20030225379	12-04-2003	Schaffer et al.	
	5.	20050131387	06-16-2005	Pursley	
	6.	5951539	09-14-1999	Nita et al.	
	7.	11213356	01-04-2022	Tanner et al.	
	8.	7905877	03-15-2011	Jilnenez et al.	
	9.	20010041881	11-15-2001	SARGE et al.	
	10.	20110264132	10-27-2011	Strauss et al.	
	11.	20200054861	02-20-2020	Korkuch et al.	
	12.	20190223893	07-25-2019	GILVARRY et al.	
	13.	20190328411	10-31-2019	VALE et al.	
	14.	20240074771	03-07-2024	Quick et al.	
	15.				
	16.				
	17.				

FOREIGN PATENT DOCUMENTS						
Examiner Initial*	Cite No	Foreign Document Number ³	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
	1.	WO2012114633	08-30-2012	TERUMO KABUSHIKI KAISHA		
	2.					
	3.					

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	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
	1.	International Search Report and Written Opinion for International App. No. PCT/US23/66538; Date of Filing: May 3, 2023, Applicant: Inari Medical, Inc., Date of Mailing: January 4, 2024, 14 pages.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

2.	English translation of Japanese Office Action received for JP Application No. 2022-574456, Applicant: Inari Medical, Inc, Date of Mailing: January 23, 2024, 12 pages.
3.	Chinese First Office Action received for CN Application No. 201980067623.1, Applicant: Inari Medical, Inc., Date of Mailing: January 31, 2024, 10 pages.
4.	International Search Report and Written Opinion for International App. No. PCT/US23/73765; Date of Filing: September 8, 2023, Applicant: Inari Medical, Inc., Date of Mailing: February 28, 2024, 7 pages.
5.	

EXAMINER SIGNATURE

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

CERTIFICATION STATEMENT

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

☐ 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. See 37 CFR 1.97(e) (1).

OR

☐ 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references. This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, Applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.

COPIES OF REFERENCES

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

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	/Matthew S. Williams/	Date (YYYY-MM-DD)	2024-03-12
Name/Print	Matthew S. Williams	Registration Number	77,516

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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.**



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

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
18/358,837	07/25/2023	3771	2020	111552.8023.US06	22	2

25096
PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

CONFIRMATION NO. 6598

UPDATED FILING RECEIPT



0000000069231767

Date Mailed: 03/06/2024

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)

Richard Quick, Mission Viejo, CA;
Benjamin Edward Merritt, San Clemente, CA;
Paul Lubock, Monarch Beach, CA;
John Coleman Thress, Capistrano Beach, CA;

Applicant(s)

Inari Medical, Inc., Irvine, CA;

Power of Attorney: The patent practitioners associated with Customer Number 25096

Domestic Priority data as claimed by applicant

This application is a CON of 17/865,307 07/14/2022 PAT 11,849,963
which is a CON of 17/498,642 10/11/2021
which is a CON of 16/258,344 01/25/2019 PAT 11,154,314
which claims benefit of 62/622,691 01/26/2018

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: 08/09/2023

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 18/358,837**

Projected Publication Date: 11/16/2023

Non-Publication Request: No

Early Publication Request: No

Title

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Preliminary Class

606

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,

page 2 of 4

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).

LICENSE FOR FOREIGN FILING UNDER
Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

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 Assets Control, 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).

SelectUSA

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

technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
18/358,837	07/25/2023	Richard Quick	111552.8023.US06

CONFIRMATION NO. 6598

25096
PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

**37 CFR 1.48 ACKNOWLEDGEMENT
LETTER**



OC000000069231772

Date Mailed: 03/06/2024

NOTICE OF ACCEPTANCE OF REQUEST UNDER 37 CFR 1.48(a)

This is in response to the applicant's request under 37 CFR 1.48(a) submitted on 03/04/2024.

The request under 37 CFR 1.48(a) to correct the inventorship, to correct or update the name of an inventor, or to correct the order of names of joint inventors is accepted.

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.

/ggasgedom/

CORRECTED APPLICATION DATA SHEET

PTO/AIA/14 (11-15)

Approved for use through 04/30/2017. OMB 0651-0032

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	111552 8023.US06
		Application Number	
Title of Invention	SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS		
<p>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.</p> <p>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.</p>			

Secrecy Order 37 CFR 5.2:

☐ 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
	Richard		Quick	
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service				
City	Mission Viejo	State/Province	CA	Country of Residence US
Mailing Address of Inventor:				
Address 1		c/o Inari Medical, Inc.		
Address 2		6001 Oak Canyon, Suite #100		
City	Irvine	State/Province	CA	
Postal Code	92618	Country	US	
Inventor 2 Remove				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Benjamin	Edward	Merritt	
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service				
City	San Clemente	State/Province	CA	Country of Residence US
Mailing Address of Inventor:				
Address 1		c/o Inari Medical, Inc.		
Address 2		6001 Oak Canyon, Suite #100		
City	Irvine	State/Province	CA	
Postal Code	92618	Country	US	
Inventor 3 Remove				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Paul		Lubock	
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service				

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	111552.8023.US06	
		Application Number		
Title of Invention	SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS			

City	<u>Monarch Beach</u>	State/Province	<u>CA</u>	Country of Residence	<u>US</u>
------	----------------------	----------------	-----------	----------------------	-----------

Mailing Address of Inventor:

Address 1	<u>c/o Inari Medical, Inc.</u>				
Address 2	<u>6001 Oak Canyon, Suite #100</u>				
City	<u>Irvine</u>	State/Province	<u>CA</u>		
Postal Code	<u>92618</u>	Country	<u>US</u>		

Inventor 4	Remove
Legal Name	

Prefix	Given Name	Middle Name	Family Name	Suffix
	<u>John</u>	<u>Coleman</u>	<u>Thress</u>	

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

City	<u>Capistrano Beach</u>	State/Province	<u>CA</u>	Country of Residence	<u>US</u>
------	-------------------------	----------------	-----------	----------------------	-----------

Mailing Address of Inventor:

Address 1	<u>c/o Inari Medical, Inc.</u>				
Address 2	<u>6001 Oak Canyon, Suite #100</u>				
City	<u>Irvine</u>	State/Province	<u>CA</u>		
Postal Code	<u>92618</u>	Country	<u>US</u>		

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

[Add](#)**Correspondence Information:**

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	25096
Email Address	patentprocurement@perkinscoie.com

[Add Email](#)[Remove Email](#)**Application Information:**

Title of the Invention	SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS		
Attorney Docket Number	111552.8023.US06	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	20	Suggested Figure for Publication (if any)	1A

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	111552.8023.US06
		Application Number	
Title of Invention	SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS		

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.

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	25096		

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	17/865307	2022-07-14

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	111552.8023.US06		
		Application Number			
Title of Invention	SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS				
Prior Application Status	Pending		Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
17/865307	Continuation of	17/498642	2021-10-11		
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
17/498642	Continuation of	16/258344	2019-01-25	11154314	2021-10-26
Prior Application Status	Expired		Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
16/258344	Claims benefit of provisional	62/622691	2018-01-26		
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.					

Foreign Priority Information:

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).

			Remove
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			

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	111552.8023.US06
		Application Number	
Title of Invention	SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS		

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.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

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)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ 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	111552.8023.US06
		Application Number	
Title of Invention	SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS		

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

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.

☒ 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

Mailing Address Information For Applicant:

Address 1	6001 Oak Canyon, Suite #100		
Address 2			
City	Irvine	State/Province	CA
Country	US	Postal Code	92618
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee 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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	111552.8023.US06
		Application Number	
Title of Invention	SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS		

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.

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

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		State/Province	
Country ¹		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the **INITIAL** filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

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

Signature	/Matthew S. Williams/		Date (YYYY-MM-DD)	2024-03-04
First Name	Matthew S.	Last Name	Williams	Registration Number
77,516				

Additional Signature may be generated within this form by selecting the Add button.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	111552.8023.US06
		Application Number	
Title of Invention	SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS		

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.**

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 the Freedom of Information Act requires disclosure of these records.
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 inspections 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.



UNITED STATES
PATENT AND TRADEMARK OFFICE

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

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
18/358,837

RECEIPT DATE / TIME
03/04/2024 11:56:44 AM Z ET

ATTORNEY DOCKET #
111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 6598

FILED BY JiYoung Anderson

PATENT CENTER # 64534814

FILING DATE 07/25/2023

CUSTOMER # 25096

FIRST NAMED
INVENTOR Richard Quick

CORRESPONDENCE
ADDRESS -

AUTHORIZED BY Matthew Williams

Documents

TOTAL DOCUMENTS: 3

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2024.3.4 Corrected ADS - 111552-8023US6.pdf	9	Application Data Sheet	165 KB
Warning: This is not a USPTO supplied ADS fillable form. Data in the form cannot be automatically loaded to other USPTO systems.			
Declaration signed additional all - 111552.8023US06.pdf	3	Oath or Declaration filed	1213 KB
2024-3-4 Request for Correction of Inventorship - 111552.8023.US06.pdf	3	Request under Rule 48 correcting inventorship	236 KB

Digest

DOCUMENT**MESSAGE DIGEST(SHA-512)**

2024.3.4 Corrected ADS -
111552-8023US6.pdf

8689FA8E774314A96FF994B8C4CF5B60F895A3F8E173B1E96
A1197FFFB19A12FC38DFE996EB785E707BC7B8063852E1F4B
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Declaration signed additional all
- 111552.8023US06.pdf

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2024-3-4 Request for
Correction of Inventorship -
111552.8023.US06.pdf

3DC6E40EFA16AB136A4988BF8DDC3FE4EC65B9ABE937B9E
4E370B8BE1455752544DFEDC664F2DB60DDCEDCD71D22B0
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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 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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PATENT AND TRADEMARK OFFICE

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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/358,837	03/04/2024 11:56:44 AM Z ET	111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	6598	FILED BY	JiYoung Anderson
PATENT CENTER #	64534814	AUTHORIZED BY	Matthew Williams
CUSTOMER #	25096	FILING DATE	07/25/2023
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Richard Quick

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 5111	E202434B57366426	JiYoung Anderson

FEE CODE	DESCRIPTION	ITEM PRICE(\$)	QUANTITY	ITEM TOTAL(\$)
1830	PROCESSING FEE, EXCEPT IN PROVISIONAL APPLICATIONS	140.00	1	140.00
1819	CORRECTION OF INVENTORSHIP AFTER FIRST ACTION ON MERITS	640.00	1	640.00
TOTAL AMOUNT:				\$780.00

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.

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Receipt will establish the filing date of the application

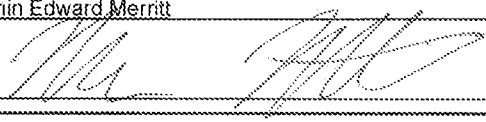
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**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING
AN APPLICATION DATA SHEET (37 CFR 1.76)**

Title of Invention	SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS
<p>As the below named inventor, I hereby declare that:</p> <p>This declaration is directed to:</p> <p style="margin-left: 40px;"> ☐ The attached application, or </p> <p style="margin-left: 40px;"> ☒ United States application or PCT international application number <u>18/358,837</u> </p> <p style="margin-left: 80px;">filed on <u>2023-07-25</u>.</p> <p>The above-identified application was made or authorized to be made by me.</p> <p>I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.</p> <p>I hereby acknowledge that any wilful 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.</p> <p align="center">WARNING:</p> <p>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.</p>	
<p>LEGAL NAME OF INVENTOR</p> <p>Inventor: <u>Benjamin Edward Merritt</u> Date: <u>12/4/23</u></p> <p>Signature: </p>	
<p><small>Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01 form for each additional inventor.</small></p>	

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.

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

**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING
AN APPLICATION DATA SHEET (37 CFR 1.76)**

Title of Invention

**SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND
ASSOCIATED SYSTEMS AND METHODS**

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 18/358,837

filed on 2023-07-25.

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 wilful 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:

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LEGAL NAME OF INVENTOR

Inventor: Paul Lubock

December 13, 2023

Date: _____

Signature: _____

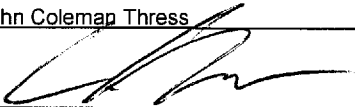
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THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING
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Title of Invention	SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS
<p>As the below named inventor, I hereby declare that:</p> <p>This declaration is directed to:</p> <div style="margin-left: 40px;"> ☐ The attached application, or </div> <div style="margin-left: 40px;"> ☒ United States application or PCT international application number <u>18/358,837</u> filed on <u>2023-07-25</u>. </div> <p>The above-identified application was made or authorized to be made by me.</p> <p>I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.</p> <p>I hereby acknowledge that any wilful 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.</p> <p align="center">WARNING:</p> <p>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.</p>	
<p>LEGAL NAME OF INVENTOR</p> <p>Inventor: <u>John Colemap Thress</u> Date: <u>12/4/2023</u></p> <p>Signature: </p>	
<p><small>Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01 form for each additional inventor.</small></p>	

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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.

**REQUEST FOR CORRECTION IN A
PATENT APPLICATION RELATING TO
INVENTORSHIP OR AN INVENTOR
NAME, OR ORDER OF NAMES, OTHER
THAN IN A REISSUE APPLICATION (37
CFR 1.48)**

Application Number	18/358,837, Conf. 6598
Filing Date	2023-07-25
First Named Inventor	Richard Quick
Art Unit	3771
Examiner Name	Tuan Van Nguyen
Practitioner Docket Number	111552.8023.US06

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

Applicant hereby requests that the inventorship be corrected or changed, or that the name of the inventor or a joint inventor, or the order of the names of joint inventors, be changed, in the above-identified application. **Note:** 37 CFR 1.48 applies to any request to correct inventorship filed on or after September 16, 2012, regardless of the application filing date. **Do not submit this form after payment of the issue fee or if the application has been patented.** See 37 CFR 1.324 for correction of inventorship in a patent.

Please check the applicable box(es) below.

For a nonprovisional application:

- ☒ 1. This request is to correct or change the inventorship in a **nonprovisional** application (under 37 CFR 1.48(a)) and includes:
- ☒ An application data sheet (ADS) in accordance with 37 CFR 1.76(c) with the corrected or updated information shown with markings (e.g., underlining for insertions, strikethrough for deletions). See the Manual of Patent Examining Procedure (MPEP) section 601.05(a) for information about filing an ADS in an application filed on/after September 16, 2012. For information about filing a Supplemental ADS in an application filed before September 16, 2012, see MPEP 601.05(b).
- ☒ The processing fee set forth in 37 CFR 1.17(i). \$ 140
- ☒ An inventor is being added. An inventor's oath or declaration by any actual inventor who has not yet executed an oath or declaration is required (see 37 CFR 1.48(b)). See MPEP 602.01(a) for information about an inventor's oath or declaration for an application filed on/after September 16, 2012 (e.g., form **PTO/AIA/01**). For information about an inventor's oath or declaration for an application filed before September 16, 2012 (e.g., form **PTO/SB/01**), see MPEP 602.01(b).
- ☒ This request is being filed after the first Office action on the merits has been given or mailed (see 37 CFR 1.48(c) and 1.17(d)). Check one of the following:
- ☐ This request to correct or change the inventorship is due solely to the cancellation of claims in the application.
- OR
- ☒ The fee set forth in 37 CFR 1.17(d) is due (in addition to the fee set forth in 37 CFR 1.17(i)). \$ 640

[Page 1 of 2]

This collection of information is required by 37 CFR 1.48. 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 hour 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.

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.

REQUEST FOR CORRECTION IN A PATENT APPLICATION RELATING TO INVENTORSHIP OR AN INVENTOR NAME, OR ORDER OF NAMES, OTHER THAN IN A REISSUE APPLICATION (37 CFR 1.48)

- ☐ 2. This request is to correct or update the name of the inventor or a joint inventor, or the order of names of joint inventors, in a **nonprovisional** application (under 37 CFR 1.48(f)) and includes:

- ☐ An application data sheet in accordance with 37 CFR 1.76(c) identifying the complete inventive entity, including the corrected or updated name of the inventor, or the new order of names shown with markings (e.g., underlining for insertions, strikethrough for deletions). See the MPEP 601.05(a) for information about filing an ADS in an application filed on/after September 16, 2012. For information about filing a Supplemental ADS in an application filed before September 16, 2012, see MPEP 601.05(b).

- ☐ The processing fee set forth in 37 CFR 1.17(i). \$ _____

For a provisional application:

- ☐ This request is to change or correct the inventorship, or correct or update the name of the inventor or a joint inventor, in a **provisional** application (under 37 CFR 1.48(d)) and includes:

- ☐ Attached hereto is a document that is signed by a party set forth in 37 CFR 1.33(b) and identifies each inventor by his or her legal name, in the preferred order. Note: the document may be an application data sheet in accordance with 37 CFR 1.76(c) that identifies the changes with markings (underlining for insertions, strikethrough for deletions).

- ☐ The processing fee set forth in 37 CFR 1.17(q). \$ _____

Fee Payment Information:

- ☐ 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 is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. 50-0665.
- ☒ Payment made via EFS-Web.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

- ☐ Applicant* ☒ attorney or agent of record ☐ attorney or agent acting under 37 CFR 1.34
Registration number 77,516 Registration number _____

Signature /Matthew S. Williams/

Typed or printed name Matthew S. Williams

Date 2024-03-04

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, 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 1 forms are submitted.

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.

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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.
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.



UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/358,837	07/25/2023	Richard Quick	111552.8023.US06	6598
25096	7590	01/10/2024		
PERKINS COIE LLP - SEA General PATENT-SEA P.O. BOX 1247 SEATTLE, WA 98111-1247			EXAMINER NGUYEN, TUAN VAN	
			ART UNIT	PAPER NUMBER
			3771	
			NOTIFICATION DATE	DELIVERY MODE
			01/10/2024	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):

patentprocurement@perkinscoie.com

Supplemental Notice of Allowability	Application No. 18/358,837	Applicant(s) Quick, Richard	
	Examiner TUAN V NGUYEN	Art Unit 3771	AIA (FITF) Status Yes

-- 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 the amendment filed October 7, 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 1-30. 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)	5. ☐ Examiner's Amendment/Comment
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.	6. ☐ Examiner's Statement of Reasons for Allowance
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.	7. ☐ Other _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.	

/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771	
--	--

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552-8023.US06

ririU.S. PATENTS AND PUBLICATIONS					
Examiner Initial*	Cite No	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	20190366036	12-05-2019	Jalgaonkar et al.	
	2.	20110071503	03-24-2011	TAKAGI et al.	
	3.	20120109109	05-03-2012	KAJII	
	4.	20180250498	09-06-2018	Stern et al.	
	5.	11744691	09-05-2023	Merritt et al.	
	6.	20230248380	08-10-2023	Long et al.	
	7.	5391152	02-21-1995	Patterson et al.	
	8.	20210404464	12-30-2021	Patoskie	
	9.	5971958	10-26-1999	Zhang	
	10.	3860006	01-14-1975	Patel	
	11.	20130150793	06-13-2013	Beissel et al.	
	12.	20230270991	08-31-2023	Merritt et al.	
	13.	20190015298	01-17-2019	Beatty et al.	
	14.	20180055999	03-01-2018	Bare et al.	
	15.	20040019310	01-29-2004	Hogendijk	
	16.	20080312681	12-18-2008	Ansel et al.	
	17.	20170143359	05-25-2017	Nguyen et al.	
	18.	20170143938	05-25-2017	Ogle et al.	
	19.	20170281204	10-05-2017	Garrison et al.	
	20.	8021351	09-20-2011	Boldenow et al.	
	21.	1101890	06-30-1914	TUNSTEAD	
	22.	10953195	03-23-2021	Jalgaonkar et al.	
	23.	20210205577	07-08-2021	Jalgaonkar et al.	
	24.	3416531	12-17-1968	EDWARDS	
	25.	4981478	01-01-1991	Evard et al.	
	26.	7815608	10-19-2010	Schafersman et al.	
	27.	9662129	05-30-2017	Galdonik et al.	
	28.	8070694	12-06-2011	Galdonik et al.	
	29.	10058339	08-28-2018	Galdonik et al.	
	30.	9532792	01-03-2017	Galdonik et al.	

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552-8023.US06

31.	20200121334	04-23-2020	Galdonik et al.	
32.	11596768	03-07-2023	Stern et al.	
33.	10926060	02-23-2021	Stern et al.	
34.	11224450	01-18-2022	Chou et al.	
35.	11065019	07-20-2021	Chou et al.	
36.	11576691	02-14-2023	Chou et al.	
37.	2022033888	02-03-2022	Schnall-Levin et al.	
38.	20220370761	11-24-2022	Chou et al.	
39.	20230059721	02-23-2023	Chou et al.	
40.	20230122587	04-20-2023	Chou et al.	
41.	11305094	04-19-2022	Carrison et al.	
42.	10485952	11-26-2019	Carrison et al.	
43.	10456555	10-29-2019	Carrison et al.	
44.	11383064	07-12-2022	Carrison et al.	
45.	11185664	11-30-2021	Carrison et al.	
46.	11224721	01-18-2022	Carrison et al.	
47.	11395903	07-26-2022	Carrison et al.	
48.	20200046940	02-13-2020	Carrison et al.	
49.	20210138194	05-13-2021	Carrison et al.	
50.	7122034	10-17-2006	Belhe et al.	
51.	5639276	06-17-1997	Weinstock et al.	
52.	7481805	01-27-2009	Magnusson	
53.	9241669	01-26-2016	Pugh et al.	
54.	10384034	08-20-2019	Carrison et al.	
55.	9265512	02-23-2016	Carrison et al.	
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	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552-8023.US06

FOREIGN PATENT DOCUMENTS						
Examiner Initial*	Cite No	Foreign Document Number ³	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
	1.	CN106178227	12-07-2016	Shanghai Microport Medical Group Co., Ltd.		
	2.	WO2023154612	08-17-2023	Inari Medical, Inc.		
	3.	WO2018065092	04-12-2018	PRINZESSIN VON ISENBURG, Sarah		
	4.	EP3013404	04-15-2020	NorMedix Inc.		
	5.	EP3583972	12-25-2019	Covidien LP		
	6.	EP3589348	01-08-2020	Covidien LP		
	7.	EP4137070	02-22-2023	ROUTE 92 MEDICAL INC.		
	8.	EP3620204	03-11-2020	ROUTE 92 MEDICAL INC.		
	9.					
NON-PATENT LITERATURE DOCUMENTS						
Examiner Initials*	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
	1.	International Search Report and Written Opinion for International App. No. PCT/US23/60927; Date of Filing: January 19, 2023, Applicant: Inari Medical, Inc., Date of Mailing: July 20, 2023, 12 pages.				
	2.					
	3.					
	4.					
	5.					
EXAMINER SIGNATURE						
Examiner Signature		/TUAN V NGUYEN/		Date Considered		01/05/2024
<p>*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p> <p>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.</p> <p>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.</p>						

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552-8023.US06

CERTIFICATION STATEMENT

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

☐ 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. See 37 CFR 1.97(e) (1).

OR

☐ 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references. This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, Applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.

COPIES OF REFERENCES

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

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	/Matthew S. Williams/	Date (YYYY-MM-DD)	2023-09-27
Name/Print	Matthew S. Williams	Registration Number	77,516

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552-8023.US06

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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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NOTICE OF ALLOWANCE AND FEE(S) DUE

25096 7590 12/29/2023
PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

EXAMINER

NGUYEN, TUAN VAN

ART UNIT

PAPER NUMBER

3771

DATE MAILED: 12/29/2023

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/358,837	07/25/2023	Richard Quick	111552.8023.US06	6598

TITLE OF INVENTION: SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	03/29/2024

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 the USPTO patent electronic filing system.

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)

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 the USPTO patent electronic filing system 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.
18/358,837	07/25/2023	Richard Quick	111552.8023.US06	6598

TITLE OF INVENTION: SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	03/29/2024

EXAMINER	ART UNIT	CLASS-SUBCLASS
NGUYEN, TUAN VAN	3771	606-200000

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,

1 _____

(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.

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 the USPTO patent electronic filing system ☐ 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

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

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.

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.

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. _____



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/358,837	07/25/2023	Richard Quick	111552.8023.US06	6598
<div>25096 7590 12/29/2023</div> <div>PERKINS COIE LLP - SEA General</div> <div>PATENT-SEA</div> <div>P.O. BOX 1247</div> <div>SEATTLE, WA 98111-1247</div>				
<div>EXAMINER</div> <div>NGUYEN, TUAN VAN</div>				
<div>ART UNIT PAPER NUMBER</div> <div>3771</div>				
DATE MAILED: 12/29/2023				

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. The United States Patent and Trademark Office (USPTO) collects the information in this record under authority of 35 U.S.C. 2. The USPTO's system of records is used to manage all applicant and owner information including name, citizenship, residence, post office address, and other information with respect to inventors and their legal representatives pertaining to the applicant's/owner's activities in connection with the invention for which a patent is sought or has been granted. The applicable Privacy Act System of Records Notice for the information collected in this form is COMMERCE/PAT-TM-7 Patent Application Files, available in the Federal Register at 78 FR 19243 (March 29, 2013).

<https://www.govinfo.gov/content/pkg/FR-2013-03-29/pdf/2013-07341.pdf>

Routine uses of the information in this record may include disclosure to:

- 1) law enforcement, in the event that the system of records indicates a violation or potential violation of law;
- 2) a federal, state, local, or international agency, in response to its request;
- 3) a contractor of the USPTO having need for the information in order to perform a contract;
- 4) the Department of Justice for determination of whether the Freedom of Information Act (FOIA) requires disclosure of the record;
- 5) a Member of Congress submitting a request involving an individual to whom the record pertains, when the individual has requested the Member's assistance with respect to the subject matter of the record;
- 6) a court, magistrate, or administrative tribunal, in the course of presenting evidence, including disclosures to opposing counsel in the course of settlement negotiations;
- 7) the Administrator, General Services Administration (GSA), or their designee, during an inspection of records conducted by GSA under authority of 44 U.S.C. 2904 and 2906, in accordance with the GSA regulations and any other relevant (i.e., GSA or Commerce) directive, where such disclosure shall not be used to make determinations about individuals;
- 8) 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));
- 9) the Office of Personnel Management (OPM) for personnel research purposes; and
- 10) the Office of Management and Budget (OMB) for legislative coordination and clearance.

If you do not furnish the information requested on this form, the USPTO may not be able to process and/or examine your submission, which may result in termination of proceedings, abandonment of the application, and/or expiration of the patent.

Notice of Allowability	Application No. 18/358,837	Applicant(s) Quick, Richard	
	Examiner TUAN V NGUYEN	Art Unit 3771	AIA (FITF) Status Yes

-- 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 the amendment filed October 7, 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 1-30. 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 _____.
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/TUAN V NGUYEN/
Primary Examiner, Art Unit 3771

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Allowable Subject Matter

Claims 1-30 allowed.

Quick (US 20150352325, which is cited in the IDS filed on August 8, 2023), which is the best prior art, discloses an aspiration system, comprising: a vacuum source (syringe 108 of pressure source 106, which is located inside handle 102, Figs. 1B-4A; para [0032]-[0034] and [0045]); connection tubing fluidically coupled to the vacuum source 302a (Fig. 4A); a catheter 206 fluidically coupled to the vacuum source (para [0051]); a flow controller 310 (Fig. 4A, para [0052]) fluidically coupling the filter chamber to the catheter, wherein the flow controller is along the first flow path between the filter chamber and the catheter such that flow from the catheter to the filter chamber is controlled proximate to the catheter.

There is no art of record alone or in combination teach an aspiration system that includes the combination of recited limitations in claims 1 and 12. Prior art of record alone or in combination did not teach the limitation of a filter chamber coupled to the connection tubing at a location apart from the vacuum source, wherein the filter chamber comprises a housing and a filter within the housing, and wherein the housing includes a port configured to be fluidically coupled to the catheter; and a fluid connector configured to be coupled to the connection tubing; and wherein the filter is in the housing along a first fluid path, wherein the filter fluidically couples the port and the fluid

connector, and wherein the catheter is fluidically coupled to the vacuum source via the filter chamber along the first fluid path; and a hemostasis valve fluidically coupled to the catheter along a second fluid path at least partially different than the first fluid path, wherein the hemostasis valve is configured to maintain hemostasis by inhibiting proximal fluid flow along the second fluid path when an interventional device is inserted through the hemostasis valve and the catheter.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TUAN V NGUYEN whose telephone number is (571)272-5962. The examiner can normally be reached Monday - Friday 8:30 AM - 5:30 PM.

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, Jackie Ho can be reached on 571-272-4696. 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->

Art Unit: 3771

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.

/TUAN V NGUYEN/

Primary Examiner, Art Unit 3771

Issue Classification 	Application/Control No. 18/358,837	Applicant(s)/Patent Under Reexamination Quick, Richard
	Examiner TUAN V NGUYEN	Art Unit 3771

CPC						
Symbol					Type	Version
A61B	/	17	/	22031	F	2013-01-01
A61M	/	25	/	0082	I	2013-01-01
A61B	/	17	/	22	I	2013-01-01
A61M	/	39	/	06	I	2013-01-01
A61B	/	17	/	221	I	2013-01-01
A61B	/	2017	/	22042	A	2013-01-01
A61M	/	2210	/	12	A	2013-01-01
A61B	/	2017	/	22079	A	2013-01-01
A61B	/	2017	/	22094	A	2013-01-01
A61B	/	2017	/	22034	A	2013-01-01
A61B	/	2017	/	00907	A	2013-01-01
A61B	/	2217	/	005	A	2013-01-01

CPC Combination Sets					
Symbol				Type	Version
/	/	/	/		

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	30	
/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771 (Primary Examiner)	08 December 2023 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1A

Issue Classification 	Application/Control No. 18/358,837	Applicant(s)/Patent Under Reexamination Quick, Richard
	Examiner TUAN V NGUYEN	Art Unit 3771

INTERNATIONAL CLASSIFICATION			
CLAIMED			
A61B	/	17	/ 00
A61B	/	17	/ 22

NON-CLAIMED			
	/		/

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

NONE		Total Claims Allowed:	
(Assistant Examiner)		30	
(Date)			
/TUAN V NGUYEN/		08 December 2023	
Primary Examiner, Art Unit 3771		O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)		1	1A
(Date)			

Issue Classification 	Application/Control No. 18/358,837	Applicant(s)/Patent Under Reexamination Quick, Richard
	Examiner TUAN V NGUYEN	Art Unit 3771

☐ 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
1	1	10	10	22	19	12	28								
2	2	11	11	23	20	13	29								
3	3	15	12	24	21	14	30								
4	4	16	13	25	22										
5	5	17	14	26	23										
6	6	18	15	27	24										
7	7	19	16	28	25										
8	8	20	17	29	26										
9	9	21	18	30	27										

NONE (Assistant Examiner) _____ (Date) _____		Total Claims Allowed: 30	
/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771 (Primary Examiner) _____ (Date) _____		08 December 2023 O.G. Print Claim(s) 1	O.G. Print Figure 1A

<i>Search Notes</i> 	Application/Control No. 18/358,837	Applicant(s)/Patent Under Reexamination Quick, Richard
	Examiner TUAN V NGUYEN	Art Unit 3771

CPC - Searched*		
Symbol	Date	Examiner
A61B17/22031,22,221,220758,320725	10/19/2023	TN
A61B2017/22034,22042,22079,22094	10/19/2023	TN
A61M1/60,0001,0003	10/19/2023	TN
A61M2039/027	10/19/2023	TN

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
Group/subgroups combined with text (see search history printout)	10/19/2023	TN
Search update (see search history printout)	12/08/2023	TN

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
Text search	USPAT; US_PGPUB	12/08/2023	TN

/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771	
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Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

U.S. PATENTS AND PUBLICATIONS					
Examiner Initial*	Cite No	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	20110152889	06-23-2011	Ashland	
	2.	20230310138	10-05-2023	Merritt et al.	
	3.	20230310137	10-05-2023	Merritt et al.	
	4.	20230310751	10-05-2023	Merritt et al.	
	5.	20030023263	01-30-2003	Krolik et al.	
	6.	20030135151	07-17-2003	Deng	
	7.	20200022711	01-23-2020	Look et al.	
	8.	6017335	01-25-2000	Burnham	
	9.	20040039351	02-26-2004	Barrett	
	10.	20140180055	06-26-2014	Glynn et al.	
	11.	20230329734	10-19-2023	Marchand et al.	
	12.	5242461	09-07-1993	Kortenbach et al.	
	13.	11806033	11-07-2023	Marchand et al.	
	14.	3438607	04-15-1969	Williams et al.	
	15.	4401107	08-30-1983	Harber et al.	
	16.	4634421	01-06-1987	Hegemann	
	17.	5484418	01-16-1996	Quiachon et al.	
	18.	20080087853	04-17-2008	Kees	
	19.	10648268	05-12-2020	Jaffrey et al.	
	20.	20230320834	10-12-2023	Merritt et al.	
	21.	2784717	03-12-1957	E.O. Thompson	
	22.	9884387	02-06-2018	Plha	
	23.	20230338131	10-26-2023	Merritt et al.	
	24.	20230338130	10-26-2023	Merritt et al.	
	25.	2010114017	05-06-2010	Lenker et al.	
	26.	6589264	07-08-2003	Barbut et al.	
	27.	20230355259	11-09-2023	Marchand et al.	
	28.	20230355256	11-09-2023	Dinh	
	29.	20230355938	11-09-2023	Merritt et al.	
	30.	20230363883	11-16-2023	Merritt et al.	

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031

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	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

31.	20170113005	04-27-2017	LINDER et al.	
32.	20110309037	12-22-2011	LEE	
33.	20080294096	11-27-2008	Uber, III et al.	
34.	20130270161	10-17-2013	KUMAR et al.	
35.				
36.				
37.				

FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number ³	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
	1.	WO2023192925	10-05-2023	Inari Medical, Inc.		
	2.	WO2019173475	09-12-2019	Innovative Cardiovascular Solutions, LLC		
	3.	WO2023215779	11-09-2023	Inari Medical, Inc.		
	4.					
	5.					
	6.					
	7.					
	8.					
	9.					

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	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
	1.	Extended European Search Report issued for EP Application No. 20877370.5, Date of Mailing: October 17, 2023, 11 pages.	
	2.	International Search Report and Written Opinion for International App. No. PCT/US23/65128; Date of Filing: March 30, 2023, Applicant: Inari Medical, Inc., Date of Mailing: November 14, 2023, 14 pages.	
	3.		
	4.		
	5.		

EXAMINER SIGNATURE

Examiner Signature	/TUAN V NGUYEN/	Date Considered	12/07/2023
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Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw 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.

CERTIFICATION STATEMENT

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

☐ 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. See 37 CFR 1.97(e) (1).

OR

☐ 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).

☐ See attached certification statement.

☒ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ None

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references. This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, Applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.

COPIES OF REFERENCES

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

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	/Matthew S. Williams/	Date (YYYY-MM-DD)	2023-11-27
Name/Print	Matthew S. Williams	Registration Number	77,516

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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.**

Bibliographic Data

Application No: 18/358,837

Foreign Priority claimed: ☐ Yes ☒ No

35 USC 119 (a-d) conditions met: ☐ Yes ☐ No ☐ Met After Allowance

Verified and Acknowledged: /TUAN V NGUYEN/

Examiner's Signature

Initials

Title:

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
07/25/2023	606	3771	111552.8023.US06
RULE			

APPLICANTS

Inari Medical, Inc., Irvine, CA, UNITED STATES

INVENTORS

Richard Quick,

CONTINUING DATA

This application is a CON of 17865307 07/14/2022 PAT 11849963

17865307 is a CON of 17498642 10/11/2021

17498642 is a CON of 16258344 01/25/2019 PAT 11154314

16258344 has PRO of 62622691 01/26/2018

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

08/09/2023

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\$6,360

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L183	7	("20150352325" "20070038225" "20150025555" "20220240959" "5911710" "8057497" "20150173782").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/10/19 12:06 PM
L184	8	("20150352325" "20070038225" "20150025555" "20220240959" "5911710" "8057497" "20150173782" "5197485").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/10/19 12:06 PM
L185	166	A61B2017/22034,2204 2,22079,22094.cpc. AND (reservoir container collect\$4) WITH (debris thromb\$5 embol\$5) AND filter SAME valve	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/10/19 03:18 PM
L186	13	A61B17/220758,32072 5.cpc. AND (reservoir container collect\$4) SAME filter SAME valve	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/10/19 03:18 PM
L187	139	A61B17/22031,22,221.c pc. AND (reservoir container collect\$4) SAME filter SAME valve	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/10/19 03:18 PM
L188	487	A61M39/0613.cpc.	(US-PGPUB; USPAT)	OR	ON	ON	2023/10/19 09:55 PM
L189	27	("10772636" "11166703 "20050203605" "2016 0192912" "2021003838 5" "20210393278" "525 6150" "5330436" "6152 144" "6540722" "71280 73" "7152605" "767813 1" "7713282" "7722641" "8080032" "8480708" " 8523897" "8535343" "8 647367" "8784469" "88 34519" "9011551" "916 8043" "9301769" "9566 073" "9717488").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2023/10/24 08:28 AM
L190	14	("10531883" "10960114 "20050004534" "2006 0264905" "2010009420 1" "20100106081" "201 60030708" "201601063 53" "20160135829" "20 170021130" "20190365	(US-PGPUB; USPAT)	OR	ON	ON	2023/10/24 08:28 AM

		395" "5234403" "5244619" "9581942").PN.					
L191	18	("11697011" "11697012" "20130030460" "20130144326" "20130204297" "20140005715" "20140180397" "20140222070" "20140324091" "20150018859" "20150150672" "20150196744" "20160038267" "20160367285" "20230200970" "20230218310" "20230218313" "20230218383").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2023/10/24 08:29 AM
L192	8	("10183159" "20070233043" "20230233311" "20230240705" "20230240706" "20230241302" "8343167" "8568465").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2023/10/24 08:29 AM
L193	55	("10058339" "10384034" "10456555" "10485952" "10926060" "10953195" "1101890" "11065019" "11185664" "11224450" "11224721" "11305094" "11383064" "11395903" "11576691" "11596768" "11744691" "20040019310" "20080312681" "20110071503" "20120109109" "20130150793" "20170143359" "20170143938" "20170281204" "20180055999" "20180250498" "20190015298" "20190366036" "20200046940" "20200121334" "20210138194" "20210205577" "20210404464" "20220033888" "20220370761" "20230059721" "20230122587" "20230248380" "20230270991" "3416531" "3860006" "4981478" "5391152" "5639276" "5971958" "7122034" "7481805" "7815608" "8021351" "8070694" "9241669" "9265512" "9532792" "9662129").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2023/10/24 08:29 AM
L194	10	("20030023263" "20030135151" "20040039351" "20110152889" "20140180055" "2020002271	(US-PGPUB; USPAT)	OR	ON	ON	2023/10/24 08:30 AM

		1" "20230310137" "20230310138" "20230310751" "6017335").PN.					
L195	1	("10799331").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/10/24 08:55 AM
L196	45	(Artificial Intelligence) Similar to: 18/358,837 with 0 CPC Selections and 0 Text Selections Text: (US-20220346814-A1 OR US-11154314-B2 OR US-20220240959- A1 OR US- 20220346813-A1 OR US-20230046775-A1 OR US-20210298773- A1 OR US-11554005- B2 OR EP-3094363-A1 OR CA-2939315-C OR US-11642209-B2 OR CN-113456168-A OR JP-2021159767-A OR KR-20210016878-A OR EP-3888570-A2 OR CN-106470728-A OR US-11096712-B2 OR AU-2015274704-B2 OR CA-2939315-A1 OR JP- 2021087777-A OR WO- 2021016213-A1 OR EP-3998966-A1 OR US-20220346801-A1 OR US-20220125450- A1 OR KR- 20220038096-A OR US-20150360001-A1 OR JP-6438495-B2 OR US-20230218383-A1 OR US-20230320834- A1 OR US- 20200121336-A1 OR EP-3639769-A1 OR CN-111067588-A OR JP-2020062317-A OR CN-114502086-A OR EP-3713507-A1 OR WO-2019102307-A1 OR US-20210186540- A1 OR US- 20210161544-A1 OR CN-115590580-A OR US-11589880-B2 OR EP-3831318-A1 OR US-11517340-B2 OR US-20230310138-A1	(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))	OR	ON	ON	2023/12/07 09:50 PM

		OR US-20230149034-A1 OR US-20230033555-A1 OR KR-20210070201-A OR US-20200281612-A1 OR EP-3705067-A2 OR JP-2023011528-A OR US-20160008014-A1 OR US-9408620-B2).did.					
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PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N75	1	(method SAME clot SAME vessel AND positioning SAME distal SAME elongated WITH shaft SAME clot AND pre NEAR charging SAME vacuum SAME pressure WITH source AND fluidly SAME connecting SAME pressure WITH source SAME shaft AND unsealing SAME attach\$5 WITH member SAME shaft AND advancing SAME device SAME through SAME attach\$5 WITH member SAME shaft AND engaging SAME device SAME second WITH portion SAME clot).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/01 09:12 AM
N76	1	(aspiration SAME system AND vacuum WITH source AND connection WITH tubing AND catheter AND filter WITH chamber SAME tubing SAME housing AND port AND fluid WITH connector AND fluid WITH path AND filter WITH chamber SAME vacuum WITH source AND flow WITH controller AND hemostasis WITH valve SAME second WITH path).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2023/12/07 07:54 PM

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

U.S. PATENTS AND PUBLICATIONS					
Examiner Initial*	Cite No	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	20110152889	06-23-2011	Ashland	
	2.	20230310138	10-05-2023	Merritt et al.	
	3.	20230310137	10-05-2023	Merritt et al.	
	4.	20230310751	10-05-2023	Merritt et al.	
	5.	20030023263	01-30-2003	Krolik et al.	
	6.	20030135151	07-17-2003	Deng	
	7.	20200022711	01-23-2020	Look et al.	
	8.	6017335	01-25-2000	Burnham	
	9.	20040039351	02-26-2004	Barrett	
	10.	20140180055	06-26-2014	Glynn et al.	
	11.	20230329734	10-19-2023	Marchand et al.	
	12.	5242461	09-07-1993	Kortenbach et al.	
	13.	11806033	11-07-2023	Marchand et al.	
	14.	3438607	04-15-1969	Williams et al.	
	15.	4401107	08-30-1983	Harber et al.	
	16.	4634421	01-06-1987	Hegemann	
	17.	5484418	01-16-1996	Quiachon et al.	
	18.	20080087853	04-17-2008	Kees	
	19.	10648268	05-12-2020	Jaffrey et al.	
	20.	20230320834	10-12-2023	Merritt et al.	
	21.	2784717	03-12-1957	E.O. Thompson	
	22.	9884387	02-06-2018	Plha	
	23.	20230338131	10-26-2023	Merritt et al.	
	24.	20230338130	10-26-2023	Merritt et al.	
	25.	2010114017	05-06-2010	Lenker et al.	
	26.	6589264	07-08-2003	Barbut et al.	
	27.	20230355259	11-09-2023	Marchand et al.	
	28.	20230355256	11-09-2023	Dinh	
	29.	20230355938	11-09-2023	Merritt et al.	
	30.	20230363883	11-16-2023	Merritt et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

31.	20170113005	04-27-2017	LINDER et al.	
32.	20110309037	12-22-2011	LEE	
33.	20080294096	11-27-2008	Uber, III et al.	
34.	20130270161	10-17-2013	KUMAR et al.	
35.				
36.				
37.				

FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number ³	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
	1.	WO2023192925	10-05-2023	Inari Medical, Inc.		
	2.	WO2019173475	09-12-2019	Innovative Cardiovascular Solutions, LLC		
	3.	WO2023215779	11-09-2023	Inari Medical, Inc.		
	4.					
	5.					
	6.					
	7.					
	8.					
	9.					

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	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
	1.	Extended European Search Report issued for EP Application No. 20877370.5, Date of Mailing: October 17, 2023, 11 pages.	
	2.	International Search Report and Written Opinion for International App. No. PCT/US23/65128; Date of Filing: March 30, 2023, Applicant: Inari Medical, Inc., Date of Mailing: November 14, 2023, 14 pages.	
	3.		
	4.		
	5.		

EXAMINER SIGNATURE

Examiner Signature		Date Considered	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

***EXAMINER:** Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw 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.

CERTIFICATION STATEMENT

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

☐ 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. See 37 CFR 1.97(e) (1).

OR

☐ 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).

☐ See attached certification statement.

☒ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ None

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references. This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, Applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.

COPIES OF REFERENCES

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Tuan Van Nguyen
	Attorney Docket Number	111552-8023.US06

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	/Matthew S. Williams/	Date (YYYY-MM-DD)	2023-11-27
Name/Print	Matthew S. Williams	Registration Number	77,516

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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.**



ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
18/358,837

RECEIPT DATE / TIME
11/27/2023 11:52:57 AM Z ET

ATTORNEY DOCKET #
111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 6598

FILED BY JiYoung Anderson

PATENT CENTER # 63378770

FILING DATE 07/25/2023

CUSTOMER # 25096

FIRST NAMED INVENTOR Richard Quick

CORRESPONDENCE ADDRESS -

AUTHORIZED BY Matthew Williams

Documents

TOTAL DOCUMENTS: 9

DOCUMENT		PAGES	DESCRIPTION	SIZE (KB)
2023-11-27 Response to NFOA 111552.8023.US06.pdf		10	-	111 KB
2023-11-27 Response to NFOA 111552.8023.US06-A....pdf	(1-1)	1	Amendment/Request for Reconsideration-After Non-Final Rejection	89 KB
2023-11-27 Response to NFOA 111552.8023.US06-IACS.pdf	(2-7)	6	Amendment Copy Claims/Response to Suggested Claims	99 KB
2023-11-27 Response to NFOA 111552.8023.US06-	(8-10)	3	Applicant Arguments/Remarks Made in an Amendment	94 KB

REM.pdf

2023-11-27 - IDS SB08 - 111552-8023US6.pdf	4	Information Disclosure Statement (IDS) Form (SB08)	134 KB
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Warning: This is not a USPTO supplied IDS fillable form. Data in the form cannot be automatically loaded to other USPTO systems.

FOR_WO2023192925.pdf	54	Foreign Reference	2231 KB
FOR_WO2019173475.pdf	114	Foreign Reference	5744 KB
FOR_WO2023215779.pdf	33	Foreign Reference	1420 KB
NPL_EESR-EP20877370.5- Oct 17 2023 11 pages.pdf	11	Non Patent Literature	1028 KB
NPL_ISR-PCTUS23_65128 Nov 14 2023 - 14 pages.pdf	14	Non Patent Literature	2410 KB

Digest

DOCUMENT

MESSAGE DIGEST(SHA-512)

2023-11-27 Response to NFOA 111552.8023.US06.pdf	10ACBAF22CA23BD7D60150C7304806EDC7FD30E635E88B25 C6E76F4D940EDAFE A126C80FF89C06A166CC5CD628870EC1 04F98DAB4A9EAB5F047DCC2C071C02EF
2023-11-27 Response to NFOA 111552.8023.US06-A....pdf	DEEFFD097A3676D27220DFF8891383D5475AB6767788483BA2 9A1740CBB9D83E489A995DA2A2A8932C21E9D1837558722BF 9572F08CF7D7FC1D666982012B1AA
2023-11-27 Response to NFOA 111552.8023.US06-IACS.pdf	B355521191AAEF978BD870AACAF4C449D0752A8447828290C FDBF153C1A70767020E470757A713A861BEE55F1A1DAE3B84 1DDFC2E7F152494FC75B033BE46B5B
2023-11-27 Response to NFOA 111552.8023.US06-REM.pdf	D8420485A8225DD04B99CA8A7B5EB6C339308D9A0950BE345 6203200F0DD29BBDEE3C7E97C1FE5A32C1552CC263756E4C

A8C07F4B99237FE74338E070F9A0916

2023-11-27 - IDS SB08 - 111552-8023US6.pdf	F1739A99EC84325BD22A18525BA0CF52E14E5DE2EFE688A4B 07A583E4E4AEF3D6AA80332269CBA82123BD1EE45538DBC57 E003537329C56B5BD242D9256CFFD2
FOR_WO2023192925.pdf	505C8B0B5181623D59604F65A91F55E7362EC91ECCFAED65C DDADF834C815E200E02C38FF719F0C512F22B547F9B3C14DD 623B59C16DAB25BFB5A8A2FC85055F
FOR_WO2019173475.pdf	46135CA36322848AC7713731C3C3A89B30E3CD582A0A4656E0 00533596F331158ECD136D065C986D6C15459727E80D1E8901 469442DD51ADE518ACC9FD2FBBD5
FOR_WO2023215779.pdf	822189693D23DE0172A440D88C414B1830B6A2EA08247722E0 4B87B1176552CCF2625D119E1A1B60EB97B33DE23A2BA3A56 E554FDC3DA071CC5608A9C2902D4F
NPL_EESR-EP20877370.5-Oct 17 2023 11 pages.pdf	965199476EC91E44333C0B2C98A43D4DB73CBBE22CD58A51 C5F767C071A88473B07F82C411A5BAB6F24DB4311E74FDAC8 03F906F3C960C97292C98BC16A40CF0
NPL_ISR-PCTUS23_65128 Nov 14 2023 - 14 pages.pdf	B168B0F8F5BB4B99A99668BDBD61735258CF29A560AF704A0 6792410EC4553843A32D74FFC82399E5242863C55E578ED67E AD1F2E132E1CA1C100D7088CCE01A

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 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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Richard Quick

Application No.: 18/358,837

Filed: July 25, 2023

For: SINGLE INSERTION DELIVERY
SYSTEM FOR TREATING
EMBOLISM AND ASSOCIATED
SYSTEMS AND METHODS

Conf. No.: 6598

Art Unit: 3771

Examiner: Tuan Van Nguyen

Customer No. 25096

AMENDMENT AND RESPONSE TO NON-FINAL OFFICE ACTION
UNDER 37 C.F.R. § 1.111

MAIL STOP AMENDMENT

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

Dear Commissioner:

In response to the Office Action mailed on October 25, 2023, please amend the above-identified application as follows:

Amendments to the Claims are reflected in the listing of claims beginning on page 2.

Remarks begin on page 8.

AMENDMENTS TO THE CLAIMS

Please amend claims 1, 4, 10–12, 15, and 20–22 and add new claims 23–30. Following is a complete listing of the claims pending in the application, as amended:

1. (Currently Amended) An aspiration system, comprising:
a vacuum source;
connection tubing fluidically coupled to the vacuum source;
a catheter fluidically coupled to the vacuum source;
a filter chamber fluidically coupled to the connection tubing at a location apart from the vacuum source, wherein the filter chamber comprises a housing and a filter within the housing, and wherein the housing includes—
a port configured to be fluidically coupled to the catheter; and
a fluid connector configured to be fluidically coupled to the connection tubing; and
wherein the filter is in the housing along a first ~~flow~~ fluid path, wherein the ~~filter~~ first fluid path fluidically couples the port and the fluid connector, and
wherein the catheter is fluidically coupled to the vacuum source via the filter chamber along the first ~~flow~~ fluid path;
a flow controller fluidically coupling the filter chamber to the catheter, wherein the flow controller is along the first ~~flow~~ fluid path between the filter chamber and the catheter ~~such that flow from the catheter to the filter chamber is controlled proximate to the catheter~~; and
a hemostasis valve fluidically coupled to the catheter along a second ~~flow~~ fluid path at least partially different than the first ~~flow~~ fluid path, wherein the hemostasis valve is configured to maintain hemostasis by ~~preventing~~ inhibiting proximal fluid flow along the second ~~flow~~ fluid path when an interventional device is inserted through the hemostasis valve and the catheter.

2. (Original) The aspiration system of claim 1 wherein the flow controller comprises a flow control unit between the filter chamber and the catheter.

3. (Original) The aspiration system of claim 2 wherein the flow control unit comprises a user-actuable valve.

4. (Currently Amended) The aspiration system of claim 1 wherein the catheter is fluidically connected in serial to the ~~catheter~~ filter chamber along the first ~~flow~~ fluid path.

5. (Original) The aspiration system of claim 1, further comprising the interventional device.

6. (Original) The aspiration system of claim 5 wherein the interventional device is configured to be inserted through the hemostasis valve and the catheter past a distal end portion of the catheter.

7. (Original) The aspiration system of claim 6 wherein the interventional device comprises:

an elongate shaft having a distal portion; and

a clot engagement member coupled to a distal portion of the elongate shaft, wherein the clot engagement member is shaped and sized to disrupt clot material.

8. (Original) The aspiration system of claim 1 wherein the filter is removable from within the housing.

9. (Original) The aspiration system of claim 1 wherein the filter chamber is removably coupled to the connection tubing.

10. (Currently Amended) The aspiration system of claim 1 wherein the filter ~~is coupled around~~ encloses a region within the housing, wherein the fluid connector is proximal to the enclosed region along the first fluid path, and wherein the filter includes a plurality of pores sized to inhibit clot material from flowing therethrough and to permit blood to flow therethrough.

11. (Currently Amended) The aspiration system of claim 1 wherein a distal portion of the first ~~flow-fluid~~ path and a distal portion of the second ~~flow-fluid~~ path overlap.

12. (Currently Amended) An aspiration system, comprising:
a vacuum source;
a catheter fluidically coupled to the vacuum source via a first ~~flow-fluid~~ path;
a filter chamber along the first ~~flow-fluid~~ path and spaced apart from the vacuum source, wherein the filter chamber comprises a housing and a filter within the housing, and wherein the housing includes—
a first port configured to be fluidically coupled to the catheter; and
a second port configured to be fluidically coupled to the vacuum source; and
wherein the filter is in the housing along the first ~~flow-fluid~~ path between the first port and the second port;
a flow controller fluidically coupling the filter chamber to the catheter, wherein the flow controller is along the first ~~flow-fluid~~ path between the filter chamber and the catheter ~~such that flow from the catheter to the filter chamber is controlled proximate to the catheter~~; and
a hemostasis valve fluidically coupled to the catheter along a second ~~flow-fluid~~ path at least partially different than the first ~~flow-fluid~~ path, wherein the hemostasis valve is configured to maintain hemostasis by ~~preventing-inhibiting~~ proximal fluid flow along the second ~~flow-fluid~~ path when an interventional device is inserted through the hemostasis valve and the catheter.

13. (Original) The aspiration system of claim 12 wherein the flow controller comprises a flow control unit between the filter chamber and the catheter.

14. (Original) The aspiration system of claim 13 wherein the flow control unit comprises a user-actuable valve.

15. (Currently Amended) The aspiration system of claim 12 wherein the catheter is fluidically connected in serial to the filter chamber along the first flow-fluid path ~~is fluidically connected in serial to the second flow path.~~

16. (Original) The aspiration system of claim 12, further comprising the interventional device.

17. (Original) The aspiration system of claim 16 wherein the interventional device is configured to be inserted through the hemostasis valve and the catheter past a distal end portion of the catheter.

18. (Original) The aspiration system of claim 17 wherein the interventional device comprises:

an elongate shaft having a distal portion; and

a clot engagement member coupled to a distal portion of the elongate shaft, wherein the clot engagement member is shaped and sized to disrupt clot material.

19. (Original) The aspiration system of claim 12 wherein the filter is removable from within the housing.

20. (Currently Amended) The aspiration system of claim 12 wherein the filter chamber is removably coupled along the first flow-fluid path.

21. (Currently Amended) The aspiration system of claim 12 wherein the filter encloses a region within the housing, wherein the second port is proximal to the enclosed region along the first fluid path, and wherein the filter includes a plurality of pores sized to inhibit clot material from flowing therethrough and to permit blood to flow therethrough.

22. (Currently Amended) The aspiration system of claim 12 wherein a distal portion of the first ~~flow~~fluid path and a distal portion of the second ~~flow~~fluid path overlap.

23. (New) The aspiration system of claim 12 wherein the hemostasis valve comprises a tubular member, a button, and a filament coupled to the button and the tubular member, and wherein the button is configured to be actuated from a first position to a second position to loosen the filament to allow the tubular member to expand to unseal the hemostasis valve to allow the interventional device to be inserted through the hemostasis valve.

24. (New) The aspiration system of claim 23 wherein the button is movable from the second position to the first position to tighten the filament to allow the tubular member to collapse and seal about a portion of the interventional device.

25. (New) The aspiration system of claim 24 wherein the hemostasis valve further comprises a spring configured to bias the button to the first position.

26. (New) The aspiration system of claim 12 wherein the vacuum source is syringe.

27. (New) The aspiration system of claim 12 wherein the vacuum source comprises a vacuum chamber, and wherein the catheter is fluidically coupled to vacuum chamber via the first fluid path.

28. (New) The aspiration system of claim 1 wherein—

the hemostasis valve comprises a tubular member, a button, a spring coupled to the button, and a filament coupled to the button and the tubular member, the button is configured to be actuated from a first position to a second position to loosen the filament to allow the tubular member to expand to unseal the hemostasis valve to allow the interventional device to be inserted through the hemostasis valve, and the spring is configured to bias the button to the first position.

29. (New) The aspiration system of claim 1 wherein the vacuum source is syringe.

30. (New) The aspiration system of claim 1 wherein the vacuum source comprises a vacuum chamber, wherein the connection tubing is fluidically coupled to the vacuum chamber, and wherein the catheter is fluidically coupled to the vacuum chamber via the filter chamber along the first fluid path.

REMARKS

Claims 1–22 were pending when the present Office Action was mailed on October 25, 2023. In this response, claims 1, 4, 10–12, 15, and 20–22 have been amended to further clarify certain features of these claims and to expedite prosecution of this application. As discussed during the November 9th telephone interview, no new matter has been added. The foregoing amendments are made without commenting on or conceding the merits of the rejections of these claims and without prejudice to or disclaimer of pursuing the subject matter of these claims in a continuation or other related application. New claims 23–30 have been added in this response; no claims have been canceled. Accordingly, claims 1–30 are currently pending.

The status of the claims in view of the Office Action dated October 25, 2023 is as follows:

- (A) Claim 10 was rejected under 35 U.S.C. § 112(b); and
- (B) Claims 1–9 and 11–22 were indicated to be allowable, and claim 10 was indicated to be allowable if the Section 112(b) rejection was overcome.

As a preliminary matter, the undersigned attorney wishes to thank the Examiner for engaging in a productive telephone interview on November 9, 2023 to discuss the present Office Action and proposed amendments to claims 1 and 10. At that time, the Examiner agreed that the Section 112(b) rejection of claim 10 would be overcome if amended as set forth herein, and that the amendments to claim 1 do not affect the allowability of this claim.

The following remarks summarize and expand on the November 9th telephone interview and reflect the agreements reached between the Examiner and the undersigned attorney. Accordingly, the Applicant requests that this paper constitute the Applicant's Interview Summary. If the Examiner notices any deficiencies in this regard, the Examiner is encouraged to contact the undersigned attorney so that any such deficiencies can be addressed.

(A) Response to the Section 112(b) Rejection of Claim 10

Claim 10 was rejected under 35 U.S.C. § 112(b) as allegedly being indefinite. Without commenting on or conceding the merits of this rejection, claim 10 has been amended to address the alleged indefiniteness. Accordingly, as discussed and agreed upon during the November 9th telephone interview, the Section 112(b) rejection of claim 10 should be withdrawn.

(B) Indication of Allowable Subject Matter

Claims 1–9 and 11–22 were indicated to be allowable, and claim 10 was indicated to be allowable if the Section 112(b) rejection was overcome. As noted above, the Section 112(b) rejection of claim 10 should be withdrawn.

The Applicant thanks the Examiner for indicating that claims 1–22 are allowable. Although the undersigned attorney agrees with the Examiner’s conclusion that claims 1–22 are allowable, the undersigned attorney notes that these claims may be allowable for reasons other than those identified by the Examiner and does not concede that the Examiner’s characterization of the terms of these claims and the prior art are correct.

New Claims 23–30

New claims 23–30 depend from one of independent claims 1 and 12. Accordingly, new claims 23–30 are allowable for at least the reason that they depend from an allowable base claim, and for the additional features of these dependent claims.

Conclusion

In view of the foregoing, the pending claims comply with 35 U.S.C. § 112 and are patentable over the applied art. The Applicant accordingly requests reconsideration of the application and respectfully submits that the application is in condition for allowance. If the Examiner has any questions or believes a telephone conference would expedite prosecution of this application, the Examiner is encouraged to contact the undersigned at (206) 359-3343.

Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, the Applicant is not conceding that previously pending claims are not patentable over the cited references; instead, any alteration or characterizations are being made to expedite prosecution of this application.

The Applicant also reserves the right to later pursue any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter that might be found disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that the Applicant has made any disclaimers or disavowals of any subject matter supported by the present application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any underpayment or credit any overpayment to Deposit Account No. 50-0665, under Order No. 111552.8023.US06 from which the undersigned is authorized to draw.

Dated: November 27, 2023

Respectfully submitted,

By: /Matthew S. Williams/
Matthew S. Williams
Registration No.: 77,516

PERKINS COIE LLP
P.O. Box 1247
Seattle, Washington 98111-1247
Telephone: 206.359.3343
Facsimile: 206.359.7198

Attorney for Applicant



ELECTRONIC PAYMENT RECEIPT

APPLICATION #
18/358,837

RECEIPT DATE / TIME
11/27/2023 11:52:57 AM Z ET

ATTORNEY DOCKET #
111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 6598

FILED BY J iYoung Anderson

PATENT CENTER # 63378770

AUTHORIZED BY Matthew Williams

CUSTOMER # 25096

FILING DATE 07/25/2023

CORRESPONDENCE ADDRESS -

FIRST NAMED INVENTOR Richard Quick

Payment Information

PAYMENT METHOD
CARD / 3369

PAYMENT TRANSACTION ID
E2023AQB54009298

PAYMENT AUTHORIZED BY
J iYoung Anderson

FEE CODE	DESCRIPTION	ITEM PRICE(\$)	QUANTITY	ITEM TOTAL(\$)
1806	SUBMISSION OF AN INFORMATION DISCLOSURE STATEMENT	260.00	1	260.00
TOTAL AMOUNT:				\$260.00

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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.

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.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 18/358,837		Filing Date 07/25/2023		☐ To be Mailed			
ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO											
APPLICATION AS FILED - PART I											
		(Column 1)		(Column 2)							
FOR		NUMBER FILED		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 \$100 =					
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 = *				x \$480 =					
☐ 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	11/27/2023	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA		RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 30	Minus	** 22	= 8			x \$100 =		800	
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0			x \$480 =		0	
	☐ Application Size Fee (37 CFR 1.16(s))										
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
								TOTAL ADD'L FEE		800	
		(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".								/POLIN ANG/			
*** 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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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
18/358,837	07/25/2023	Richard Quick	111552.8023.US06

CONFIRMATION NO. 6598

25096
PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

PUBLICATION NOTICE



Date Mailed: 11/16/2023

Title:SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Publication No.US-2023-0363776-A1

Publication Date:11/16/2023

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.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/358,837	07/25/2023	Richard Quick	111552.8023.US06	6598
25096	7590	11/15/2023	EXAMINER	
PERKINS COIE LLP - SEA General			NGUYEN, TUAN VAN	
PATENT-SEA			ART UNIT	PAPER NUMBER
P.O. BOX 1247			3771	
SEATTLE, WA 98111-1247			NOTIFICATION DATE	DELIVERY MODE
			11/15/2023	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):

patentprocurement@perkinscoie.com

<i>Applicant-Initiated Interview Summary</i>	Application No. 18/358,837	Applicant(s) Quick, Richard		
	Examiner TUAN V NGUYEN	Art Unit 3771	AIA (First Inventor to File) Status Yes	Page 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	Title	Type
TUAN V NGUYEN	Primary Examiner	Telephonic
MATTHEW WILLIAMS		

Date of Interview: 09 November 2023

Issues Discussed:

Proposed Amendment(s)

In a telephonic interview with applicant's representative on November 9, 2023, a proposed amendment to claim 1 and 10 was discussed (see attachment). As to claim 1, applicant amendment the claim to improve clarity of the scope of the invention. Examiner agreed with the proposed amendment to claim 1. As to claim 10, examiner stated the proposed amendment overcome the 112b rejection in the most recent Office action.

☒ Attachment

/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771	
<p>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</p> <p>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</p>	

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.

PATENT**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

IN RE APPLICATION OF: RICHARD QUICK
 APPLICATION NO.: 18/358,837
 FILED: JULY 25, 2023
 FOR: SINGLE INSERTION DELIVERY SYSTEM FOR
 TREATING EMBOLISM AND ASSOCIATED
 SYSTEMS AND METHODS

EXAMINER: TUAN VAN NGUYEN
 ART UNIT: 3771
 CONF. NO: 6598

Proposed Agenda**DO NOT ENTER—FOR DISCUSSION
PURPOSES ONLY**

Examiner Nguyen,

The present paper is an agenda for a telephone interview regarding U.S. Patent Application No. 18/358,837 scheduled for Thursday, November 9, 2023 at 9:00 AM (Eastern). I will call you at 571-272-5962.

The proposed list of participants for the interview representing the Applicant includes:

- Matthew S. Williams (Reg. No. 77,516)

During the interview, the Applicant's representative plans to discuss:

(1) Discussion of proposed amendment to independent claim 1:

1. (Proposed Amendment) An aspiration system, comprising:
 a vacuum source having a vacuum chamber;
 connection tubing fluidically coupled to the vacuum ~~source~~chamber;
 a catheter fluidically coupled to the vacuum ~~source~~chamber;
 a filter chamber fluidically coupled to the connection tubing at a location apart from the vacuum source, wherein the filter chamber comprises a housing and a filter within the housing, and wherein the housing includes—

a port configured to be fluidically coupled to the catheter; and
 a fluid connector configured to be coupled to the connection tubing; and
 wherein the filter is in the housing along a first ~~fluid flow~~-path, wherein the filter
~~first fluid path~~ fluidically couples the port and the fluid connector, and
 wherein the catheter is fluidically coupled to the vacuum ~~source chamber~~
 via the filter chamber along the first ~~fluid flow~~-path;

a flow controller fluidically coupling the filter chamber to the catheter, wherein the flow
 controller is along the first ~~fluid flow~~-path between the filter chamber and the
 catheter ~~such that flow from the catheter to the filter chamber is controlled~~
~~proximate to the catheter~~; and

a hemostasis valve fluidically coupled to the catheter along a second ~~fluid flow~~-path at
 least partially different than the first ~~fluid flow~~-path, wherein the hemostasis valve
 is configured to maintain hemostasis by preventing proximal ~~fluid fluid~~-flow
 along the second ~~fluid flow~~-path when an interventional device is inserted through
 the hemostasis valve and the catheter.

(2) Discussion of a proposed amendment to dependent claim 10:

10. (Proposed Amendment) The aspiration system of claim 1 wherein the filter is
~~coupled around~~encloses a region within the housing, wherein the fluid connector, is proximal to
~~the enclosed region along the first fluid path~~, and wherein the filter includes a plurality of pores
 sized to inhibit clot material from flowing therethrough and to permit blood to flow therethrough.

(3) Discussion of the Section 112(b) rejection of claim 10 in view of the proposed amendment to claim 10.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/358,837	07/25/2023	Richard Quick	111552.8023.US06	6598

25096 7590 10/25/2023
PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

EXAMINER

NGUYEN, TUAN VAN

ART UNIT	PAPER NUMBER
----------	--------------

3771

NOTIFICATION DATE	DELIVERY MODE
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10/25/2023

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patentprocurement@perkinscoie.com

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Priority

1. This application is a continuation of U.S. Patent Application No. 17/865,307, filed July 14, 2022, which is a continuation of U.S. Patent Application No. 17/498,642, filed on October 11, 2021, which is a continuation of U.S. Patent Application No. 16/258,344, filed on January 25, 2019, which is now issued as U.S. Patent No. 11,154,314, which claims the benefit of U.S. Provisional Patent Application No. 62/622,691, filed on January 26, 2018.

Claim Rejections - 35 USC § 112

1. 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.

2. Claim 10 is 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 applications subject to pre-AIA 35 U.S.C. 112, the applicant), regards as the invention.

3. Claim 10 recites “the filter is coupled **around** the fluid connector” (emphasis added). Attention is directed to Figs. 3A-3C. Fig. 3A is reproduced below. The figure fails to show filter 321 is coupled around the fluid connector 332. Therefore, the limitation above renders the scope of claim 10 unclear.

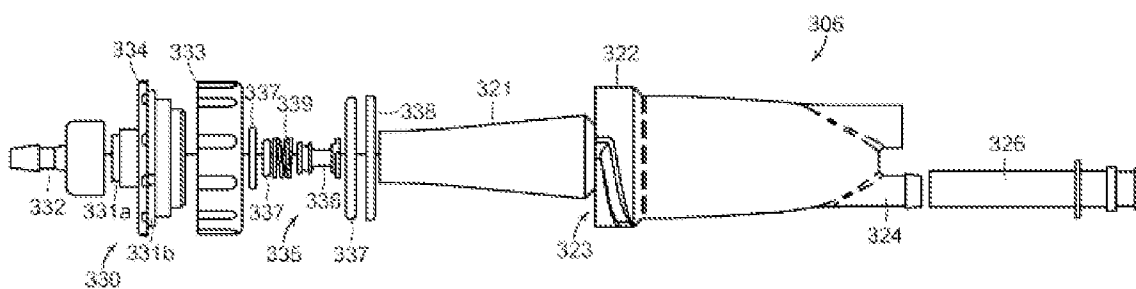


FIG. 3A

Allowable Subject Matter

1. Claims 1-9 and 11-22 are allowable.
2. Claim 10 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), 2nd paragraph, set forth in this Office action.
3. Quick (US 20150352325, which is cited in the IDS filed on August 8, 2023), which is the best prior art, discloses an aspiration system, comprising: a vacuum source (syringe 108 of pressure source 106, which is located inside handle 102, Figs. 1B-4A; para [0032]-[0034] and [0045]); connection tubing fluidically coupled to the vacuum source 302a (Fig. 4A); a catheter 206 fluidically coupled to the vacuum source (para [0051]); a flow controller 310 (Fig. 4A, para [0052]) fluidically coupling the filter chamber to the catheter, wherein the flow controller is along the first flow path between the filter

chamber and the catheter such that flow from the catheter to the filter chamber is controlled proximate to the catheter.

4. There is no art of record alone or in combination teach an aspiration system that includes the combination of recited limitations in claims 1 and 12. Prior art of record alone or in combination did not teach the limitation of a filter chamber coupled to the connection tubing at a location apart from the vacuum source, wherein the filter chamber comprises a housing and a filter within the housing, and wherein the housing includes a port configured to be fluidically coupled to the catheter; and a fluid connector configured to be coupled to the connection tubing; and wherein the filter is in the housing along a first flow path, wherein the filter fluidically couples the port and the fluid connector, and wherein the catheter is fluidically coupled to the vacuum source via the filter chamber along the first flow path; and a hemostasis valve fluidically coupled to the catheter along a second flow path at least partially different than the first flow path, wherein the hemostasis valve is configured to maintain hemostasis by preventing proximal fluid flow along the second flow path when an interventional device is inserted through the hemostasis valve and the catheter.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TUAN V NGUYEN whose telephone number is (571)272-5962. The examiner can normally be reached Monday - Friday 8:30 AM - 5:30 PM.

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, Jackie Ho can be reached on 571-272-4696. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/TUAN V NGUYEN/
Primary Examiner, Art Unit 3771

<i>Search Notes</i> 	Application/Control No. 18/358,837	Applicant(s)/Patent Under Reexamination Quick, Richard
	Examiner TUAN V NGUYEN	Art Unit 3771

CPC - Searched*		
Symbol	Date	Examiner
A61B17/22031,22,221,220758,320725	10/19/2023	TN
A61B2017/22034,22042,22079,22094	10/19/2023	TN
A61M1/60,0001,0003	10/19/2023	TN
A61M2039/027	10/19/2023	TN

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
Group/subgroups combined with text (see search history printout)	10/19/2023	TN

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/TUAN V NGUYEN/ Primary Examiner, Art Unit 3771	
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Doc code: IDS

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Doc description: Information Disclosure Statement (IDS) Filed

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552.8023.US06

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Examiner Initial*	Cite No	Foreign Document Number ²	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
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NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	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

EXAMINER SIGNATURE			
Examiner Signature	/TUAN V NGUYEN/	Date Considered	10/19/2023
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw 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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CERTIFICATION STATEMENT

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

☐ 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. See 37 CFR 1.97(e) (1).

OR

☐ 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references. This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, Applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.

COPIES OF REFERENCES

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

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	/Matthew S. Williams/	Date (YYYY-MM-DD)	2023-08-14
Name/Print	Matthew S. Williams	Registration Number	77,516

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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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	Attorney Docket Number	111552.8023.US06

U.S. PATENTS AND PUBLICATIONS					
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	First Named Inventor	Richard Quick
	Art Unit	Not Yet Assigned
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	Not Yet Assigned
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552.8023.US06

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	First Named Inventor	Richard Quick
	Art Unit	Not Yet Assigned
	Examiner Name	Not Yet Assigned
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	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	Not Yet Assigned
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552.8023.US06

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33. **	GOLDHABER, S. et al. "Percutaneous Mechanical Thrombectomy for Acute Pulmonary Embolism - A Double-Edged Sword," American College of CHEST Physicians, August 2007, 132:2, 363-372.
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35. **	International Search Report and Written Opinion for International App. No. PCT/US2017/029696, Date of Filing: April 26, 2017, Applicant: Inari Medical, Inc., Date of Mailing: September 15, 2017, 19 pages.
36. **	International Search Report and Written Opinion for International App. No. PCT/US2016/058536, Date of Filing: October 24, 2016, Applicant: Inari Medical, Inc., Date of Mailing: March 13, 2017, 14 pages.
37. **	International Search Report and Written Opinion for International App. No. PCT/US2018/048786, Date of Filing: August 30, 2018, Applicant: Inari Medical, Inc., Date of Mailing: December 13, 2018, 12 pages.
38. **	International Search Report and Written Opinion for International App. No. PCT/US2018/055780, Date of Filing: October 13, 2018, Applicant: Inceptus Medical LLC., Date of Mailing: January 22, 2019, 8 pages.
39. **	International Search Report and Written Opinion for International App. No. PCT/US2019/045794, Date of Filing: August 8, 2019, Applicant: Inari Medical, Inc., Date of Mailing: November 1, 2019, 17 pages.
40. **	International Search Report and Written Opinion for International App. No. PCT/US2020/056067, Date of Filing: October 16, 2020; Applicant: Inari Medical, Inc., Date of Mailing: January 22, 2021, 8 pages.
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Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552.8023.US06

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52. **	International Search Report and Written Opinion for International App. No. PCT/US21/45072 Date of Filing: August 6, 2021, Applicant: Inari Medical, Inc., Date of Mailing: January 20, 2022, 10 pages.
53. **	International Search Report and Written Opinion for International App. No. PCT/US21/58793; Date of Filing: November 10, 2021, Applicant: Inari Medical, Inc., Date of Mailing: March 16, 2022, 13 pages.
54. **	International Search Report and Written Opinion for International App. No. PCT/US21/59718; Date of Filing: November 17, 2021, Applicant: Inari Medical, Inc., Date of Mailing: March 22, 2022, 13 pages.
55. **	International Search Report and Written Opinion for International App. No. PCT/US21/59735; Date of Filing: November 17, 2021, Applicant: Inari Medical, Inc., Date of Mailing: March 22, 2022, 11 pages.
56.	International Search Report and Written Opinion for International App. No. PCT/US23/60502; Date of Filing: January 11, 2023, Applicant: Inari Medical, Inc., Date of Mailing: May 25, 2023, 9 pages.
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EXAMINER SIGNATURE

Examiner Signature	/TUAN V NGUYEN/	Date Considered	10/19/2023
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw 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.

Doc code: IDS

PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552.8023.US06

CERTIFICATION STATEMENT

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

☐ 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. See 37 CFR 1.97(e) (1).

OR

☐ 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references. This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, Applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.

COPIES OF REFERENCES

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2). Those documents which are marked with a double asterisk (**) next to the Cite No. in the attached form PTO/SB/08 are not supplied because they were previously cited by or submitted to the Office in prior application numbers **16/258,344**, filed on **January 25, 2019** and **17/865,307**, filed on **July 14, 2022** relied upon in this application for an earlier filing date under 35 U.S.C. § 120.

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	/Matthew S. Williams/	Date (YYYY-MM-DD)	2023-08-08
Name/Print	Matthew S. Williams	Registration Number	77,516

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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.**

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	1	"20190231373"	(US-PGPUB; USPAT)	OR	ON	ON	2020/10/05 09:38 PM
L2	13	((("Inari") near3 ("Medical") near3 ("Inc"))).AS.AANM.	(USPAT)	OR	ON	ON	2020/10/06 04:04 PM
L3	253	((("Quick") near3 ("Richard"))).INV.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2020/10/06 04:05 PM
L5	5718	A61B2017/22042.2209 4,22034.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 06:42 PM
L6	4652	A61M25/0082.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 06:43 PM
L7	2813	A61B2017/22079.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 06:43 PM
L8	1954	A61M2210/12.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 06:44 PM
L10	5718	A61B2017/22042.2209 4,22034.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 08:30 PM
L11	22	L10 and (adapt\$3 connector) same seal same lock\$4 same (catheter sheath)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 08:30 PM
L12	4652	A61M25/0082.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 08:30 PM
L13	8	L12 and (adapt\$3 connector) same seal same lock\$4 same (catheter sheath)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 08:30 PM
L14	2813	A61B2017/22079.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 08:30 PM
L15	48	L14 and (adapt\$3 connector) same seal same lock\$4 same (catheter sheath)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 08:30 PM
L16	1954	A61M2210/12.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	ON	ON	2020/10/06 08:30 PM

			JPO; DERWENT; IBM_TDB)				
L17	18	L16 and (adapt\$3 connector) same seal same lock\$4 same (catheter sheath)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 08:30 PM
L18	36	L16 and (adapt\$3 connector) same seal and (adapt\$3 connector) same lock\$4 and lock\$4 same (catheter sheath)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 08:31 PM
L19	3089	A61B17/22031.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 08:31 PM
L20	24	L19 and (adapt\$3 connector) same seal and (adapt\$3 connector) same lock\$4 and lock\$4 same (catheter sheath)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 08:31 PM
L21	53	L10 and (adapt\$3 connector) same seal and (adapt\$3 connector) same lock\$4 and lock\$4 same (catheter sheath)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 08:31 PM
L22	33	L12 and (adapt\$3 connector) same seal and (adapt\$3 connector) same lock\$4 and lock\$4 same (catheter sheath)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 08:31 PM
L23	84	L14 and (adapt\$3 connector) same seal and (adapt\$3 connector) same lock\$4 and lock\$4 same (catheter sheath)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 08:31 PM
L24	36	L16 and (adapt\$3 connector) same seal and (adapt\$3 connector) same lock\$4 and lock\$4 same (catheter sheath)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 08:31 PM
L25	12081	A61B17/221.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 08:40 PM
L26	39	L25 and clean\$4 same repeat\$4	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 08:40 PM

L27	24	L25 and clean\$4 same reinsert\$4	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 08:44 PM
L28	44	L25 and (adapt\$3 connector) same seal and (adapt\$3 connector) same lock\$4 and lock\$4 same (catheter sheath)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 08:46 PM
L29	36	L16 and (adapt\$3 connector) same seal\$4 and (adapt\$3 connector) same lock\$4 and lock\$4 same (catheter sheath)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 09:00 PM
L30	55	L10 and (adapt\$3 connector) same seal\$4 and (adapt\$3 connector) same lock\$4 and lock\$4 same (catheter sheath)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 09:00 PM
L31	187	L10 and (adapt\$3 connector attachment coupl\$4) same seal\$4 and (adapt\$3 connector attachment coupl\$4) same lock\$4 and lock\$4 same (catheter sheath)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 09:01 PM
L32	61	L12 and (adapt\$3 connector attachment coupl\$4) same seal\$4 and (adapt\$3 connector attachment coupl\$4) same lock\$4 and lock\$4 same (catheter sheath)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 09:01 PM
L33	163	L14 and (adapt\$3 connector attachment coupl\$4) same seal\$4 and (adapt\$3 connector attachment coupl\$4) same lock\$4 and lock\$4 same (catheter sheath)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 09:01 PM
L34	137	L16 and (adapt\$3 connector attachment coupl\$4) same seal\$4 and (adapt\$3 connector attachment coupl\$4) same lock\$4 and lock\$4 same (catheter sheath)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 09:01 PM
L35	113	L19 and (adapt\$3 connector attachment coupl\$4) same seal\$4 and (adapt\$3 connector attachment coupl\$4)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/06 09:02 PM

		same lock\$4 and lock\$4 same (catheter sheath)					
L36	226	604/159.ccls.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/07 09:16 AM
L37	7358	A61M25/01.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/07 09:21 AM
L38	1983	A61M25/01.cpc.	(US-PGPUB; USPAT)	OR	ON	ON	2020/10/07 09:21 AM
L39	7358	A61M25/01.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/07 03:21 PM
L40	1983	A61M25/01.cpc.	(US-PGPUB; USPAT)	OR	ON	ON	2020/10/07 03:22 PM
L41	5375	L39 not L40	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/07 03:22 PM
L42	47	L41 and (adapt\$3 connector attachment coupl\$4) same seal\$4 and seal\$4 same (sheath catheter)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/07 03:25 PM
L43	126	A61M25/0122.cpc.	(US-PGPUB; USPAT)	OR	ON	ON	2020/10/07 09:08 PM
L45	3089	A61B17/22031.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/07 09:11 PM
L47	1745	A61B2017/22035.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/07 09:12 PM
L48	1	("20150335416").PN	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/10/08 09:58 AM
L49	19178	A61F2/95.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/09 09:39 AM
L50	12084	A61B17/221.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/09 10:09 AM
L51	7	L50 and clean\$4 same reinsert\$4 and clean\$4 same (new prestine)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/09 10:09 AM
L52	1	("20090163896").PN	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/10/09 11:30 AM

L53	338	A61B17/22031.cpc. and clamp	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/09 04:53 PM
L54	135	A61B17/22031.cpc. and clamp same tub\$4	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/09 04:53 PM
L55	21	606/159.ccls. and (releas\$4 open\$3 unlock\$4) with seal with catheter	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/09 05:36 PM
L56	537	(releas\$4 open\$3 unlock\$4) with seal with catheter and 606/\$.ccls.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/10 10:35 AM
L57	1	("5911710").PN.	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/10/10 10:46 AM
L58	7	604/249.ccls. and hemostasis with seal	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/10 10:59 AM
L59	875	604/249.ccls.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/10 11:02 AM
L60	2426	604/246.ccls.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/10 11:02 AM
L61	2881	A61M2039/062.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2020/10/10 12:38 PM
L62	752	A61M2039/062.cpc.	(US-PGPUB; USPAT)	OR	ON	ON	2020/10/10 12:38 PM
L63	104	("4000739" "4029099" "4062363" "4205675" "4327723" "4327735" "4362150" "4424833" "4430081" "4483340" "4551137" "4564014" "4582181" "4613329" "4634433" "4638805" "4657536" "4684363" "4692200" "4696304" "4714461" "4715378" "4726374" "4748982" "4759751" "4767409" "4793351" "4811737" "4821722" "4844092" "4846174" "4917094" "4930341" "4983167" "5114408" "5149326").PN. OR	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2020/10/10 01:42 PM

L68	8	("5334153").URPN. (("10524811") or ("10912577") or ("20110152823") or ("20210113224") or ("20110160763") or ("20050283165") or ("20110125181") or ("20020095171")).PN.	(US-PGPUB; USPAT)	OR	ON	ON	2021/06/18 08:07 AM
L71	2	wo-2020036809-\$.did.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/06/18 02:54 PM
L72	1	("20200046368").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2021/06/18 02:56 PM
L73	19	((("Inari") near3 ("Medical") near3 ("Inc"))).AS,AANM.	(USPAT)	OR	ON	ON	2022/09/01 02:14 PM
L74	277	((("Quick") near3 ("Richard"))).INV	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/09/01 02:16 PM
L77	17	("5102417" "5603698" "5662700" "5876436" "6719790" "7462191" "7544198" "8414632" "20030144670" "20030199849" "20040106900" "20040236403" "20060036263" "20060264905" "20070270780" "20080015625" "20080167522").pn. OR ("9408694").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/09/01 04:38 PM
L78	1	("8876848").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/01 04:45 PM
L79	62	("4364391" "4884579" "5057083" "5058580" "5095915" "5465733" "5474535" "5773020" "5865826" "5885217" "5910134" "5980493" "6637435" "6695850" "6814718" "6926728" "7198631" "7306574" "7632277" "7695489" "7713193" "7776062" "8202289" "8396532" "8485969" "20020026207" "20020133128" "20040015138" "20040138589"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/09/01 04:45 PM

		"20040243212" "20050131393" "20050216007" "20050234437" "20060124134" "20060208028" "20070060927" "20070156219" "20080009797" "20080009823" "20080125791" "20080146967" "20090024089" "20090209912" "20090216238" "20090306657" "20090312784" "20090318896" "20100010334" "20100016984" "20100036226" "20100262158" "20100298832" "20110087234" "20110166579" "20110245800" "20110275935" "20110319898" "20120116323" "20120123464" "20120316565" "20130255694").pn. OR ("8876848").urpn. AND (PGPB USPT USOC).dbnm.					
L82	3748	A61M1/0281.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	2022/09/06 09:13 AM
L83	1730	A61M1/0281.cpc. AND filter	(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	2022/09/06 09:13 AM

			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)				
L84	676	A61M1/0281.cpc. AND filter AND valve	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, 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, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/06 09:13 AM
L85	32	A61M1/008.cpc. AND filter AND valve	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, 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, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/06 09:15 AM
L86	115	A61B17/22031,22,221.cpc. AND (reservoir container collect\$4) SAME filter SAME valve	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/06 10:23 AM
L87	12	A61B17/220758,320725.cpc. AND (reservoir container collect\$4) SAME filter SAME valve	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/06 10:24 AM
L88	122	A61B2017/22034,22042,22079,22094.cpc. AND (reservoir container collect\$4) WITH (debris thromb\$5 embol\$5) AND filter	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/06 10:34 AM

		SAME valve					
L89	188	("4164223" "4315506" "4458877" "4662871" "4696669" "4767403" "4902276" "4911399" "5254085" "5318546" "5496267" "5704584" "6193732" "6226843" "6261283" "6423028" "6471683" "6689109" "6887220" "6960189" "7004931" "7033336" "7178699" "7472882" "7530976" "7641170" "7713276" "7717853" "7918822" "7931659" "7976515" "7998168" "8206374" "8287654" "8333796" "8366726" "8366735" "8435225" "8460312" "8465507" "8518017" "8568370" "8617106" "8636754" "8647294" "8690907" "8715314" "8721595" "8770542" "8814778" "8852218" "8911487" "8932321" "9017349" "9119656" "9186151" "9248228" "9402757" "9402985" "9526864" "9526865" "9554805" "9572933" "9615832" "9615951" "9623230" "9655633" "9775621" "9820761" "9883863" "9901351" "9901352" "9943321" "9980841" "10166024" "10299947" "20030023263" "20030229368" "20040102716" "20040267305" "20050149068" "20050182432" "20050256447" "20050273122" "20060025794" "20060058837" "20060264995" "20070060888" "20070100276" "20070129652" "20070239261" "20080015478" "20080154184" "20080163731"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/09/06 10:38 AM

		"20080208324"					
		"20080319355"					
		"20090012545"					
		"20090030400"					
		"20090120957"					
		"20090187198"					
		"20100204672"					
		"20100217276"					
		"20110160621"					
		"20110184454"					
		"20110238147"					
		"20110313328"					
		"20110314977"					
		"20110319927"					
		"20120078140"					
		"20120078285"					
		"20120150147"					
		"20120171055"					
		"20120289892"					
		"20120330196"					
		"20130110087"					
		"20130261730"					
		"20130299032"					
		"20140128907"					
		"20140180377"					
		"20140358175"					
		"20150073524"					
		"20150157378"					
		"20150173767"					
		"20150196304"					
		"20150223813"					
		"20150342682"					
		"20150374380"					
		"20160008001"					
		"20160166265"					
		"20160166266"					
		"20160220741"					
		"20160220807"					
		"20160278895"					
		"20170027730"					
		"20170095259"					
		"20170105743"					
		"20170120039"					
		"20170135700"					
		"20170136209"					
		"20170143938"					
		"20170147765"					
		"20170151032"					
		"20170169374"					
		"20170172581"					
		"20170215902"					
		"20170238950"					
		"20170238951"					
		"20170238953"					
		"20170239440"					
		"20170239441"					
		"20170239447"					
		"20170252536"					

		"20170296195" "20170333170" "20170340797" "20170354777" "20170360450" "20170367857" "20180014840" "20180042623" "20180064578" "20180132857" "20180154063" "20180193042" "20180197633" "20180199944" "20180221029" "20180228502" "20180242989" "20180263642" "20180263646" "20180271686" "20180317922" "20180353194" "20190142452" "20190175184" "20190216476" "20190239910").pn. OR ("10531883").urpn. AND (PGPB USPT USOC).dbnm.					
L90	354	A61B2017/\$6.cpc. AND (reservoir container collect\$4) WITH (debris thromb\$5 embol\$5) AND filter SAME valve	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/06 12:53 PM
L91	67	("3224434" "3342175" "3526219" "3727602" "3785380" "3889657" "4243048" "4249541" "4393879" "4655226" "4680029" "4794928" "4815477" "4838855" "4857045" "5011490" "5030201" "5073168" "5087265").pn. OR ("5197485").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/09/06 01:34 PM
L92	42	("3623607" "3785380" "3863624" "3889657" "3890712" "4068664" "4400168" "4417874" "4468217" "4701164" "4813926" "4878900" "4886492" "5013300" "5078605" "5098416" "5123840" "5197485" "5244458" "D365146"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/09/06 01:41 PM

		"5520668" "5597385" "5630939" "5741134" "5766134" "5779649" "5807353" "6083175").pn. OR ("6908455").urpn. AND (PGPB USPT USOC).dbnm.					
L93	7822	A61B10/04.cpc.	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/06 01:49 PM
L94	3	A61B10/04.cpc. AND (debris thromb\$5 embol\$5) SAME filter SAME valve	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/06 01:49 PM
L95	3	A61B10/04.cpc. AND (debris thromb\$5 embol\$5) SAME filter AND filter SAME valve	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/06 01:50 PM
L96	1	A61B10/04.cpc. AND (debris thromb\$5 embol\$5) SAME filter AND check near3 valve	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/09/06 01:50 PM
L97	7	("5827229" "8057497" "20050137498" "20060129091" "20090036871" "20130317529" "20140081075").pn. OR ("10456152").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/09/06 02:09 PM
L98	43	606/159.ccls. AND (debris thromb\$5 embol\$5) SAME filter AND filter SAME valve	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/06 02:12 PM
L99	4	("20150352325" "20150173782" "20130035628" "5197485").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/06 04:11 PM
L100	21	606/159.ccls. AND (debris thromb\$5 embol\$5) SAME filter AND filter SAME (housing chamber) AND (housing chamber) SAME valve	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/06 04:39 PM
L101	22	606/159.ccls. AND (debris thromb\$5 embol\$5) SAME filter AND filter SAME (housing chamber container) AND (housing chamber	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/06 04:52 PM

		container cartridge magazine) SAME valve					
L102	1970	A61B17/\$6.cpc. AND check near3 valve AND catheter	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/07 01:03 PM
L103	155	A61B17/\$6.cpc. AND check near3 valve AND catheter AND valve SAME connector SAME cap	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/07 01:04 PM
L104	380	A61B17/\$6.cpc. AND check near3 valve AND catheter AND valve SAME cap	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/07 01:14 PM
L105	484	A61M2039/027.cpc.	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/07 01:23 PM
L106	564	A61B17/\$6.cpc. AND one near3 way near4 valve AND catheter AND valve SAME cap	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/07 01:41 PM
L107	448	A61M39/0613.cpc.	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/07 01:50 PM
L108	27	("4946133" "5125915" "5167637" "5205831" "5205834" "5259842" "5478331" "5507732" "5556387" "5810869" "5895376" "5957901" "6024729" "6197016" "6287280" "6299132" "6344031" "6609696" "7226433" "20030066978" "20030094429" "20040172008" "20060229564" "20070073242" "20080255651" "20080289181").pn. OR ("8951229").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/09/07 02:11 PM
L109	1	("5,349,984").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/07 02:13 PM
L110	111	("2960998" "3025874" "4665943" "4681132" "4805664" "4953589" "5098405").pn. OR ("5349984").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/09/07 02:14 PM
L111	67	("3224434" "3342175" "3526219" "3727602" "3785380" "3889657" "4243048" "4249541"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/09/08 10:34 AM

		"4393879" "4655226" "4680029" "4794928" "4815477" "4838855" "4857045" "5011490" "5030201" "5073168" "5087265").pn. OR ("5197485").urpn. AND (PGPB USPT USOC).dbnm.					
L112	320	stopcock near2 valve SAME (suction vacuum aspirat\$4) AND A61B17/\$6.cpc.	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/08 02:50 PM
L113	362	stopcock near2 valve SAME (suction vacuum aspirat\$4) AND A61B2017/\$6.cpc.	(US-PGPUB; USPAT)	OR	ON	ON	2022/09/08 02:57 PM
L114	4	("20150352325" "6564828" "5197485" "20130035628").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2022/12/05 09:12 AM
L115	5	("20150352325" "6564828" "5197485" "20130035628" "20220346813").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2022/12/05 09:14 AM
L116	38	(Artificial Intelligence) More like doc: US-5197485-A Text: (US-8657840-B2 OR US-8475482-B2 OR US-20120215245-A1 OR AU-2003255187-A1 OR JP-2021527479-A OR US-3889657-A OR US-20060270974-A1 OR AU-6501800-A OR EP-1885430-A2 OR WO-2006124307-A2 OR CA-2609138-A1 OR US-5522826-A OR EP- 1206220-B1 OR US- 5827229-A OR AU- 2003252147-A1 OR WO-2004011058-A2 OR EP-1539275-A2 OR AU-2003252147-B9 OR AU-2003252147-B2 OR US-4393879-A).did.	(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	2022/12/05 09:34 AM
L118	11	(tuan WITH v WITH nguyen).xp. AND skin SAME abras\$4	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/06 09:40 AM
L119	66	("2701559" "2712823" "2867214" "2881763" "2921585" "4378804" "4646482" "4957747"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2023/01/06 09:43 AM

		"5954695" "5961472" "5971948" "6059745" "6161547" "6251291" "6423032" "6447473" "20010049486").pn. OR ("7223253").urpn. AND (PGPB USPT USOC).dbnm.					
L123	8583	A61M1/60,0001,0003.c pc.	(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	2023/01/06 04:18 PM
L124	709	L123 AND filter	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/06 04:18 PM
L125	465	L123 AND filter AND valve	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/06 04:31 PM
L126	45	("10478535" "11259821 "11433218" "1143979 9" "11457936" "115291 58" "20010049486" "20 040127936" "20060217 664" "20070010787" "2 0080234715" "2010021 7276" "20110034986" " 20110196309" "201302 81788" "20140257363" " 20140296868" "20150 173782" "20160220741 "20170056032" "2017 0196576" "2017025205 7" "20170319221" "201 70340867" "201801044 04" "20190239910" "20 190336142" "20210022 843" "20210315598" "2 0220211400" "2022034 6800" "20220346801" " 20220346814" "202203 47455" "20220362512" " 3675657" "5158564" "6 451036" "6719717" "69 60189" "7004931" "722 3253" "8057497" "9216 277" "9980813").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/07 11:13 AM

L127	4	("6719717" "5197485" "20150352325" "6564828").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/07 12:21 PM
L128	5	("6719717" "5197485" "20150352325" "6564828" "8057497").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/07 03:37 PM
L129	6	("6719717" "5197485" "20150352325" "6564828" "8057497" "11154314").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/24 03:45 PM
L130	336	A61B17/\$6.cpc. AND ((one near3 way near4 valve) (check near3 valve)) SAME filter AND catheter	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/25 08:28 AM
L131	378	A61B2017/\$6.cpc. AND ((one near3 way near4 valve) (check near3 valve)) SAME filter AND catheter	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/25 08:28 AM
L132	630	A61B17/\$6.cpc. AND ((one near3 way near4 valve) (check near3 valve)) SAME filter AND catheter	(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	2023/01/25 08:28 AM
L133	661	A61B2017/\$6.cpc. AND ((one near3 way near4 valve) (check near3 valve)) SAME filter AND catheter	(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	2023/01/25 08:28 AM
L134	92	("2795390" "3552712" "4268005" "4406656" "4451252" "4516398"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2023/01/25 09:01 AM

		"4705501" "4894057" "4923462" "4955375" "5112301" "5161773" "5180364" "5197192" "5290263" "5295956" "5305982" "5314406" "5374244" "5376100" "5441482" "5464398" "5527292" "5549626" "5584803" "5669876" "5827243" "5833650" "5935100" "6066149" "6179816" "6251121" "6450987" "6468291" "6540712" "6551268" "6595967" "6660014" "6855136" "6908474" "7223253" "20020103472" "20020151918" "20040019310" "20050020973" "20050085761").pn. OR ("8002725").urpn. AND (PGPB USPT USOC).dbnm.					
L135	461	("3631848" "4771777" "4840690" "4865581" "4921478" "4921479" "4946440" "5135484" "5250060" "5312356" "RE34633" "5324262" "5328471" "5338300" "5380284" "5385562" "5429605" "5437632" "5443454" "5454795" "5476450" "5484407" "5484412" "5484418" "5492530" "5496294" "5522836" "5527292" "5542937" "5558635" "5573520" "5599326" "5628754" "5658264" "5658309" "5667499" "5695483" "5702373" "5707376" "5730734" "5749849" "5749858" "5776141" "5794629" "5795341" "5810869" "5827229" "5833650" "5836926" "5846251" "5851210" "5853400" "5876367" "5876386" "5882334" "5895399" "5908407" "5913848" "5916208" "5921952" "5928192" "5935122" "5938645"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2023/01/25 09:17 AM

		"5957882"	"5976093"					
		"5976178"	"5997508"					
		"5997523"	"6004310"					
		"6013085"	"6022340"					
		"6030369"	"6033388"					
		"6044845"	"6053903"					
		"6053904"	"6071263"					
		"6074357"	"6074398"					
		"6090072"	"6110139"					
		"6139524"	"6146370"					
		"6146373"	"6146415"					
		"6152909"	"6152912"					
		"6159230"	"6161547"					
		"6165199"	"6176844"					
		"6197016"	"6206868"					
		"6210370"	"6234971"					
		"6238430"	"6254628"					
		"6258080"	"6270477"					
		"6277139"	"6287319"					
		"6295989"	"6295990"					
		"6306106"	"6306163"					
		"6364900"	"6368316"					
		"6368344"	"6379325"					
		"6383172"	"6413235"					
		"6423032"	"6423086"					
		"6428531"	"6435189"					
		"6436087"	"6454741"					
		"6458151"	"6464664"					
		"6481439"	"6482172"					
		"6482217"	"6508824"					
		"6517520"	"6527746"					
		"6533800"	"6540712"					
		"6544276"	"6549800"					
		"6551268"	"6555057"					
		"6562049"	"6562052"					
		"6582390"	"6582396"					
		"6582448"	"6595953"					
		"6595980"	"6605074"					
		"6612999"	"6623471"					
		"6623491"	"6623518"					
		"6626886"	"6632236"					
		"6635070"	"6638243"					
		"6638245"	"6641573"					
		"6645160"	"6645222"					
		"6652480"	"6656152"					
		"6663650"	"6663652"					
		"6676637"	"6679893"					
		"6682505"	"6685722"					
		"6692473"	"6702782"					
		"6711436"	"6719717"					
		"6730104"	"6733517"					
		"6740104"	"6749627"					
		"6755803"	"6755847"					
		"6758854"	"6764464"					
		"6790204"	"6824545"					
		"6827730"	"6837881"					
		"6840949"	"6849068"					
		"6855136"	"6884235"					

		"6902540"	"6905490"					
		"6905505"	"6908474"					
		"6929632"	"6929634"					
		"6936060"	"6958059"					
		"6960189"	"6972030"					
		"7001400"	"7004924"					
		"7004931"	"7004952"					
		"7022100"	"7029488"					
		"7033325"	"7033336"					
		"7033344"	"7048758"					
		"7063714"	"7083594"					
		"7104979"	"7108677"					
		"7144386"	"7150712"					
		"7152605"	"7166088"					
		"7169165"	"7172621"					
		"7223253"	"7232452"					
		"7250042"	"7306585"					
		"7309334"	"7316678"					
		"7367982"	"7374560"					
		"7374561"	"7384412"					
		"7402151"	"7422579"					
		"7458980"	"7497844"					
		"7524303"	"7534250"					
		"7731683"	"7766049"					
		"7766820"	"7806906"					
		"7815626"	"7842065"					
		"7854746"	"7867216"					
		"7905856"	"7905877"					
		"7909812"	"7927309"					
		"7927347"	"7972294"					
		"7972308"	"7998104"					
		"8021351"	"8029533"					
		"8048032"	"8052640"					
		"8066757"	"8142413"					
		"RE43300"	"8152782"					
		"8157760"	"8172831"					
		"8181324"	"8221348"					
		"8231600"	"8251978"					
		"8252010"	"8292850"					
		"8343089"	"8414516"					
		"8425549"	"8465456"					
		"8523801"	"8545552"					
		"8574245"	"8708954"					
		"8870805"						
		"RE45380"	"8961549"					
		"8996095"	"9034007"					
		"9126018"	"9144662"					
		"RE45760"						
		"RE45776"						
		"20010044598"						
		"20010049486"						
		"20010049517"						
		"20020087119"						
		"20020128679"						
		"20020133111"						
		"20020151922"						
		"20020156455"						
		"20020156460"						

	"20020165598"						
	"20020173815"						
	"20020183783"						
	"20030040762"						
	"20030065356"						
	"20030069468"						
	"20030078562"						
	"20030186203"						
	"20030212304"						
	"20030212384"						
	"20040059243"						
	"20040116878"						
	"20040133232"						
	"20040138608"						
	"20040210194"						
	"20050131453"						
	"20050154344"						
	"20050154349"						
	"20050209559"						
	"20050273051"						
	"20060058836"						
	"20060058837"						
	"20060058838"						
	"20060089618"						
	"20060135961"						
	"20060200191"						
	"20060271098"						
	"20070021778"						
	"20070173784"						
	"20070197956"						
	"20070198028"						
	"20070198049"						
	"20080082107"						
	"20080140010"						
	"20080177245"						
	"20080200946"						
	"20090018455"						
	"20090024072"						
	"20090030400"						
	"20090198172"						
	"20090254166"						
	"20090264865"						
	"20090299393"						
	"20100004607"						
	"20100042118"						
	"20100063479"						
	"20100063480"						
	"20100094330"						
	"20100114017"						
	"20100145308"						
	"20100185216"						
	"20100204672"						
	"20100204684"						
	"20100217276"						
	"20100228269"						
	"20100256600"						
	"20100318097"						
	"20110009875"						

		"20110034986" "20110087147" "20110112567" "20110125181" "20110152760" "20110238041" "20120310212" "20130035628" "20130116701" "20130184735" "20130281788" "20140025043" "20140155783" "20140257186" "20140296769" "20140296868" "20150174368").pn. OR ("9561345").urpn. AND (PGPB USPT USOC).dbnm.					
L136	18	A61B2017/\$6.cpc. AND ((one near3 way near4 valve) (check near3 valve)) SAME filter SAME hous\$4 AND catheter	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/25 09:55 AM
L139	2	blood SAME filter AND ((one near3 way near4 valve) (check near3 valve)) SAME filter SAME convenien\$4 AND catheter	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/25 10:16 AM
L140	193	blood SAME filter AND ((one near3 way near4 valve) (check near3 valve)) SAME filter SAME in WITH one AND catheter	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/25 10:19 AM
L141	1968	((one near3 way near4 valve) (check near3 valve)) SAME filter AND catheter	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/25 10:34 AM
L142	605	((one near3 way near4 valve) (check near3 valve)) SAME filter AND catheter AND blood WITH filter	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/25 10:34 AM
L143	66	("2006/0111667").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2023/01/25 10:43 AM
L144	3961	one near3 way near4 valve WITH filter	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/25 10:48 AM
L145	1114	one near3 way near4 valve WITH filter AND blood	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/25 10:48 AM

L146	76	("2992701" "3275145" "3545438" "3568977" "3930096" "4111228" "4141379" "4167482" "4222407" "4239041" "4311587").pn. OR ("4488961").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2023/01/25 10:50 AM
L147	37	("2008/0011667").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2023/01/25 11:15 AM
L150	10	("20150352325" "20130035628" "5197485" "8057497" "20100297577" "20080011667" "20180042623" "20060206028" "11154314" "20050020973").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/25 03:05 PM
L151	11	("20150352325" "20130035628" "5197485" "8057497" "20100297577" "20080011667" "20180042623" "20060206028" "11154314" "20050020973" "6719717").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/01/26 08:41 AM
L152	37	(Artificial Intelligence) More like doc: US-20100297577-A1 Text: (EP-2432417-A1 OR WO-2010135005-A1 OR CA-2799300-A1 OR US-9693843-B2 OR WO-2022011143-A1 OR US-5630939-A OR US-4083706-A OR US- 20220008178-A1 OR US-5741134-A OR CA- 2161165-C OR US- 20080257815-A1 OR US-6299763-B1 OR EP-0779799-A1 OR WO-9639986-A1 OR US-3890712-A OR US- 8393898-B2 OR US- 20050239016-A1 OR WO-2006049878-A2 OR US-20060093990- A1 OR CA-2161165- A1).did.	(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	2023/01/26 09:15 AM

L153	21	("2010/0297577").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2023/01/26 09:19 AM
L154	45	("10478535" "11259821 "11433218" "1143979 9" "11457936" "115291 58" "20010049486" "20 040127936" "20060217 664" "20070010787" "2 0080234715" "2010021 7276" "20110034986" " 20110196309" "201300 35628" "20130281788" " "20140257363" "20140 296868" "20160220741 "20170056032" "2017 0196576" "2017025205 7" "20170319221" "201 70340867" "201801044 04" "20190239910" "20 190336142" "20210022 843" "20210315598" "2 0220211400" "2022034 6800" "20220346801" " 20220346813" "202203 47455" "20220362512" " "3675657" "5158564" "6 451036" "6564828" "67 19717" "6960189" "700 4931" "7223253" "9216 277" "9980813").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2023/05/09 04:43 PM
L155	23	("11013523" "11406801 "11554005" "1155938 2" "20030116731" "200 50054995" "201201729 18" "20140052161" "20 160262774" "20180042 623" "20180184912" "2 0180256177" "2021013 7667" "20220142638" " 20220151647" "202201 52355" "4611594" "542 1824" "5653684" "5908 435" "6818006" "90786 82" "9827084").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2023/05/09 04:44 PM
L156	13	("20010031981" "20040 102807" "20140074144 "20140188127" "2021 0236148" "2023004677 5" "20230062809" "202 30070120" "5158533" " 6059814" "8535283" "8 753322" "8808259").PN	(US-PGPUB; USPAT)	OR	ON	ON	2023/05/09 04:44 PM
L157	45	(Artificial Intelligence) Similar to: 17/865,307 with 0 CPC	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY,	OR	ON	ON	2023/05/09 05:21 PM

		<p>Selections and 0 Text Selections</p> <p>Text</p> <p>(US-20190231373-A1 OR US-11154314-B2 OR US-20220240959- A1 OR US- 20220346814-A1 OR US-20220346813-A1 OR US-20230046775- A1 OR CA-2939315-C OR AU-2015274704-A1 OR WO-2015191646- A1 OR EP-3094363-A1 OR US-9526864-B2 OR WO-2021025440-A2 OR CN-106470728-A OR JP-2017518093-A OR WO-2023279009- A2 OR AU- 2015274704-B2 OR CA-2939315-A1 OR US-10426498-B1 OR WO-2021016213-A1 OR EP-3998966-A1 OR KR-20220038096-A OR US-20150360001-A1 OR WO-2021194789- A1 OR EP-4164727-A1 OR JP-2022540692-A OR US-20220125450- A1 OR JP-6438495-B2 OR WO-2010093521- A1 OR US- 20100204672-A1 OR US-20200121336-A1 OR JP-2020062317-A OR CN-112890914-A OR EP-3713507-A1 OR CN-114502086-A OR US-11589880-B2 OR US-20230062809-A1 OR JP-2021023827-A OR US-20220346801- A1 OR US-11554005- B2 OR US-11490911- B2 OR WO- 2011142994-A2 OR US-20220346800-A1 OR US-20220218369- A1 OR KR- 20210018115-A OR EP-4144307-A1 OR KR-20210110003-A OR KR-102371974-B1 OR US-20160135826-A1 OR US-20210137540- A1 OR CN-108024820-</p>	<p>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))</p>				
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L158	0	A) did. (vacuum SAME aspiration AND housing SAME chamber AND cap SAME aspirat\$4 AND flow WITH path SAME cap AND catheter SAME flexible SAME port SAME housing AND flow WITH regulator AND first WITH operator SAME actuation WITH mechanism AND second WITH operator AND filter SAME housing SAME flow WITH path). cfm.	(US-PGPUB; USPAT)	OR	ON	ON	2023/05/22 10:28 AM
L159	35	("11013523" "11406801" "11554005" "11559382" "20010031981" "20030116731" "20040102807" "20050054995" "20120172918" "20140052161" "20140074144" "20140188127" "20160262774" "20180042623" "20180184912" "20180256177" "20210137667" "20220142638" "20220151647" "20220152355" "20230046775" "20230062809" "20230070120" "4611594" "5158533" "5421824" "5653684" "5908435" "6059814" "6818006" "8535283" "8753322" "8808259" "9078682" "9827084").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2023/05/22 04:06 PM
L160	46	(Artificial Intelligence) Similar to: 17/865,297 with 0 CPC Selections and 0 Text Selections Text: (US-20190231373-A1 OR US-11154314-B2 OR US-20220240959-A1 OR US-20220346814-A1 OR US-20220346813-A1 OR US-20230046775-A1 OR AU-2015274704-A1 OR EP-3094363-A1 OR CA-2939315-C OR WO-2015191646-A1	(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))	OR	ON	ON	2023/05/22 04:09 PM

		OR JP-2017518093-A OR WO-2023279009-A2 OR AU-2015274704-B2 OR CA-2939315-A1 OR US-20150360001-A1 OR US-20150352325-A1 OR US-9526865-B2 OR US-20230062809-A1 OR JP-2021023827-A OR US-11554005-B2 OR US-20220346800-A1 OR US-11490911-B2 OR US-20220346801-A1 OR EP-3772357-A1 OR US-20220218369-A1 OR KR-20210018115-A OR KR-20210110003-A OR KR-102371974-B1 OR US-20160135826-A1 OR US-20210137540-A1 OR CN-108024820-A OR CN-111938750-A OR CN-112336414-A OR CN-112842461-A OR US-20220330960-A1 OR US-11553935-B2 OR WO-2023009703-A1 OR US-20230043096-A1 OR CA-3114285-A1 OR AU-2019321256-A1 OR WO-2020036809-A1 OR EP-3836855-A1 OR CN-108024804-A OR US-20200046368-A1 OR CN-113729856-B OR US-20230026412-A1 OR US-11559382-B2 OR JP-2021534851-A OR WO-2022104374-A1 OR US-11241243-B2).did.					
L161	1	("20210177262").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/12 10:28 PM
L162	2	("20210177262" "20220346638").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/13 08:28 AM
L163	44	(Artificial Intelligence) Similar to: 177763,810 with 0 CPC Selections and 0 Text Selections Text: (CN-114746033-A OR US-20220346638-A1	(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	2023/06/13 10:00 AM

		OR WO-2021076356-A1 OR EP-4044942-A1 OR JP-2022553223-A OR EP-3166512-B1 OR JP-2020114426-A OR EP-3781021-B1 OR US-11147583-B2 OR US-20200069327-A1 OR JP-2022078035-A OR JP-2017519599-A OR US-20210059713-A1 OR US-20220039828-A1 OR WO-2016007652-A1 OR EP-3166512-A1 OR CA-2955242-A1 OR US-20180146978-A1 OR US-10357277-B2 OR JP-6728128-B2 OR WO-2022192102-A1 OR JP-2021521916-A OR WO-2019204797-A1 OR EP-3781021-A1 OR JP-7021278-B2 OR CN-107106190-B OR CN-107106190-A OR CN-112312828-A OR CN-108882948-A OR US-20210076949-A1 OR US-11399863-B2 OR US-20230157718-A1 OR US-20190029714-A1 OR JP-2019513446-A OR WO-2017173370-A1 OR EP-3435892-A1 OR JP-6959255-B2 OR US-11382653-B2 OR US-10660510-B2 OR US-20170215914-A1 OR US-20200060718-A1 OR US-20220273337-A1 OR WO-2012145133-A2 OR JP-2011229956-A OR US-20120046679-A1 OR CA-2803992-A1 OR WO-2012003430-A2 OR EP-2588012-A2 OR JP-2013531542-A OR EP-2588012-B1).did	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))				
L164	8777	A61M1/60,0001,0003.c pc.	(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,	OR	ON	ON	2023/06/13 10:55 AM

			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)				
L165	466	A61M39/0613.cpc.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/13 10:55 AM
L166	2	("20150352325" "20070038225" "2015002555").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/13 06:46 PM
L167	3	("20150352325" "20070038225" "2015002555").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/13 06:46 PM
L169	18	A61B17/\$6.cpc. AND pre near3 charg\$4 WITH vacuum WITH (source syringe) AND catheter SAME (clot thromb\$4)	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/14 10:17 AM
L170	18	A61B2017/\$6.cpc. AND pre near3 charg\$4 WITH vacuum WITH (source syringe) AND catheter SAME (clot thromb\$4)	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/14 10:20 AM
L171	29	A61B2017/\$6.cpc. AND pre near3 charg\$4 WITH vacuum WITH (source syringe) AND catheter SAME (clot thromb\$4)	(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	2023/06/14 10:21 AM
L172	37	A61B2017/\$6.cpc. AND pre near3 charg\$4 WITH vacuum AND catheter SAME (clot thromb\$4)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, 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, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE,	OR	ON	ON	2023/06/14 10:21 AM

			SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L173	681	A61B2017/\$6.cpc. AND (aspirat\$6 vacuum) WITH open\$4 WITH valve AND catheter SAME (clot thromb\$4)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, 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, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/06/14 10:26 AM
L174	837	A61B2017/\$6.cpc. AND (aspirat\$6 vacuum suction\$4) WITH open\$4 WITH valve AND catheter SAME (clot thromb\$4)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, 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, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/06/14 10:26 AM
L175	116	A61B2017/\$6.cpc. AND (aspirat\$6 suction\$4) WITH open\$4 WITH valve WITH (vacuum WITH source) AND catheter SAME (clot thromb\$4) SAME (aspirat\$6 suction\$6)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, 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, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/06/14 10:31 AM
L176	3	("20150352325" "20070038225" "2015002555" "20220240959").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/14 05:48 PM

L177	4	("20150352325" "20070038225" "20150025555" "20220240959").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/14 05:49 PM
L178	5	("20150352325" "20070038225" "20150025555" "20220240959" "5911710") pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/16 01:16 PM
L179	408	("4430081" "4580573" "4626245" "4857062" "4895346" "4929235" "4978341" "4978344" "5000745" "5006114" "5041095" "5051109" "5092845" "5092846" "5098406" "5102395" "5106054" "5114408" "5125903" "5127626" "5154701" "5167637" "5176652" "5195980" "5205829" "5207649" "5215527" "5215528" "5256150" "5267966" "5269997" "5273546" "5290245" "5290249" "5300033" "5304142" "5304143" "5304156" "5312362" "5312363" "5330436" "5334160" "5336192" "5350362" "5350363" "5356390" "5366446" "5403292" "5458640" "5584808" "5591137" "5599305").pn. OR ("5911710").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2023/06/16 01:17 PM
L180	19	("4112932" "4535773" "5112321" "5217441" "5224930").pn. OR ("5330436").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2023/06/16 01:42 PM
L181	1	("5256150").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/06/17 10:27 AM
L182	284	("2844351" "4311136" "4401433" "4540411" "4580573" "4601713" "4738666" "4857062" "5015239" "5066285").pn. OR ("5256150").urpn. AND (PGPB USPT USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2023/06/17 10:28 AM

L183	7	("20150352325" "20070038225" "20150025555" "20220240959" "5911710" "8057497" "20150173782").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/10/19 12:06 PM
L184	8	("20150352325" "20070038225" "20150025555" "20220240959" "5911710" "8057497" "20150173782" "5197485") pn.	(US-PGPUB; USPAT)	OR	ON	ON	2023/10/19 12:06 PM
L185	166	A61B2017/22034,2204 2,22079,22094.cpc. AND (reservoir container collect\$4) WITH (debris thromb\$5 embol\$5) AND filter SAME valve	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/10/19 03:18 PM
L186	13	A61B17/220758,32072 5.cpc. AND (reservoir container collect\$4) SAME filter SAME valve	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/10/19 03:18 PM
L187	139	A61B17/22031,22,221.c pc. AND (reservoir container collect\$4) SAME filter SAME valve	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2023/10/19 03:18 PM
L188	487	A61M39/0613.cpc.	(US-PGPUB; USPAT)	OR	ON	ON	2023/10/19 09:55 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.



ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
18/358,837

RECEIPT DATE / TIME
09/27/2023 07:45:38 PM ET

ATTORNEY DOCKET #
111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 6598

FILED BY JiYoung Anderson

PATENT CENTER # 62885104

FILING DATE 07/25/2023

CUSTOMER # 25096

FIRST NAMED INVENTOR Richard Quick

CORRESPONDENCE ADDRESS -

AUTHORIZED BY Matthew Williams

Documents

TOTAL DOCUMENTS: 10

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2023-9-27 IDS SB08 - 111552-8023US6.pdf	5	Information Disclosure Statement (IDS) Form (SB08)	143 KB

Warning: This is not a USPTO supplied IDS fillable form. Data in the form cannot be automatically loaded to other USPTO systems.

FOR-EP3013404.pdf	15	Foreign Reference	591 KB
FOR-WO2018065092.pdf	50	Foreign Reference	2030 KB
FOR-EP3589348 - Counterpart WO2018160810.pdf	44	Foreign Reference	2164 KB

FOR-EP3583972.pdf	21	Foreign Reference	1735 KB
FOR-EP4137070.pdf	51	Foreign Reference	3226 KB
FOR-EP3620204.pdf	50	Foreign Reference	3291 KB
FOR_CN106178227.pdf	14	Foreign Reference	6121 KB
NPL_ISR_WO_PCTUS20236 0927_J UL_20_2023_12page s.pdf	12	Non Patent Literature	6286 KB
FOR_WO2023154612.pdf	42	Foreign Reference	8876 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2023-9-27 IDS SB08 - 111552- 8023US6.pdf	31A3B03320C67A25AE449237F4DB07AB83D46F4A5E7D18BDC AFE6EFFBD4614F370BD1D769D623A3E132979BC2D79A152BE E4C3FAE2D2AD2ED4AF7791B03059FC
FOR-EP3013404.pdf	3D90324030CFADDE2E69B16548429204EED8FD4CB29E457F0 532D25D701134341C5E14FD142B0E42FBE19C633688FAC8C5 684757CE7C5BDF2AAA1DC4AAF01E4F
FOR-WO2018065092.pdf	8CD5C10DCA882A13C195ED6238D679A0D5AEC67FB86BA6D7 5814A5943F1911EE33A68A315B57F447D2CA9698FA33332063 CE1BB690E501F57728B93546A20BAD
FOR-EP3589348 - Counterpart WO2018160810.pdf	5494011818D2C61C69D8661EAE176A54A8D2D22DE923F718F EAE2C688C0893E19C7F61304AD3589D55C2AA6C52E01FD238 5F346D5A7523F37569A5AA54BBEDE2
FOR-EP3583972.pdf	1BCADA91406B3C917BB9CA44C5E41E850921CC779D2790C8 20A8D3F5730A239DFE5AB4A8A8412B60BFAC80E3ED5A3C2A 9F47BF7ADE74D0BD6052AB153471DDAD

FOR-EP4137070.pdf	05C4C9A6AF9A250D312393DAF39AABE109571DE37245F17B6 5A86187121D449DC3060876A4DDD7C5E2023068B0EDE11F9E A19C9777D641BBE064B96725B094AA
FOR-EP3620204.pdf	3BFC88107F2D2CC39249A1082F73A511741CFF801B44AAC79 7CAC8ED804966306DDC2052ED2BA49AEF1280DFC3B31D0DE 301B802ECD3EC774353D8A04CE3EE09
FOR_CN106178227.pdf	5A5A25D3A129C1CA7F59548B3AA207B09B7B6674AE7508C5B 307B43967E2C3546C294514C3BCCDD7C3503E392643D94605 17231E240FA9368165728CF9E2C7B2
NPL_ISR_WO_PCTUS2023609 27_JUL_20_2023_12pages.pdf	C3544C8CC4356AE50734DAA84C2B65A4258997E9E0E90E459 CCDABC6A995E67A4123E7F292B4D4D91AA981B64CDE45498 14DAB408B3E39575FF8CDA130EC4870
FOR_WO2023154612.pdf	3C9F5C1AFA5DAF87353AD9ADE84FDB7C4BAED63CC5B03A1 BFA09D4C569B26851BF1F54043C003B047406BA9C85A53244E 46A60E8CA62C7AEE7F89CB62BFA557E

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 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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552-8023.US06

ririU.S. PATENTS AND PUBLICATIONS					
Examiner Initial*	Cite No	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	20190366036	12-05-2019	Jalgaonkar et al.	
	2.	20110071503	03-24-2011	TAKAGI et al.	
	3.	20120109109	05-03-2012	KAJII	
	4.	20180250498	09-06-2018	Stern et al.	
	5.	11744691	09-05-2023	Merritt et al.	
	6.	20230248380	08-10-2023	Long et al.	
	7.	5391152	02-21-1995	Patterson et al.	
	8.	20210404464	12-30-2021	Patoskie	
	9.	5971958	10-26-1999	Zhang	
	10.	3860006	01-14-1975	Patel	
	11.	20130150793	06-13-2013	Beissel et al.	
	12.	20230270991	08-31-2023	Merritt et al.	
	13.	20190015298	01-17-2019	Beatty et al.	
	14.	20180055999	03-01-2018	Bare et al.	
	15.	20040019310	01-29-2004	Hogendijk	
	16.	20080312681	12-18-2008	Ansel et al.	
	17.	20170143359	05-25-2017	Nguyen et al.	
	18.	20170143938	05-25-2017	Ogle et al.	
	19.	20170281204	10-05-2017	Garrison et al.	
	20.	8021351	09-20-2011	Boldenow et al.	
	21.	1101890	06-30-1914	TUNSTEAD	
	22.	10953195	03-23-2021	Jalgaonkar et al.	
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	24.	3416531	12-17-1968	EDWARDS	
	25.	4981478	01-01-1991	Evard et al.	
	26.	7815608	10-19-2010	Schafersman et al.	
	27.	9662129	05-30-2017	Galdonik et al.	
	28.	8070694	12-06-2011	Galdonik et al.	
	29.	10058339	08-28-2018	Galdonik et al.	
	30.	9532792	01-03-2017	Galdonik et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
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	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552-8023.US06

31.	20200121334	04-23-2020	Galdonik et al.	
32.	11596768	03-07-2023	Stern et al.	
33.	10926060	02-23-2021	Stern et al.	
34.	11224450	01-18-2022	Chou et al.	
35.	11065019	07-20-2021	Chou et al.	
36.	11576691	02-14-2023	Chou et al.	
37.	2022033888	02-03-2022	Schnall-Levin et al.	
38.	20220370761	11-24-2022	Chou et al.	
39.	20230059721	02-23-2023	Chou et al.	
40.	20230122587	04-20-2023	Chou et al.	
41.	11305094	04-19-2022	Carrison et al.	
42.	10485952	11-26-2019	Carrison et al.	
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44.	11383064	07-12-2022	Carrison et al.	
45.	11185664	11-30-2021	Carrison et al.	
46.	11224721	01-18-2022	Carrison et al.	
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54.	10384034	08-20-2019	Carrison et al.	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
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	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552-8023.US06

FOREIGN PATENT DOCUMENTS						
Examiner Initial*	Cite No	Foreign Document Number ³	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
	1.	CN106178227	12-07-2016	Shanghai Microport Medical Group Co., Ltd.		
	2.	WO2023154612	08-17-2023	Inari Medical, Inc.		
	3.	WO2018065092	04-12-2018	PRINZESSIN VON ISENBURG, Sarah		
	4.	EP3013404	04-15-2020	NorMedix Inc.		
	5.	EP3583972	12-25-2019	Covidien LP		
	6.	EP3589348	01-08-2020	Covidien LP		
	7.	EP4137070	02-22-2023	ROUTE 92 MEDICAL INC.		
	8.	EP3620204	03-11-2020	ROUTE 92 MEDICAL INC.		
	9.					
NON-PATENT LITERATURE DOCUMENTS						
Examiner Initials*	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
	1.	International Search Report and Written Opinion for International App. No. PCT/US23/60927; Date of Filing: January 19, 2023, Applicant: Inari Medical, Inc., Date of Mailing: July 20, 2023, 12 pages.				
	2.					
	3.					
	4.					
	5.					
EXAMINER SIGNATURE						
Examiner Signature				Date Considered		
<p>*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.</p> <p>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.</p>						

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552-8023.US06

CERTIFICATION STATEMENT

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

☐ 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. See 37 CFR 1.97(e) (1).

OR

☐ 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references. This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, Applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.

COPIES OF REFERENCES

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

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	/Matthew S. Williams/	Date (YYYY-MM-DD)	2023-09-27
Name/Print	Matthew S. Williams	Registration Number	77,516

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552-8023.US06

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/358,837	07/25/2023	Richard Quick	111552.8023.US06	6598
25096	7590	08/30/2023	EXAMINER	
PERKINS COIE LLP - SEA General PATENT-SEA P.O. BOX 1247 SEATTLE, WA 98111-1247			ART UNIT	PAPER NUMBER
			3771	
			NOTIFICATION DATE	DELIVERY MODE
			08/30/2023	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):

patentprocurement@perkinscoie.com

<i>Decision Granting Request for Prioritized Examination (Track I)</i>	Application No. 18/358,837	Applicant(s) Quick, Richard	
	Examiner CHERYL P GIBSON BAYLOR	Art Unit OPET	AIA (FITF) Status Yes
<p>1. THE REQUEST FILED <u>25 July 2023</u> IS GRANTED .</p> <p>The above-identified application has met the requirements for prioritized examination</p> <p>A. ☒ for an original nonprovisional application (Track I).</p> <p>B. ☐ for an application undergoing continued examination (RCE).</p> <p>2. The above-identified application will undergo prioritized examination. The application will be accorded special status throughout its entire course of prosecution until one of the following occurs:</p> <p>A. filing a <u>petition for extension of time</u> to extend the time period for filing a reply;</p> <p>B. filing an <u>amendment to amend the application to contain more than four independent claims, more than thirty total claims</u>, or a multiple dependent claim;</p> <p>C. filing a <u>request for continued examination</u> ;</p> <p>D. filing a notice of appeal;</p> <p>E. filing a request for suspension of action;</p> <p>F. mailing of a notice of allowance;</p> <p>G. mailing of a final Office action;</p> <p>H. completion of examination as defined in 37 CFR 41.102; or</p> <p>I. abandonment of the application.</p> <p>Telephone inquiries with regard to this decision should be directed to CHERYL GIBSON BAYLOR at (571)272-3213. In his/her absence, calls may be directed to Petition Help Desk at (571) 272-3282.</p>			
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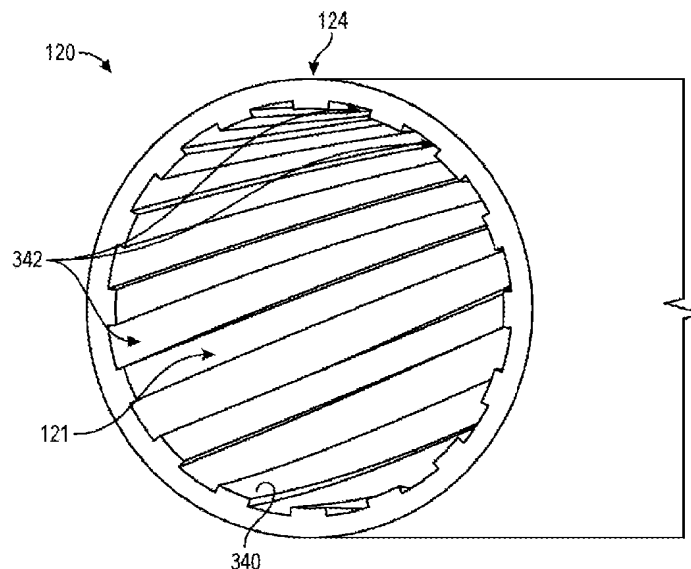


FIG. 3A

(57) Abstract: Disclosed herein are aspiration catheters having grooved inner surfaces for removing clot material from the vasculature of a patient, and associated systems and methods. In some embodiments, an aspiration catheter can include a proximal terminus, a distal terminus, and an inner surface defining a lumen. The inner surface includes at least one groove formed therein and that extends from the distal terminus at least partially toward the proximal terminus. When clot material is aspirated through the aspiration catheter, the at least one groove can provide a leak path past the clot material to improve the ingestion of the clot material through the catheter and inhibit clogging.

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ASPIRATION CATHETERS HAVING GROOVED INNER SURFACES,
AND ASSOCIATED SYSTEMS AND METHODS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 63/304,748, filed January 31, 2022, and titled “ASPIRATION CATHETERS HAVING GROOVED INNER SURFACES, AND ASSOCIATED SYSTEMS AND METHODS,” and U.S. Provisional Patent Application No. 63/395,586, filed August 5, 2022, and titled “ASPIRATION CATHETERS HAVING GROOVED INNER SURFACES, AND ASSOCIATED SYSTEMS AND METHODS,” each of which is incorporated by reference herein in its entirety.

TECHNICAL FIELD

[0002] The present technology generally relates to clot treatment systems including aspiration catheters having grooved or rifled inner surfaces to facilitate increased clot ingestion into the aspiration catheter, reduce clogging of the aspiration catheter, increase/optimize flowrate within the aspiration catheter, and/or enhance clot removal through the aspiration catheter.

BACKGROUND

[0003] Thromboembolic events are characterized by an occlusion of a blood vessel. Thromboembolic disorders, such as stroke, pulmonary embolism, heart attack, peripheral thrombosis, atherosclerosis, and the like, affect many people. These disorders are a major cause of morbidity and mortality.

[0004] When an artery is occluded by a clot, tissue ischemia develops. The ischemia will progress to tissue infarction if the occlusion persists. Infarction does not develop or is greatly limited if the flow of blood is reestablished rapidly. Failure to reestablish blood flow can lead to the loss of limb, angina pectoris, myocardial infarction, stroke, or even death.

[0005] In the venous circulation, occlusive material can also cause serious harm. Blood clots can develop in the large veins of the legs and pelvis, a common condition known as deep venous thrombosis (DVT). DVT arises most commonly when there is a propensity for stagnated blood (e.g., long distance air travel, immobility, etc.) and clotting (e.g., cancer, recent surgery, such as orthopedic surgery, etc.). DVT causes harm by: (1) obstructing drainage of venous blood

from the legs leading to swelling, ulcers, pain, and infection, and (2) serving as a reservoir for blood clots to travel to other parts of the body including the heart, lungs, brain (stroke), abdominal organs, and/or extremities.

[0006] In the pulmonary circulation, the undesirable material can cause harm by obstructing pulmonary arteries—a condition known as pulmonary embolism. If the obstruction is upstream, in the main or large branch pulmonary arteries, it can severely compromise total blood flow within the lungs, and therefore the entire body, and result in low blood pressure and shock. If the obstruction is downstream, in large to medium pulmonary artery branches, it can prevent a significant portion of the lung from participating in the exchange of gases to the blood resulting in low blood oxygen and buildup of blood carbon dioxide.

[0007] There are many existing techniques to reestablish blood flow through an occluded vessel. One common surgical technique, an embolectomy, involves incising a blood vessel and introducing a balloon-tipped device (such as the Fogarty catheter) to the location of the occlusion. The balloon is then inflated at a point beyond the clot and used to translate the obstructing material back to the point of incision. The obstructing material is then removed by the surgeon. Although such surgical techniques have been useful, exposing a patient to surgery may be traumatic and best avoided when possible. Additionally, the use of a Fogarty catheter may be problematic due to the possible risk of damaging the interior lining of the vessel as the catheter is being withdrawn.

[0008] Percutaneous methods are also utilized for reestablishing blood flow. A common percutaneous technique is referred to as balloon angioplasty where a balloon-tipped catheter is introduced to a blood vessel (e.g., typically through an introducing catheter). The balloon-tipped catheter is then advanced to the point of the occlusion and inflated to dilate the stenosis. Balloon angioplasty is appropriate for treating vessel stenosis, but it is generally not effective for treating acute thromboembolisms as none of the occlusive material is removed and the vessel will re-stenosis after dilation. Another percutaneous technique involves placing a catheter near the clot and infusing streptokinase, urokinase, or other thrombolytic agents to dissolve the clot. Unfortunately, thrombolysis typically takes hours to days to be successful. Additionally, thrombolytic agents can cause hemorrhage and in many patients the agents cannot be used at all.

[0009] Various devices exist for performing a thrombectomy or removing other foreign material. However, such devices have been found to have structures which are either highly complex, cause trauma to the treatment vessel, or lack sufficient retaining structure and thus

cannot be appropriately fixed against the vessel to perform adequately. Furthermore, many of the devices have highly complex structures that lead to manufacturing and quality control difficulties as well as delivery issues when passing through tortuous or small diameter catheters. Less complex devices may allow the user to pull through the clot, particularly with inexperienced users, and such devices may not completely capture and/or collect all the clot material.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] Many aspects of the present technology can be better understood with reference to the following drawings. The components in the drawings are not necessarily to scale. Instead, emphasis is placed on illustrating clearly the principles of the present disclosure.

[0011] Figure 1 is a partially schematic side view of a clot treatment system including a catheter in accordance with embodiments of the present technology.

[0012] Figures 2A and 2B are an enlarged partial cut-away side and an isometric view, respectively, of a portion of the catheter of the system of Figure 1 in accordance with embodiments of the present technology.

[0013] Figures 3A and 3B are an enlarged isometric view and a proximally-facing longitudinal view, respectively, of a distal portion of the catheter of Figure 1 in accordance with embodiments of the present technology. Figure 3C is an interior view of the catheter from within a lumen of the catheter in accordance with embodiments of the present technology. Figure 3D is a partially-transparent isometric view of the catheter in accordance with embodiments of the present technology.

[0014] Figure 4 is a partially-transparent isometric view of the catheter of Figure 1 in accordance with additional embodiments of the present technology.

[0015] Figure 5 is an interior view of the catheter of Figure 1 from within a lumen of the catheter in accordance with additional embodiments of the present technology.

[0016] Figures 6A and 6B are an enlarged isometric view and an enlarged cross-sectional side view, respectively, of a distal portion of the catheter of Figure 1 in accordance with additional embodiments of the present technology.

[0017] Figures 7A and 7B are side views of a distal portion of the clot treatment system of Figure 1 during a procedure for removing clot material from within a blood vessel of a patient in accordance with embodiments of the present technology.

[0018] Figures 8A and 8B are a proximally-facing longitudinal view and an enlarged partially-transparent side view, respectively, of a distal portion of the catheter of Figure 1 with clot material ingested therein in accordance with embodiments of the present technology.

[0019] Figures 9A and 9B are perspective views of the clot treatment system of Figure 1 traversing a simulated pathway to the right pulmonary artery and the left pulmonary artery, respectively, in accordance with embodiments of the present technology. Figures 9C and 9D are distally-facing longitudinal views of a proximal portion of the catheter of Figure 1 illustrating a flow pattern during aspiration without any interior grooves and with an arrangement of grooves shown in Figures 3A–3D, respectively, when the catheter traverses the simulated pathway to the right pulmonary artery shown in Figure 9A in accordance with embodiments of the present technology.

[0020] Figure 10A is a graph of a measured flow rate through the catheter of Figure 1 versus a number of revolutions of interior grooves along the length of the catheter for the simulated pathway to the right pulmonary artery shown in Figure 9A in accordance with embodiments of the present technology. Figure 10B is a graph of a corresponding measured time to aspirate an occlusive synthetic clot through the catheter in accordance with embodiments of the present technology.

[0021] Figure 11A is a graph of a measured distance traveled of an occlusive synthetic clot versus the number of revolutions of interior grooves along the length of the catheter when the clot was aspirated through the catheter of Figure 1 for the simulated pathway to the right pulmonary artery shown in Figure 9A in accordance with embodiments of the present technology. Figure 11B is a graph of a corresponding measured clot velocity in accordance with embodiments of the present technology.

[0022] Figure 12 is a graph of a measured maximum force required to move an occlusive synthetic clot through the catheter of Figure 1 versus the number of revolutions of interior grooves along the length of the catheter when the clot was aspirated through the catheter for the simulated pathway to the right pulmonary artery shown in Figure 9A in accordance with embodiments of the present technology.

[0023] Figure 13 is a longitudinal view of a mandrel over which the catheter of Figure 1 can be formed in accordance with embodiments of the present technology.

[0024] Figures 14A and 14B are a cross-sectional longitudinal view and an enlarged isometric view, respectively, of a mandrel over which the catheter of Figure 1 can be formed in accordance with additional embodiments of the present technology.

DETAILED DESCRIPTION

[0025] The present technology is generally directed to aspiration catheters having grooved inner surfaces for removing unwanted material from a patient, such as clot material from the vasculature of the patient, and associated systems and methods. In some embodiments, an aspiration catheter can include a proximal terminus, a distal terminus, and an inner surface defining a lumen. The inner surface includes at least one groove formed therein that extends at least partially between the distal terminus and the proximal terminus. When clot material is aspirated through the aspiration catheter, the at least one groove can provide a leak path past the clot material to improve the ingestion of the clot material through the catheter and inhibit clogging.

[0026] In some embodiments, the lumen extends about a longitudinal axis and the at least one groove can revolve circumferentially about the longitudinal axis between the proximal terminus and the distal terminus. Accordingly, the at least one groove can have a spiral/helical shape along the length of the aspiration catheter. In some aspects of the present technology, the spiral/helical shape of the at least one groove can generate a helical flow pattern within the lumen when clot material is aspirated through the aspiration catheter. The helical flow pattern can act to elongate and/or break apart the clot material and can increase the speed at which the clot material is ingested.

[0027] Certain details are set forth in the following description and in Figures 1–14B to provide a thorough understanding of various embodiments of the present technology. In other instances, well-known structures, materials, operations, and/or systems often associated with intravascular procedures, clot removal procedures, clot aspiration, catheters, and the like are not shown or described in detail in the following disclosure to avoid unnecessarily obscuring the description of the various embodiments of the technology. Those of ordinary skill in the art will recognize, however, that the present technology can be practiced without one or more of the details set forth herein, and/or with other structures, methods, components, and so forth. Moreover, although many of the devices and systems are described herein in the context of removing and/or treating clot material, the present technology can be used to remove and/or treat other unwanted material in addition or alternatively to clot material, such as thrombi, emboli,

plaque, intimal hyperplasia, post-thrombotic scar tissue, etc. Accordingly, the terms “clot” and “clot material” as used herein can refer to any of the foregoing materials and/or the like.

[0028] The terminology used below is to be interpreted in its broadest reasonable manner, even though it is being used in conjunction with a detailed description of certain examples of embodiments of the technology. Indeed, certain terms may even be emphasized below; however, any terminology intended to be interpreted in any restricted manner will be overtly and specifically defined as such in this Detailed Description section.

[0029] The accompanying Figures depict embodiments of the present technology and are not intended to be limiting of its scope unless expressly indicated. The sizes of various depicted elements are not necessarily drawn to scale, and these various elements may be enlarged to improve legibility. Component details may be abstracted in the Figures to exclude details such as position of components and certain precise connections between such components when such details are unnecessary for a complete understanding of how to make and use the present technology. Many of the details, dimensions, angles and other features shown in the Figures are merely illustrative of particular embodiments of the disclosure. Accordingly, other embodiments can have other details, dimensions, angles and features without departing from the present technology. In addition, those of ordinary skill in the art will appreciate that further embodiments of the present technology can be practiced without several of the details described below.

[0030] With regard to the terms “distal” and “proximal” within this description, unless otherwise specified, the terms can reference a relative position of the portions of a catheter subsystem with reference to an operator and/or a location in the vasculature. Also, as used herein, the designations “rearward,” “forward,” “upward,” “downward,” and the like are not meant to limit the referenced component to a specific orientation. It will be appreciated that such designations refer to the orientation of the referenced component as illustrated in the Figures; the systems of the present technology can be used in any orientation suitable to the user.

[0031] The headings provided herein are for convenience only and should not be construed as limiting the subject matter disclosed.

I. Selected Embodiments of Clot Treatment Systems

[0032] Figure 1 is a partially schematic side view of a clot treatment system 100 in accordance with embodiments of the present technology. The clot treatment system 100 can

also be referred to as an aspiration assembly, a clot removal system, a thrombectomy system, and/or the like. Although referred to as a clot treatment system and generally described in the context of removing clot material from the vasculature of the patient, the system 100 can be used to treat and/or remove other unwanted matter from the vasculature, body ducts, and/or other lumens of a patient. For example, the system 100 can be used to treat and/or remove emboli, foreign bodies, vegetation, and other materials from within the vasculature of a patient, gall stones from the gallbladder, and/or other materials from other body lumens.

[0033] In the illustrated embodiment, the clot treatment system 100 includes a tubing assembly 110 fluidly coupled to a catheter 120 via a valve 102. The catheter 120 can be referred to as an aspiration catheter, a guide catheter, an aspiration guide catheter, and/or the like. In general, the clot treatment system 100 (i) can include features generally similar or identical to those of the clot treatment systems described in detail in U.S. Patent Application No. 16/536,185, filed August 8, 2019, and titled "SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED DEVICES AND METHODS," which is incorporated herein by reference in its entirety, and/or (ii) can be used to treat/remove clot material from a patient (e.g., a human patient) using any of the methods described in detail therein.

[0034] In the illustrated embodiment, the catheter 120 includes a proximal region or portion 122 and a distal region or portion 124 adjacent to and distal of the proximal portion 122. The catheter 120 further defines a lumen 121 extending entirely therethrough from the proximal portion 122 to the distal portion 124. The proximal portion 122 defines a proximal terminus 123 of the catheter 120, and the distal portion 124 defines a distal tip or terminus 125 of the catheter 120. In the illustrated embodiment, the distal portion 124 includes a marker band 126, such as a radiopaque marker configured to facilitate visualization of the position of the catheter 120 during a medical procedure (e.g., a clot removal procedure) using the catheter 120. In some embodiments, the catheter 120 can have a length L of between about 20–50 inches, between about 30–40 inches, about 35 inches, and so on.

[0035] The valve 102 is fluidly coupled to the lumen 121 of the catheter 120 and can be integral with or coupled to the proximal portion 122 of the catheter 120. In some embodiments, the valve 102 is a hemostasis valve that is configured to maintain hemostasis during a clot removal procedure by inhibiting or even preventing fluid flow in the proximal direction through the valve 102 as various components such as delivery sheaths, pull members, guidewires, interventional devices, other aspiration catheters, and the like are inserted through the valve 102

to be delivered through the catheter 120 to a treatment site in a blood vessel. The valve 102 includes a branch or side port 104 configured to fluidly couple the lumen 121 of the catheter 120 to the tubing assembly 110. In some embodiments, the valve 102 can be a valve of the type disclosed in U.S. Patent Application No. 16/117,519, filed August 30, 2018, and titled "HEMOSTASIS VALVES AND METHODS OF USE," which is incorporated herein by reference in its entirety.

[0036] In the illustrated embodiment, the tubing assembly 110 fluidly couples the catheter 120 to a pressure source 106, such as a syringe (e.g., an auto-pressure locking syringe). The tubing assembly 110 can include (i) one or more tubing sections 112 (individually identified as a first tubing section 112a and a second tubing section 112b), (ii) at least one fluid control device 114 (e.g., a valve), and (iii) at least one connector 116 (e.g., a Toomey tip connector) for fluidly coupling the tubing assembly 110 to the pressure source 106 and/or other suitable components. In some embodiments, the fluid control device 114 is a stopcock that is fluidly coupled to (i) the side port 104 of the valve 102 via the first tubing section 112a and (ii) the connector 116 via the second tubing section 112b. The fluid control device 114 is externally operable by a user to regulate the flow of fluid therethrough and, specifically, from the lumen 121 of the catheter 120 to the pressure source 106. For example, the fluid control device 114 can be actuated to fluidly connect and fluidly disconnect the pressure source 106 from the lumen 121 of the catheter 120. In some embodiments, the connector 116 is a quick-release connector (e.g., a quick disconnect fitting) that enables rapid coupling/decoupling of the catheter 120 and the fluid control device 114 to/from the pressure source 106.

[0037] Figures 2A and 2B are an enlarged partial cut-away side and an isometric view, respectively, of a portion of the catheter 120 of Figure 1 in accordance with embodiments of the present technology. Referring to Figures 2A and 2B together, the catheter 120 includes an outer sheath 230 and an inner liner 232. The outer sheath 230 is positioned over (e.g., radially outside of) the inner liner 232. The outer sheath 230 can also be referred to as an outer jacket, an outer shaft, or an outer layer, and the inner liner 232 can also be referred to as an inner layer, an inner sheath, or an inner shaft. In the illustrated embodiment, the catheter 120 further includes (i) a braid 234 extending between the outer sheath 230 and the inner liner 232 and (ii) a coil 236 extending between the outer sheath 230 and the braid 234. In some embodiments, the braid 234 and the coil 236 extend along the entire length L (Figure 1) of the catheter 120. In some embodiments, the inner liner 232 can be omitted and the outer sheath 230 and/or another component of the catheter 120 can define an inner surface of the catheter 120.

[0038] In some embodiments, the outer sheath 230 is formed from a plastic material, elastomeric material, and/or thermoplastic elastomer (TPE) material. For example, the outer sheath 230 can be formed from a TPE manufactured by Arkema S.A., of Colombes, France, such as the TPEs manufactured under the trademark “Pebax.” The inner liner 232 defines the lumen 121 and can be formed of a lubricious material that facilitates the movement (e.g., distal advancement, proximal retraction) of various components through the lumen 121, such as clot material, delivery sheaths, pull members, guidewires, interventional devices, other aspiration catheters, and the like. In some embodiments, the inner liner 232 is formed from a polymer material, a fluoropolymer material (e.g., polytetrafluoroethylene (PTFE)), and/or another material having a high degree of lubricity. In some embodiments, the inner liner 232 has an inner diameter D (Figure 2) of between about 0.2–0.5 inch (e.g., about 0.270 inch), greater than about 10 French, greater than about 16 French, greater than about 20 French, greater than about 24 French, or greater. In some embodiments, the diameter D is about 20 French or about 24 French.

[0039] The braid 234 can include wires, filaments, threads, sutures, fibers, or the like (collectively “wires 238”) that have been woven or otherwise coupled, attached, formed, and/or joined together at a plurality of interstices 239. Accordingly, the braid 234 can also be referred to as a braided structure, a braided filament structure, a braided filament mesh structure, a mesh structure, a mesh filament structure, and the like. The wires 238 can be formed from metals, polymers, and/or composite materials. In some embodiments, individual ones of the wires 238 are rolled flat wires having a cross-sectional dimension of between about 0.001–0.005 inch (e.g., about 0.002 inch) by about 0.002–0.005 inch (e.g., about 0.0033 inch).

[0040] The coil 236 can include a single wire wound around the braid 234 and the inner liner 232. In other embodiments, the coil 236 includes more than one wire wound about the braid 234 and/or the inner liner 232. For example, the coil 236 can include multiple wires wound over one another and/or multiple wires wound to at least partially overlap one another to form a braided or overlapping coil structure on the braid 234 and/or the inner liner 232. The coil 236 can be formed from a metallic or other suitably strong material, such as nickel-titanium alloys (e.g., nitinol), platinum, cobalt-chrome alloys, stainless steel, tungsten, and/or titanium.

[0041] In some embodiments, the construction of the catheter 120 can be selected/varied to provide a desired flexibility, strength, steerability, torque response, pushability, hoop strength, and/or other property. For example, in some embodiments the braid 234 and the coil 236 can

extend through different regions of the catheter 120 (e.g., the proximal portion 122, the distal portion 124, an intermediate region therebetween, etc.) and/or only partially overlap. For example, the coil 236 can extend only through a distal region of the catheter 120 and can inhibit or even prevent kinking or other unwanted movement of the catheter 120 when the lumen 121 is aspirated during a clot removal procedure. Likewise, the hardness, thickness, and/or the like of the outer sheath 230 and the inner liner 232 can be varied in different regions of the catheter 120. For example, the outer sheath 230 and/or the inner liner 232 can be (i) relatively harder and/or thicker in the proximal portion 122 (Figure 1) of the catheter 120 to provide the catheter 120 with good torque response, pushability, and/or steerability and (ii) relatively softer and/or thinner in the distal portion 124 (Figure 1) such that the catheter 120 be steered to and positioned in difficult-to-reach regions of the anatomy (e.g., venous anatomy) of a patient while still having a relatively large size (e.g., 20 French, 24 French, greater than 24 French). In some embodiments, the catheter 120 can include some features that are at least generally similar in structure and function, or identical in structure and function, to those of the catheters disclosed in (i) U.S. Patent Application Publication No. 17/529,018, titled “CATHETERS HAVING SHAPED DISTAL PORTIONS, AND ASSOCIATED SYSTEMS AND METHODS,” and filed November 17, 2021, and/or (ii) U.S. Patent Application Publication No. 17/529,064, titled “CATHETERS HAVING STEERABLE DISTAL PORTIONS, AND ASSOCIATED SYSTEMS AND METHODS,” and filed November 17, 2021, each of which is incorporated herein by reference in its entirety.

II. Selected Embodiments of Grooved Aspiration Catheters

[0042] In some embodiments, the catheter 120 can include grooves on an inner surface thereof that are configured (e.g., sized and shaped) to improve the efficiency/effectiveness of clot aspiration with the catheter 120 during a clot treatment procedure. Figures 3A and 3B, for example, are an enlarged isometric view and a proximally-facing longitudinal view, respectively, of the distal portion 124 (e.g., the inlet) of the catheter 120 in accordance with embodiments of the present technology. Figure 3C is an interior view of the catheter 120 from within the lumen 121 in accordance with embodiments of the present technology. And, Figure 3D is a partially-transparent isometric view of the catheter 120 in accordance with embodiments of the present technology.

[0043] Referring to Figures 3A–3C together, the catheter 120 includes an inner surface 340 defining the lumen 121, and a plurality of grooves 342 (which can also be referred to as

microchannels, microgrooves, channels, trenches, cuts, gutters, slits, and/or the like) formed along/in the inner surface 340. In some embodiments, the grooves 342 are formed in the inner liner 232 (Figures 2A and 2B). In the illustrated embodiment, the grooves 342 are identical and the catheter 120 includes sixteen of the grooves 342 equally spaced about a circumference of the inner surface 340—that is, equally spaced circumferentially about a longitudinal axis X of the catheter 120 (Figure 3D) that extends through the lumen 121. The grooves 342 can each have a rectangular cross-sectional shape as shown in Figures 3A and 3B or the grooves 342 can each have a curved (e.g., semicircular) shape as shown in Figure 3C. In other embodiments, the grooves 342 can have other cross-sectional shapes (e.g., rectilinear, polygonal, irregular) and/or different ones of the grooves 342 can have different cross-sectional shapes. In some embodiments, the grooves 342 have a thickness or depth D (Figure 3B) of between about 0.003–0.100 inch (e.g., between about 0.005–0.050 inch, between about 0.005–0.0010 inch) and a width W (Figure 3B) of between about 0.005–0.20 inch (e.g., between about 0.010–0.015 inch).

[0044] Referring to Figure 3D, in the illustrated embodiment the grooves 342 each extend (i) along the entire length L of the catheter 120 between the proximal terminus 123 and the distal terminus 125 and (ii) extend circumferentially about the longitudinal axis X along the length L of the catheter 120. That is, the grooves 342 can revolve around the longitudinal axis L to form a spiral or helix pattern. In the illustrated embodiment, each of the grooves 342 traverses four complete revolutions about the longitudinal axis X along the length L of the catheter 120. Accordingly, in some aspects of the present technology the grooves 342 form a rifling pattern on the inner surface 340 (Figures 3A–3C) of the catheter 120. In some embodiments, the length L can be about 36 inches such that catheter 120 has about 0.14 revolutions per inch (e.g., 0.1380 revolutions per inch, between about 0.10–0.20 revolutions per inch, between about 0.13–0.16 revolutions per inch).

[0045] Referring to Figures 3A–3D together, in other embodiments the arrangement of the grooves 342 can be varied based on for example, a particular application of the catheter 120 (e.g., a particular clot removal procedure to be carried out with the catheter 120) and/or a desired aspiration flow pattern. For example, (i) the number of the grooves 342, (ii) the number of revolutions the grooves 342 traverse along the length L of the catheter 120, (iii) the cross-sectional shape of the grooves 342, (iv) the width W and/or depth D of the grooves 342, (v) the extent of the grooves 342 along the longitudinal axis X, and so on can be varied. In some embodiments, the catheter 120 can include between 1–20 or more of the grooves 342, and the grooves 342 can traverse between 0–20 revolutions along the length L of the catheter 120.

[0046] For example, Figure 4 is a partially-transparent isometric view of the catheter 120 in accordance with additional embodiments of the present technology. In the illustrated embodiment, the catheter 120 includes eight of the grooves 342 equally spaced circumferentially about the longitudinal axis X and extending along the entire length L of the catheter 120 between the proximal terminus 123 and the distal terminus 125. Further, the grooves 342 each traverse two full revolutions about the longitudinal axis X along the length L of the catheter 120. In some embodiments, the length L can be about 36 inches such that catheter 120 has about 0.053 revolutions per inch (e.g., 0.0526 revolutions per inch, between about 0.02–0.09 revolutions per inch, between about 0.04–0.07 revolutions per inch).

[0047] For example, Figure 5 is an interior view of the catheter 120 from within the lumen 121 in accordance with additional embodiments of the present technology. In the illustrated embodiment, the catheter 120 includes sixteen of the grooves 342 and the grooves 342 extend generally parallel to the longitudinal axis X (figure 3D; extending into the page in Figure 5). That is, the grooves 342 do not revolve circumferentially around the axis X along the length of the catheter 120 (e.g., the grooves 342 traverse zero revolutions per inch).

[0048] For example, Figures 6A and 6B are an enlarged isometric view and an enlarged cross-sectional side view, respectively, of the distal portion 124 of the catheter 120 in accordance with additional embodiments of the present technology. Referring to Figures 6A and 6B together, in the illustrated embodiment the catheter 120 includes a single one of the grooves 342 that extends from the distal terminus 125 only partially toward the proximal terminus 123 (Figure 1) of the catheter 120. That is, the groove 342 does not extend along the full length L (Figure 1) of the catheter 120 but only partially through the distal portion 124. Moreover, in the illustrated embodiment the groove 342 extends circumferentially (e.g., spirals) about the longitudinal axis X (Figure 6A) six times before terminating at a proximal end portion. In other embodiments, the groove 342 can revolve more or fewer times about the longitudinal axis X. In some embodiments, the depth D (Figure 3B) of the groove 342 is between about 0.010–0.015 inch and the width W (Figure 3B) is between about 0.120–0.145 inch. As described in greater detail below with reference to Figure 8B, the groove 342 can be configured (e.g., shaped and/or sized) to generate a helical flow pattern within the lumen 121 when the catheter 120 is aspirated as indicated by arrow H (which spirals/revolves about the lumen 121) in Figure 6A.

[0049] Referring to Figures 3A–6B together, in other embodiments the grooves 342 need not extend from the distal terminus of 124 of the catheter 120 and can instead start along a middle

portion of the catheter 120 between the proximal terminus 123 and the distal terminus 125. That is, the grooves 342 can be spaced apart from the distal terminus 125 and need not extend along the full length L (Figure 1) of the catheter 120. Moreover, the grooves 342 can be equally spaced relative to one another or can be spaced at varying distances relative to one another.

III. Selected Embodiments of Clot Treatment Methods

[0050] Figures 7A and 7B are side views of the distal portion 124 of the catheter 120 of the clot treatment system 100 of Figure 1 during a procedure for removing clot material C (e.g., a pulmonary embolism) from within a blood vessel BV (e.g., a pulmonary blood vessel) of a patient (e.g., a human patient) in accordance with embodiments of the present technology. As noted above, in some embodiments the clot removal procedure illustrated in Figures 7A and 7B can be generally similar or identical to any of the clot removal procedures disclosed in U.S. Patent Application No. 16/536,185, filed August 8, 2019, and titled “SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED DEVICES AND METHODS,” which is incorporated herein by reference in its entirety.

[0051] With reference to Figures 1 and 7A together, the catheter 120 can be advanced through the patient to proximate the clot material C with the blood vessel BV (e.g., advanced to a treatment site within the blood vessel BV). In some embodiments, the catheter 120 can be advanced through the blood vessel BV until the distal terminus 125 of the catheter 120 is positioned proximate to a proximal portion of the clot material C. In some embodiments, the position of the distal terminus 125 can be confirmed or located via visualization of the marker band 126 using fluoroscopy or another imaging procedure (e.g., a radiographic procedure). In other embodiments, the distal terminus 125 can be positioned at least partially within the clot material C or distal of the clot material C.

[0052] Access to the pulmonary vessels can be achieved through the patient’s vasculature, for example, via the femoral vein. In some embodiments, the clot treatment system 100 can include an introducer (e.g., a Y-connector with a hemostasis valve; not shown) that can be partially inserted into the femoral vein. A guidewire (not shown) can be guided into the femoral vein through the introducer and navigated through the right atrium, the tricuspid valve, the right ventricle, the pulmonary valve, and into the main pulmonary artery. Depending on the location of the clot material C, the guidewire can be guided to one or more of the branches of the right pulmonary artery and/or the left pulmonary artery. In some embodiments, the guidewire can be extended entirely or partially through the clot material C. In other embodiments, the guidewire

can be extended to a location just proximal of the clot material C. After positioning the guidewire, a dilator and the catheter 120 can be placed over the guidewire and advanced to the position proximate to the clot material C as illustrated in Figure 7A. The dilator can then be withdrawn proximally through the lumen 121 of the catheter 120. In some embodiments, the guidewire can then be withdrawn while, in other embodiments, the guidewire can remain and can be used to guide other catheters (e.g., delivery catheters, additional aspiration guide catheters), interventional devices, and the like to the treatment site. It will be understood, however, that other access locations into the venous circulatory system of a patient are possible and consistent with the present technology. For example, the user can gain access through the jugular vein, the subclavian vein, the brachial vein, or any other vein that connects or eventually leads to the superior vena cava. Use of other vessels that are closer to the right atrium of the patient's heart can also be advantageous as it reduces the length of the instruments needed to reach the clot material C.

[0053] With reference to Figures 1 and 7B together, the pressure source 106 is configured to generate (e.g., form, create, charge, build-up) a vacuum (e.g., negative relative pressure) and store the vacuum for subsequent application to the catheter 120. For example, after positioning the catheter 120 proximate the clot material C, a user can first close the fluid control device 114 before generating the vacuum in the pressure source 106 by, for example, withdrawing the plunger of a syringe coupled to the connector 116. In this manner, a vacuum is charged within the pressure source 106 (e.g., a negative pressure is maintained) before the pressure source 106 is fluidly connected to the lumen 121 of the catheter 120. To aspirate the lumen 121 of the catheter 120, the user can open the fluid control device 114 to fluidly connect the pressure source 106 to the catheter 120 and thereby apply or release the vacuum stored in the pressure source 106 to the lumen 121 of the catheter 120.

[0054] Opening of the fluid control device 114 instantaneously or nearly instantaneously applies the stored vacuum pressure to the tubing assembly 110 and the catheter 120, thereby generating a suction pulse throughout the catheter 120. In particular, the suction is applied at the distal portion 124 of the catheter 120 to suck/aspirate/ingest at least a portion of the clot material C into the lumen 121 of the catheter 120, as shown in Figure 7B. In one aspect of the present technology, pre-charging or storing the vacuum in the pressure source 106 before applying the vacuum to the lumen 121 of the catheter 120 is expected to generate greater suction forces and corresponding fluid flow velocities at and/or near the distal terminus 125 of the catheter 120 compared to simply activating the pressure source 106 while it is fluidly connected

to the catheter 120. The vacuum pressure can act to draw the clot material C down the entire length of the catheter 120, through the side port 104, through the tubing assembly 110, and into the pressure source 106.

[0055] Sometimes, as shown in Figure 7B, discharging the vacuum stored in the pressure source to aspirate the lumen 121 of the catheter 120 may remove substantially all (e.g., a desired amount) of the clot material C from the blood vessel BV. That is, a single aspiration pulse may adequately remove the clot material C from the blood vessel BV. In other embodiments, a portion of the clot material C may remain in the blood vessel BV. In such instances, the user may wish to again apply vacuum pressure (conduct another “aspiration pass”) to remove all or a portion of the remaining clot material C in the blood vessel BV. In such instances, the pressure source 106 can be disconnected from the tubing assembly 110 and drained (e.g., aspirated clot removal removed) before the pressure source 106 is reconnected to the tubing assembly 110 and activated once again. After removing a desired amount of the clot material C, the catheter 120 can be withdrawn from the patient.

[0056] Sometimes, however, the clot material C can clog and become stuck within the lumen 121 of the catheter 120 and/or around the distal terminus 125 of the catheter 120 (e.g., forming a “lollipop” around the distal terminus 125). Clearing such clogs can require (i) performing additional aspiration passes, (ii) removing the entire catheter 120 from the patient and then reinserting the same or a different catheter 120 for another aspiration pass, (iii) and/or inserting an additional clot removal element through the catheter 120 to mechanically disrupt and dislodge the clog. Such techniques to clear the clog can increase the complexity and time of the clot removal procedure.

[0057] In some aspects of the present technology, the grooves 342 (Figures 3A–6B) of the catheter 120 can facilitate improved ingestion/aspiration of the clot material C into and through the catheter 120—thereby inhibiting clogging—as compared to, for example, conventional catheters having a non-grooved inner surface. Figures 8A and 8B, for example, are a proximally-facing longitudinal view and an enlarged partially-transparent side view, respectively, of the distal portion 124 (e.g., inlet) of the catheter 120 with the clot material C positioned therein in accordance with embodiments of the present technology. In the illustrated embodiment, the catheter 120 includes the arrangement of the grooves 342 shown in Figures 3A–3D.

[0058] Referring to Figure 8A, some or all of the grooves 342 can create fluid paths (e.g., leak paths, microfluid paths, microleak paths) around the clot material C. These fluid paths can

inhibit or prevent the clot material C from clogging the lumen 121 and causing a cavitation within the pressure source 106 by keeping blood flowing generally proximally through the catheter 120 through the grooves 342 during aspiration. This movement of the blood through the grooves 342 can help pull the clot material C farther proximally into and through the lumen 121 of the catheter 120. Similarly, the grooves 342 can also reduce the area of the inner surface 340 that contacts the clot material C—thereby reducing friction between the clot material C and the catheter 120, and ultimately the aspiration force required to move the clot material C proximally through the entire length of the catheter 120.

[0059] Referring to Figure 8B, the rifling pattern on the grooves 342 (e.g., revolving circumferentially about the longitudinal axis of the catheter 120) can create a helical flow pattern inside the lumen 121 of the catheter 120 during aspiration as indicated by the arrow H. In some aspects of the present technology, the helical flow pattern can help keep faster moving blood travelling proximally through the lumen 121 near the inner surface 340 while maintaining the slower moving clot material C toward the center of the lumen 121. The outer “layer” of blood near the inner surface 340 can create a fluid buffer between the clot material C and the inner surface 340 of the catheter 120 that facilitates a more efficient and reliable transport of the clot material C down the entire length of the catheter 120 and into the pressure source 106 (Figure 1). More specifically, the helical flow of the blood can (i) exert an axial force against the clot material C that pulls the clot material C in a proximal direction indicated by arrow P via suction on the clot and (ii) exert a torsional force against the clot material C as indicated by the arrow H. These forces can apply shear and torsional stresses against the clot material C that act to deform (e.g., lengthen) and/or break apart the clot material C within the lumen 121 in a manner in which laminar and/or non-helical flow would not. This can further reduce the area of the inner surface 340 that contacts the clot material C—thereby reducing friction between the clot material C and the catheter 120. The decrease in friction and/or deformation of the clot material C can help the clot material C travel through the lumen 121 without clogging the lumen 121.

IV. Selected Examples of the Performance of Embodiments of the Present Technology and Associated Optimizations

[0060] Referring to Figures 3A–6B together, as described above, the arrangement of the grooves 342 can be varied to provide different aspiration flow patterns, flow rates, and/or the like. In general, for example, it is expected that increasing the number of the grooves 342 will improve/strengthen the axial flow path past an ingested clot up to a point at which the grooves

342 are too small to provide an efficient leak path past the ingested clot material. Likewise, it is expected that increasing the depth D of the grooves 342 will improve the helical flow pattern at the cost of increasing the wall thickness of the catheter 120 (e.g., the thickness of the inner liner 232 shown in Figures 2A and 2B) that the grooves 342 are formed in. For example, significant increases in the depth D are expected to require a corresponding increase in the overall thickness of the inner liner 232 (e.g., an increase in the thickness of the inner liner 232 radially outside the grooves 342—i.e., on the outer side or back side of the grooves 342) to maintain the integrity of the inner liner 232. Increasing the wall thickness of the catheter 120 can decrease the flexibility of the catheter 120. Therefore, for example, the grooves 342 can be relatively deeper for applications in which the catheter 120 does not need to be made very flexible (e.g., for clot removal procedures in non-tortuous anatomies), while the grooves 342 can be made shallower for applications in which it is advantageous for the catheter 120 to be made very flexible (e.g., for clot removal procedures in tortuous anatomies such as the pulmonary arteries).

[0061] Similarly, it is expected that increasing the number of revolutions of the grooves 342 (where the grooves 342 are rifled along the length L of the catheter 120) will (i) improve the helical flow pattern within the catheter 120 thereby increasing the torsional forces acting to lengthen and break apart the ingested clot material while also (ii) decreasing the volumetric flow rate within the catheter 120 by increasing the length the blood must travel through the catheter 120. However, where the catheter 120 traverses a tortuous path, the linear/laminar flow provided by a catheter without grooves or with linear (e.g., non-revolving) grooves can impede flow as the flow must change its trajectory down the length of the catheter. In some aspects of the present technology, the rifled arrangement of the grooves 342 can improve the flow pattern and/or volumetric flow rate of the catheter 120 in tortuous anatomies as the blood flow need not change its trajectory through the tortuous path of the catheter 120 as much.

[0062] More specifically, for example, Figures 9A and 9B are perspective views of the clot treatment system 100 traversing a simulated pathway to a right pulmonary artery RPA and a left pulmonary artery LPA, respectively, in accordance with embodiments of the present technology. Referring to Figures 9A and 9B together, the pathway to the right pulmonary artery RPA can be more tortuous than the pathway to left pulmonary artery LPA. More specifically, in the illustrated embodiment the pathway to the right pulmonary artery RPA has a tortuosity defined as the amount of curvature of the catheter 120 divided by the length L (Figure 1) of the catheter 120 of about 1.40, while the pathway to the left pulmonary artery LPA has a tortuosity of about 1.06.

[0063] Figures 9C and 9D are distally-facing longitudinal views of the proximal portion 122 (e.g., the outlet) of the catheter 120 illustrating a flow pattern during aspiration without any of the grooves 342 and with the arrangement of the grooves 342 shown in Figures 3A–3D, respectively, when the catheter 120 traverses the simulated pathway to the right pulmonary artery RPA shown in Figure 9A in accordance with embodiments of the present technology. Referring to Figures 9C and 9D together, in both embodiments the fastest flow is toward the center of the lumen 121. However, the flow pattern generated by the catheter 120 without the grooves 342 is much less uniform than the flow pattern generated by the catheter 120 with the grooves 342. In some aspects of the present technology, the nonuniform flow pattern shown in Figure 9C traverses the lumen 121 of the catheter more slowly than the more uniform flow pattern shown in Figure 9D—reducing the volumetric flow rate of the catheter 120 and the efficiency at which the catheter 120 can ingest clot material.

[0064] In some aspects of the present technology, the number of rotations that the grooves 342 traverse down the length L of the catheter 120 (and/or the number of rotations per unit length) can impact the flow rate and efficiency of clot aspiration through the catheter 120. For example, Figure 10A is a graph of a measured flow rate through the catheter 120 versus the number of revolutions of the grooves 342 along the length of the catheter 120 for the simulated pathway to the right pulmonary artery shown in Figure 9A in accordance with embodiments of the present technology. The graph illustrates the plot for the average flow rate when the catheter 120 had a size of 24 French and a length of about 36 inches. Figure 10B is a graph of a corresponding measured time to aspirate an occlusive synthetic clot through the catheter 120 in accordance with embodiments of the present technology. The graph in Figure 10B illustrates the plot for a synthetic clot that was formed of silicone 27A mold and had a spherical shape with diameter greater than the diameter of the catheter 120 of 0.28 inch. Referring to Figure 10A and 10B together, the flow rate was maximized, and the corresponding aspiration time was minimized, when the catheter 120 was tested with five revolutions (e.g., about 0.14 revolutions per inch) as opposed to having no grooves (e.g., 0 revolutions per inch), or grooves with one or ten revolutions (e.g., about 0.03 or 0.28 revolutions per inch).

[0065] Similarly, Figure 11A is a graph of a measured distance traveled of an occlusive synthetic clot through the catheter 120 versus the number of revolutions of the grooves 342 along the length of the catheter 120 when the clot was aspirated through the catheter 120 for the simulated pathway to the right pulmonary artery shown in Figure 9A in accordance with embodiments of the present technology. The graph illustrates the plot for the average clot

distance when the catheter 120 had a size of 24 French and a length of about 36 inches, and when the synthetic clot was formed of silicone 27A mold and had a cylindrical shape with a length of 0.63 inch and a diameter of 0.28 inch. Figure 11B is a graph of a corresponding measured clot velocity in accordance with embodiments of the present technology. Figure 11B further illustrates a plot for the average clot velocity for a synthetic clot having a cylindrical shape with a smaller length of 0.37 inch. Referring to Figure 11A and 11B together, again the distance the clot traveled and the velocity of the clot during aspiration was maximized when the catheter 120 was tested with five revolutions as opposed to having no grooves, or grooves with one or ten revolutions.

[0066] Similarly, Figure 12 is a graph of a measured maximum force required to move an occlusive synthetic clot through the catheter 120 versus the number of revolutions of the grooves 342 along the length of the catheter 120 when the clot was aspirated through the catheter 120 for the simulated pathway to the right pulmonary artery shown in Figure 9A in accordance with embodiments of the present technology. The graph illustrates the plot for the maximum force when the catheter 120 had a size of 24 French and a length of about 36 inches, and when the synthetic clot was formed of silicone 27A mold and had a cylindrical shape with a length of 0.50 inch. As shown, the maximum force was again minimized when the catheter 120 was tested with five revolutions as opposed to having no grooves, or grooves with one or ten revolutions. That is, five revolutions of the grooves 342 minimized the friction between the clot and the catheter 120 during aspiration.

[0067] Accordingly, in some aspects of the present technology five revolutions of the grooves 342—or about five revolutions—can maximize the efficiency of clot removal via aspiration through the catheter 120 by (i) increasing the flow rate through the catheter 120, (ii) reducing clot aspiration time through the catheter 120, (iii) increasing the distance the clot travels through the catheter 120, (iv) increasing the velocity at which the clot travels through the catheter 120, (v) decreasing the friction between the clot and the catheter 120, and/or (vi) decreasing the force needed to pull the clot through the catheter 120. It is expected that the optimum number of revolutions (among other parameters) can vary depending on the path traversed by the catheter 120 through a patient.

[0068] Moreover, in some aspects of the present technology it is expected that the optimum number of revolutions is dependent on the length of the catheter 120. Accordingly, the optimum number of revolutions per unit length of the catheter 120 can remain constant for

catheters of different lengths. As set forth above, for example, the catheter 120 can include between about 0.01–0.40 revolutions per inch (e.g., about 0.028 revolutions per inch, about 0.056 revolutions per inch, about 0.139 revolutions per inch, about 0.278 revolutions per inch, between about 0.10–0.20 revolutions per inch, between about 0.12–0.16 revolutions per inch, etc.). That is, the catheter 120 can include between about 0.005–0.15 revolutions per centimeter (e.g., about 0.011 revolutions per centimeter, about 0.022 revolutions per centimeter, about 0.055 revolutions per centimeter, about 0.109 revolutions per centimeter, between about 0.03–0.08 revolutions per centimeter, between about 0.04–0.07 revolutions per centimeter, etc.).

V. Selected Embodiments of Devices, Systems, and Methods for Manufacturing Grooved Aspiration Catheters

[0069] Referring to Figures 1–6B together, in some embodiments the catheter 120 can be formed about a mandrel, hypotube, or other elongate member. For example, the inner liner 232 can first be positioned about the mandrel and, in some embodiments, stretched along the mandrel to a desired thickness. Then, the braid 234 can be formed (e.g., wound, braided) about the inner liner 232 around the mandrel. Next, the coil 236 can be wound around the mandrel about the braid 234 and the inner liner 232. In some embodiments, the marker band 126 can be positioned about the mandrel in the distal portion 124. Next, the outer sheath 230 can be positioned over the inner liner 232, the braid 234, and the coil 236, and then some or all of these components can be heat shrunk, fused, laminated, or otherwise secured together.

[0070] To form the grooves 342, the mandrel can be formed with corresponding features that shape the inner liner 232. Figure 13, for example, is a longitudinal view of a mandrel 1350 over which the catheter 120 can be formed in accordance with embodiments of the present technology. In the illustrated embodiment, the mandrel 1350 includes a body 1352 (e.g., a cylindrical body) and positive features 1354 (e.g., extrusions, ridges, projections) projecting radially outward from the body 1352 and separated by grooves or trenches 1356. Referring to Figures 1–6B and 13 together, the positive features 1354 can correspond to the desired pattern of the grooves 342. For example, the features 1354 can have dimensions corresponding to the desired depth *D* and width *W* of the grooves 342, and can spiral about the body 1352 any number of revolutions to provide the desired rifling pattern of the grooves 342. The number of the features 1354, the spacing between the features 1354, the size (e.g., height, width) of the features 1354, the pitch or helical pattern of the features 1354, and/or other parameters of the features 1354 can be selected to produce a pattern of the grooves 342 having a desired number, depth *D*,

and width W. For example, the features 1354 have a rectangular cross-sectional shape in Figure 13 to produce grooves 342 having a rectangular cross-sectional shape while, in other embodiments, the features 1354 can have other cross-sectional shapes (e.g., circular, polygonal, irregular, etc.) to produce grooves 342 of corresponding shape. As a further example, in Figure 13 the mandrel 1350 includes 16 of the features 1354 such that the catheter 120 has a corresponding 16 of the grooves 342. The mandrel 1350 can have any number of the features 1354.

[0071] When the catheter 120 is formed (e.g., laminated) over the mandrel 1350, the catheter 120 can shrink radially about the mandrel 1350 and against/between the features 1354 to form the grooves 342. Specifically, the inner liner 232 can melt and flow into the trenches 1356 between the features 1354 before solidifying to form the grooves 342 (e.g., when the inner liner 232 comprises a Pebax material). Alternatively or additionally, the inner liner 232 can be pressed and/or formed into the trenches 1356 without melting (e.g., when the inner liner 232 comprises a PTFE material). In some embodiments, to facilitate removal of the catheter 120 from the mandrel 1350 after manufacturing, a lubricant (e.g., a silicone spray lubricant) can be applied to the mandrel 1350 prior to manufacturing of the catheter 120 (e.g., in a mold release process). Similarly, the mandrel 1350 can include a more permanent thin layer of PTFE coating over the outer surface thereof to facilitate removal and release of the catheter 120. In some embodiments, the manufacturing process can include a destructive process step that stretches and necks down the mandrel 1350 to a smaller outer diameter to facilitate removal and release of the catheter 120.

[0072] In some embodiments, the features 1354 can extend linearly along the length of the body 1352, and the mandrel 1350 can be fixed at one end and then rotated to provide the rifling pattern of the grooves 342. For example, the mandrel 1350 can be rotated a desired number of times during manufacturing (e.g., with the inner liner 232 in a molten state) such that the grooves 342 traverse a corresponding number of revolutions along the length L of the catheter 120. In some embodiments, the features 1354 can revolve at least partially about the body 1352, and the mandrel 1350 can be rotated during manufacturing of the catheter 120 to introduce further revolutions into the grooves 342.

[0073] The features 1354 of the mandrel 1350 can be formed by machining the body 1352 (e.g., a hypotube or solid tube) to cut-out or etch the trenches 1356. In some embodiments, the machining is performed by a multi-axis machine that can rotate the mandrel 1350 during

machining such that the trenches 1356 (and the corresponding features 1354) revolve about the body 1352. In other embodiments, the mandrel 1350 can be formed by extruding the body 1352 to form the positive features 1354 and the trenches 1356.

[0074] Figures 14A and 14B are a cross-sectional longitudinal view and an enlarged isometric view, respectively, of a mandrel 1450 over which the catheter 120 can be formed in accordance with additional embodiments of the present technology. Referring to Figures 14A and 14B together, in the illustrated embodiment the mandrel 1450 includes a body 1452 and filaments or wires 1454 (e.g., positive features) positioned about the body 1452 that correspond to the desired pattern of the grooves 342 (Figures 1–6B). The wires 1454 can be welded to the body 1452, tightly wound about the body 1452 (e.g., and secured at both ends of the wires 1454), or otherwise secured about/to the body 1452. Referring to Figures 1–6B, 14A, and 14B together, when the catheter 120 is formed about the mandrel 1450, the inner liner 232 can melt and flow into the spaces between the wires 1454 before solidifying to form the grooves 342, and/or can be pressed/formed into the spaces between the wires 1454 to form the grooves 342. The number of the wires 1454, the spacing between the wires 1454, the size (e.g., diameter) of the wires 1454, the pitch or helical pattern of the wires 1454, and/or other parameters of the wires 1454 can be selected to produce a pattern of the grooves 342 having a desired number, depth D, and width W. For example, in the illustrated embodiment the wires 1454 are evenly spaced circumferentially about the body 1452 and in contact with each other to form a more uniform pattern of the grooves 1454. Likewise, in Figures 14A and 14B, the mandrel 1450 includes 24 of the wires 1454 such that the catheter 120 has a corresponding 24 of the grooves 342. For example, reducing the number of the wires 1454 will produce a pattern having fewer of the grooves 342, and spacing the wires 1454 apart from one another will produce a pattern having a greater depth D and width W of the grooves. Similar to the positive features 1354 of Figure 13, the wires 1454 can wrap helically about the body 1452 to correspond to the desired number of revolutions of the grooves 342, or the wires 1454 can extend linearly (or at least partially helically) along the body 1452 and the mandrel 1450 can be rotated during manufacturing to produce a revolving (e.g., helical) pattern of the grooves 342.

VI. Additional Examples

[0075] Several aspects of the present technology are set forth in the following examples:

1. An aspiration catheter, comprising:
a proximal terminus;
a distal terminus; and
an inner surface defining a lumen, wherein the inner surface includes at least one groove formed therein and that extends from the distal terminus at least partially toward the proximal terminus.
2. The aspiration catheter of example 1 wherein the at least one groove extends from the distal terminus to the proximal terminus.
3. The aspiration catheter of example 1 or example 2 wherein the lumen extends along a longitudinal axis, and wherein the at least one groove revolves circumferentially about the longitudinal axis between the proximal terminus and the distal terminus.
4. The aspiration catheter of example 3 wherein the at least one groove revolves about 0.05 times or more per inch about the longitudinal axis between the proximal terminus and the distal terminus.
5. The aspiration catheter of example 3 wherein the at least one groove revolves between about 0.13–0.15 times per inch about the longitudinal axis between the proximal terminus and the distal terminus.
6. The aspiration catheter of example 3 wherein the at least one groove revolves more than about 0.13 times per inch about the longitudinal axis between the proximal terminus and the distal terminus.
7. The aspiration catheter of any one of examples 1–6 wherein the at least one groove has a spiral shape.
8. The aspiration catheter of any one of examples 1–7 wherein the at least one groove comprises a plurality of grooves.

9. The aspiration catheter of example 8 wherein the plurality of grooves are equally spaced apart about a circumference of the inner surface.

10. The aspiration catheter of example 8 or example 9 wherein the lumen extends along a longitudinal axis, and wherein the plurality of grooves revolves circumferentially about the longitudinal axis between the proximal terminus and the distal terminus.

11. The aspiration catheter of example 10 wherein the plurality of grooves revolves about 0.05 times or more per inch about the longitudinal axis between the proximal terminus and the distal terminus.

12. The aspiration catheter of example 10 wherein the plurality of grooves revolves between about 0.13–0.15 times per inch about the longitudinal axis between the proximal terminus and the distal terminus.

13. The aspiration catheter of example 10 wherein the plurality of grooves revolves more than about 0.13 times per inch about the longitudinal axis between the proximal terminus and the distal terminus.

14. The aspiration catheter of any one of examples 1–13 wherein the catheter further comprises:

- an inner liner having the inner surface, wherein the at least one groove is formed in the inner liner;
- a braid of wires over the inner liner;
- a wire coiled over the inner liner; and
- an outer sheath over the braid, the wire, and the inner liner.

15. An aspiration catheter, comprising:

- a proximal terminus;
- a distal terminus; and
- an inner surface defining a lumen extending along a longitudinal axis, wherein the inner surface includes a plurality of grooves formed therein, wherein the grooves extend at least partially between the distal terminus and the proximal terminus.

and wherein the grooves revolve circumferentially about the longitudinal axis between the distal terminus and the proximal terminus.

16. The aspiration catheter of example 15 wherein the grooves revolve between about 0.13–0.15 times per inch about the longitudinal axis between the proximal terminus and the distal terminus.

17. The aspiration catheter of example 15 or example 16 wherein the grooves are equally spaced about a circumference of the inner surface.

18. The aspiration catheter of any one of examples 15–17 wherein the grooves extend to the distal terminus.

19. The aspiration catheter of any one of examples 15–18 wherein the grooves extend entirely between the distal terminus and proximal terminus.

20. A system for removing material from within a lumen of a human patient, the system comprising:

- an aspiration catheter configured to be positioned at a treatment site proximate to the material within the lumen, wherein the aspiration catheter comprises—
 - a proximal terminus;
 - a distal terminus; and
 - an inner surface defining a lumen, wherein the inner surface includes at least one groove formed therein and that extends from the distal terminus at least partially toward the proximal terminus;
- a tubing assembly fluidly coupled to the catheter and including a fluid control device;
- and
- a pressure source fluidly coupled to the tubing assembly and configured to generate negative pressure, wherein the fluid control device is movable between (a) a first position in which the pressure source is fluidly connected to the aspiration catheter via the tubing assembly and (b) a second position in which the pressure source is fluidly disconnected from the aspiration catheter.

21. The system of example 20 wherein the lumen extends along a longitudinal axis, wherein the at least one groove includes a plurality of grooves, wherein the grooves are equally spaced about a circumference of the inner surface, wherein the grooves extend at least partially from the distal terminus to the proximal terminus, and wherein the grooves revolve circumferentially about the longitudinal axis between the proximal terminus and the distal terminus.

22. A method for removing material from within a lumen of a human patient, the method comprising:

positioning a distal portion of an aspiration catheter proximate to the material within the lumen, wherein the aspiration catheter includes an inner surface having at least one groove formed therein, and wherein the at least one groove extends from a distal terminus of the aspiration catheter at least partially toward a proximal terminus of the aspiration catheter;

coupling a pressure source to the aspiration catheter via a fluid control device, wherein (a) opening of the fluid control device fluidly connects the pressure source to the aspiration catheter and (b) closing of the fluid control device fluidly disconnects the pressure source from the aspiration catheter;

activating the pressure source to generate a vacuum while the fluid control device is closed; and

opening the fluid control device to apply the vacuum to the aspiration catheter to thereby aspirate at least a portion of the material into the aspiration catheter.

23. The method of example 22 wherein the at least one groove defines a leak path past the clot material when the clot material is aspirated into the aspiration catheter.

24. The method of example 22 or example 23 wherein the at least one groove generates a helical flow pattern in the lumen when the clot material is aspirated into the aspiration catheter.

25. A mandrel for use in forming a catheter, comprising:
a cylindrical body; and

a plurality of features extending radially outward from the body, wherein the catheter is configured to be formed over the body and the features such that the catheter has a plurality of grooves corresponding to an arrangement of the features.

26. The mandrel of example 25 wherein the features are integrally formed with the body.

27. The mandrel of example 25 wherein the features are wires.

28. The mandrel of any one of examples 25–27 wherein the features extend helically about the body.

29. A method of forming a catheter, the method comprising:
positioning an inner liner of the catheter about a mandrel, wherein the mandrel includes a cylindrical body and a plurality of features extending radially outward from the body;
positioning an outer liner of the catheter over the inner liner about the mandrel; and
heating the inner liner and the outer liner such that the inner liner includes a plurality of grooves corresponding to the features of the mandrel.

30. The method of example 29 wherein the method further comprises cooling the inner liner and the outer liner such that the outer liner fuses to the inner liner.

31. The method of example 29 or example 30 wherein the method further comprises rotating the mandrel after heating the inner liner and the outer liner to revolve the features and the corresponding grooves in the inner liner.

32. The method of any one of examples 29–31 wherein the features are integrally formed with the body.

33. The method of any one of examples 29–31 wherein the features are wires.

34. The method of any one of examples 29–33 wherein the features extend helically about the body.

VII. Conclusion

[0076] The above detailed descriptions of embodiments of the technology are not intended to be exhaustive or to limit the technology to the precise form disclosed above. Although specific embodiments of, and examples for, the technology are described above for illustrative purposes, various equivalent modifications are possible within the scope of the technology as those skilled in the relevant art will recognize. For example, although steps are presented in a given order, alternative embodiments may perform steps in a different order. The various embodiments described herein may also be combined to provide further embodiments.

[0077] From the foregoing, it will be appreciated that specific embodiments of the technology have been described herein for purposes of illustration, but well-known structures and functions have not been shown or described in detail to avoid unnecessarily obscuring the description of the embodiments of the technology. Where the context permits, singular or plural terms may also include the plural or singular term, respectively.

[0078] Moreover, unless the word “or” is expressly limited to mean only a single item exclusive from the other items in reference to a list of two or more items, then the use of “or” in such a list is to be interpreted as including (a) any single item in the list, (b) all of the items in the list, or (c) any combination of the items in the list. Additionally, the term “comprising” is used throughout to mean including at least the recited feature(s) such that any greater number of the same feature and/or additional types of other features are not precluded. It will also be appreciated that specific embodiments have been described herein for purposes of illustration, but that various modifications may be made without deviating from the technology. Further, while advantages associated with some embodiments of the technology have been described in the context of those embodiments, other embodiments may also exhibit such advantages, and not all embodiments need necessarily exhibit such advantages to fall within the scope of the technology. Accordingly, the disclosure and associated technology can encompass other embodiments not expressly shown or described herein.

CLAIMS

I/We claim:

1. An aspiration catheter, comprising:
a proximal terminus;
a distal terminus; and
an inner surface defining a lumen, wherein the inner surface includes at least one groove formed therein and that extends from the distal terminus at least partially toward the proximal terminus.
2. The aspiration catheter of claim 1 wherein the at least one groove extends from the distal terminus to the proximal terminus.
3. The aspiration catheter of claim 1 wherein the lumen extends along a longitudinal axis, and wherein the at least one groove revolves circumferentially about the longitudinal axis between the proximal terminus and the distal terminus.
4. The aspiration catheter of claim 3 wherein the at least one groove revolves about 0.05 times or more per inch about the longitudinal axis between the proximal terminus and the distal terminus.
5. The aspiration catheter of claim 3 wherein the at least one groove revolves between about 0.13–0.15 times per inch about the longitudinal axis between the proximal terminus and the distal terminus.
6. The aspiration catheter of claim 3 wherein the at least one groove revolves more than about 0.13 times per inch about the longitudinal axis between the proximal terminus and the distal terminus.
7. The aspiration catheter of claim 1 wherein the at least one groove has a spiral shape.

8. The aspiration catheter of claim 1 wherein the at least one groove comprises a plurality of grooves.

9. The aspiration catheter of claim 8 wherein the plurality of grooves are equally spaced apart about a circumference of the inner surface.

10. The aspiration catheter of claim 8 wherein the lumen extends along a longitudinal axis, and wherein the plurality of grooves revolves circumferentially about the longitudinal axis between the proximal terminus and the distal terminus.

11. The aspiration catheter of claim 10 wherein the plurality of grooves revolves about 0.05 times or more per inch about the longitudinal axis between the proximal terminus and the distal terminus.

12. The aspiration catheter of claim 10 wherein the plurality of grooves revolves between about 0.13–0.15 times per inch about the longitudinal axis between the proximal terminus and the distal terminus.

13. The aspiration catheter of claim 10 wherein the plurality of grooves revolves more than about 0.13 times per inch about the longitudinal axis between the proximal terminus and the distal terminus.

14. The aspiration catheter of claim 1 wherein the catheter further comprises:
an inner liner having the inner surface, wherein the at least one groove is formed in the inner liner;
a braid of wires over the inner liner;
a wire coiled over the inner liner; and
an outer sheath over the braid, the wire, and the inner liner.

15. An aspiration catheter, comprising:
a proximal terminus;
a distal terminus; and

an inner surface defining a lumen extending along a longitudinal axis, wherein the inner surface includes a plurality of grooves formed therein, wherein the grooves extend at least partially between the distal terminus and the proximal terminus, and wherein the grooves revolve circumferentially about the longitudinal axis between the distal terminus and the proximal terminus.

16. The aspiration catheter of claim 15 wherein the grooves revolve between about 0.13–0.15 times per inch about the longitudinal axis between the proximal terminus and the distal terminus.

17. The aspiration catheter of claim 15 wherein the grooves are equally spaced about a circumference of the inner surface.

18. The aspiration catheter of claim 15 wherein the grooves extend to the distal terminus.

19. The aspiration catheter of claim 15 wherein the grooves extend entirely between the distal terminus and proximal terminus.

20. A system for removing material from within a lumen of a human patient, the system comprising:

an aspiration catheter configured to be positioned at a treatment site proximate to the material within the lumen, wherein the aspiration catheter comprises—

a proximal terminus;

a distal terminus; and

an inner surface defining a lumen, wherein the inner surface includes at least one groove formed therein and that extends from the distal terminus at least partially toward the proximal terminus;

a tubing assembly fluidly coupled to the catheter and including a fluid control device; and

a pressure source fluidly coupled to the tubing assembly and configured to generate negative pressure, wherein the fluid control device is movable between (a) a first position in which the pressure source is fluidly connected to the aspiration

catheter via the tubing assembly and (b) a second position in which the pressure source is fluidly disconnected from the aspiration catheter.

21. The system of claim 20 wherein the lumen extends along a longitudinal axis, wherein the at least one groove includes a plurality of grooves, wherein the grooves are equally spaced about a circumference of the inner surface, wherein the grooves extend at least partially from the distal terminus to the proximal terminus, and wherein the grooves revolve circumferentially about the longitudinal axis between the proximal terminus and the distal terminus.

22. A method for removing material from within a lumen of a human patient, the method comprising:

positioning a distal portion of an aspiration catheter proximate to the material within the lumen, wherein the aspiration catheter includes an inner surface having at least one groove formed therein, and wherein the at least one groove extends from a distal terminus of the aspiration catheter at least partially toward a proximal terminus of the aspiration catheter;

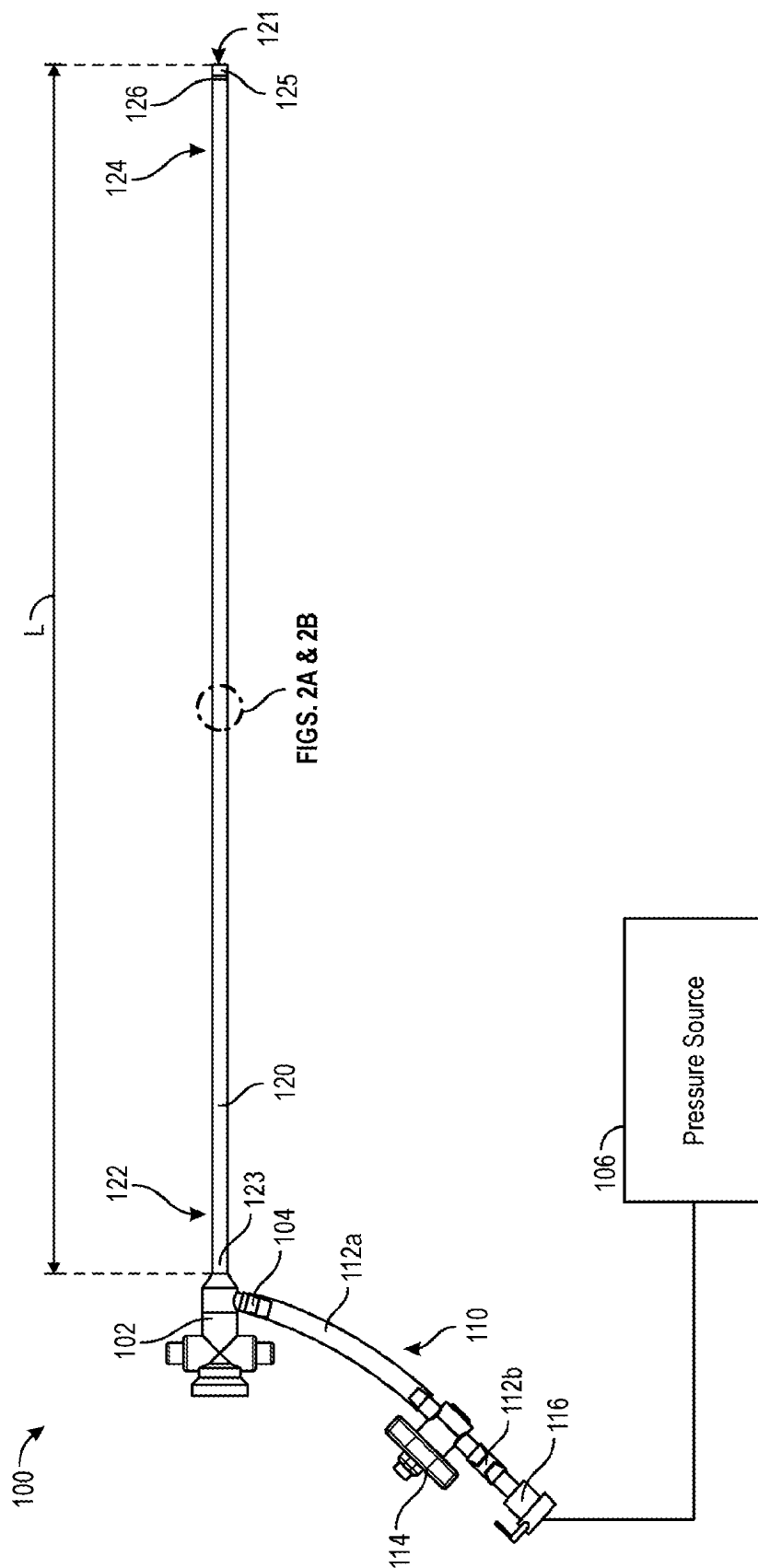
coupling a pressure source to the aspiration catheter via a fluid control device, wherein (a) opening of the fluid control device fluidly connects the pressure source to the aspiration catheter and (b) closing of the fluid control device fluidly disconnects the pressure source from the aspiration catheter;

activating the pressure source to generate a vacuum while the fluid control device is closed; and

opening the fluid control device to apply the vacuum to the aspiration catheter to thereby aspirate at least a portion of the material into the aspiration catheter.

23. The method of claim 22 wherein the at least one groove defines a leak path past the clot material when the clot material is aspirated into the aspiration catheter.

24. The method of claim 22 wherein the at least one groove generates a helical flow pattern in the lumen when the clot material is aspirated into the aspiration catheter.



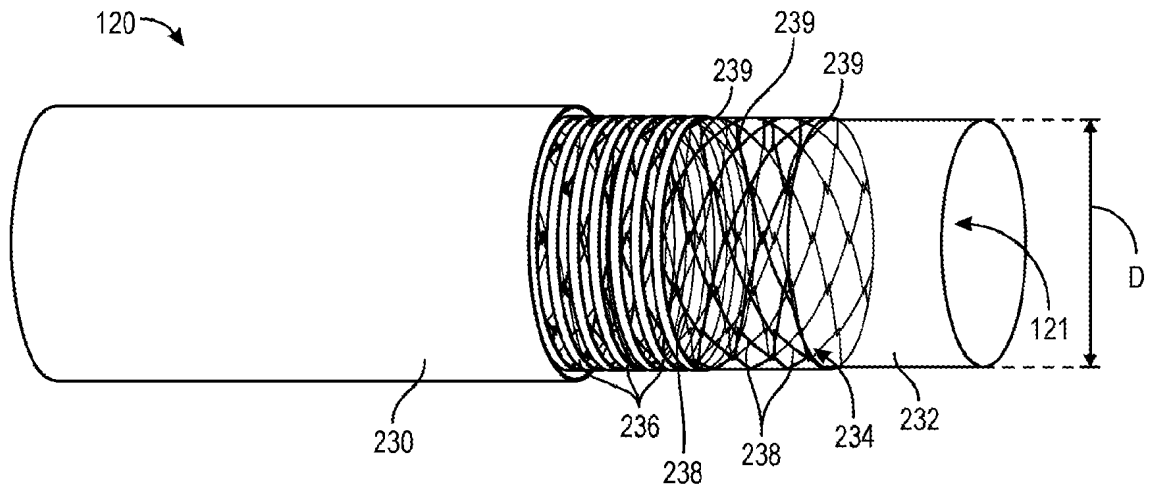


FIG. 2A

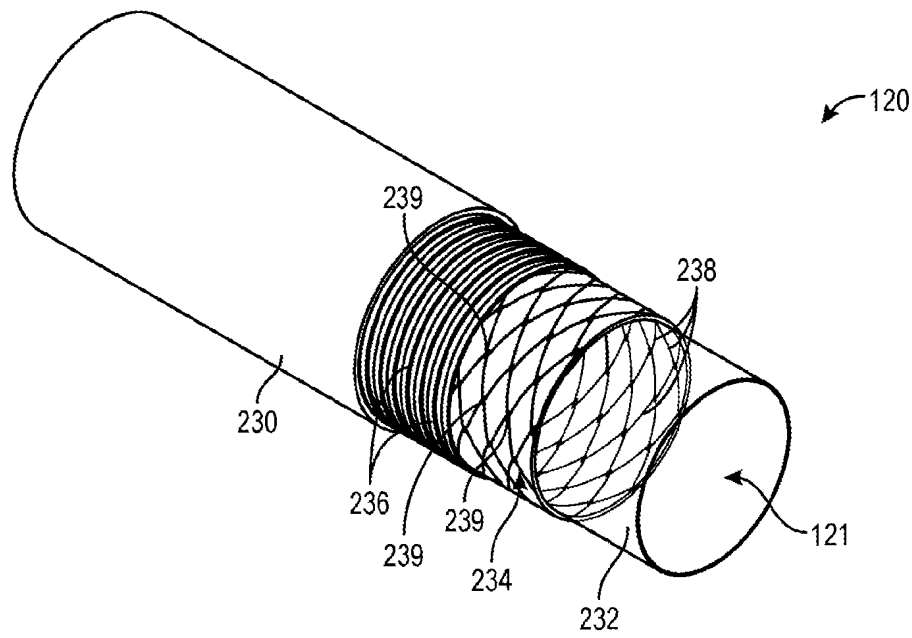


FIG. 2B

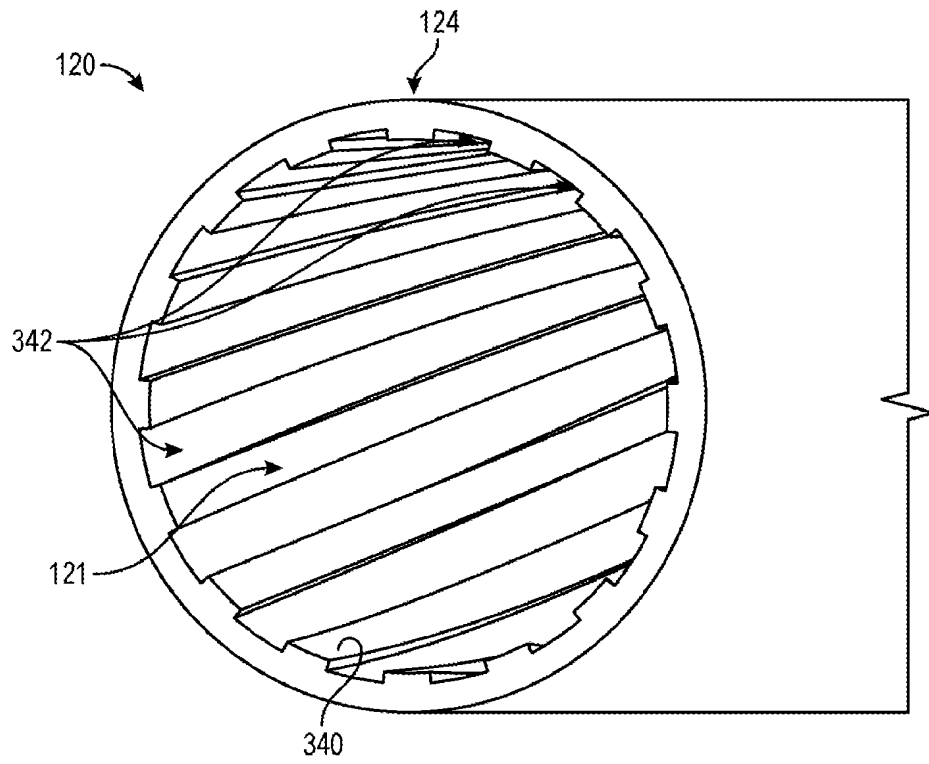


FIG. 3A

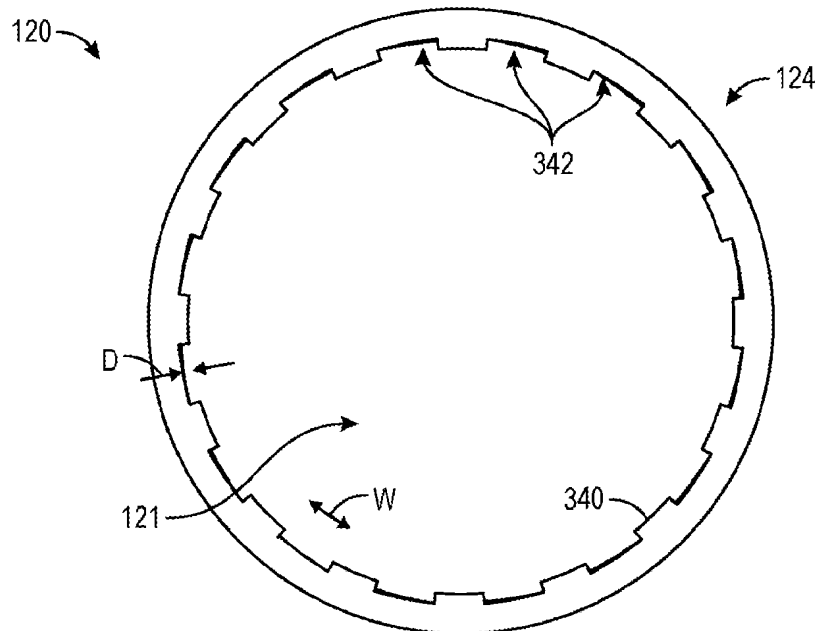
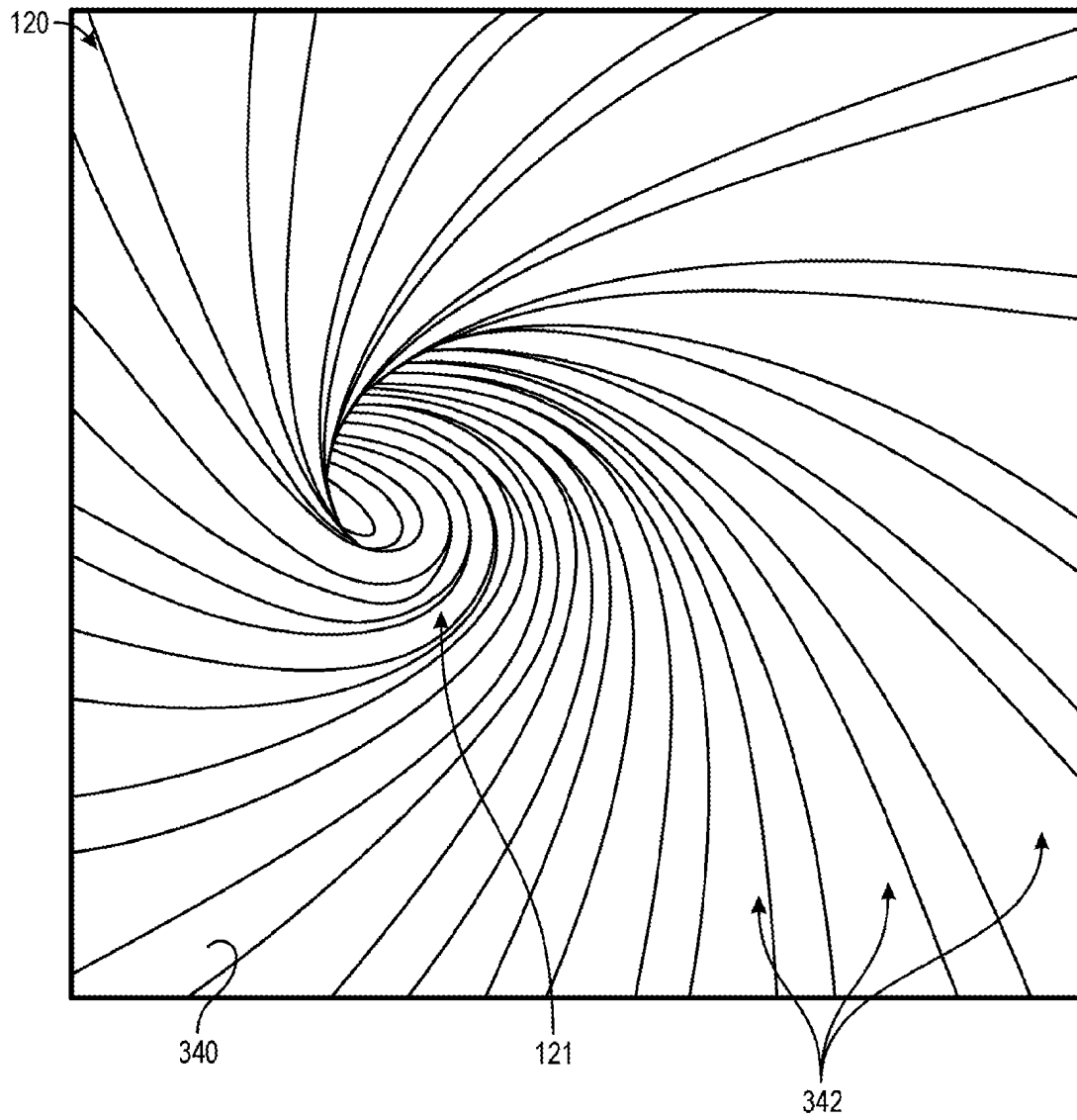


FIG. 3B

**FIG. 3C**

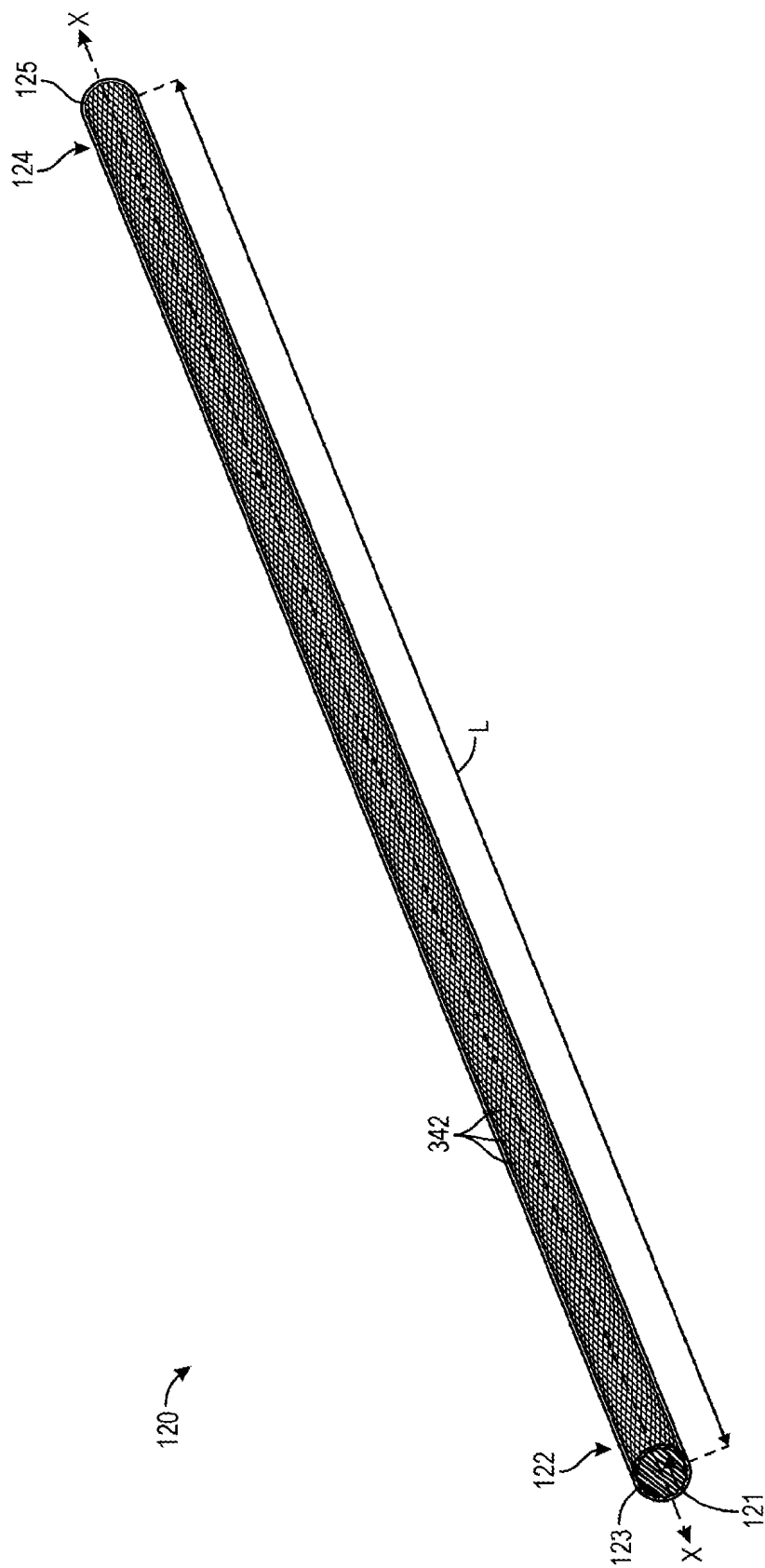


FIG. 3D

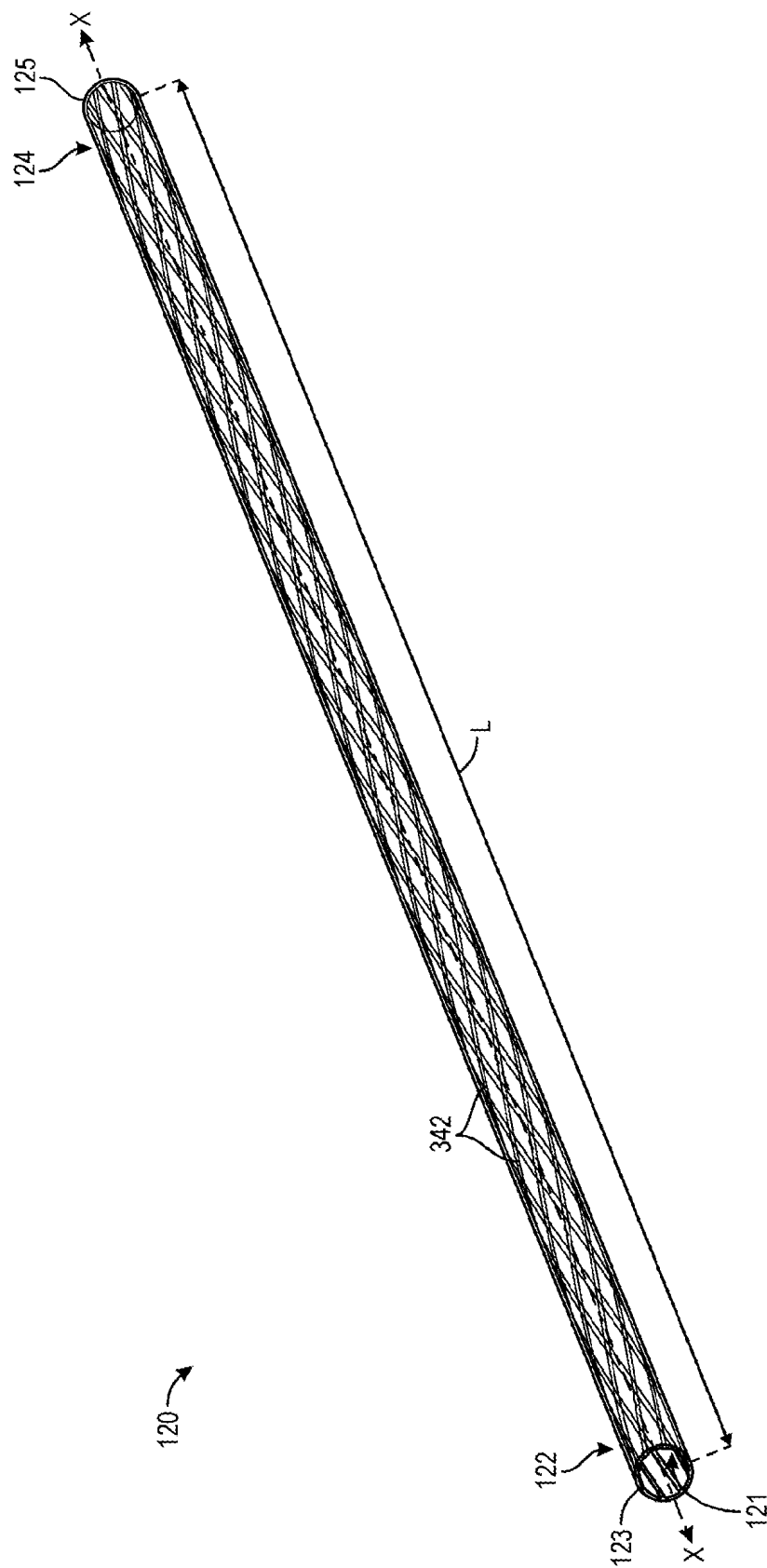
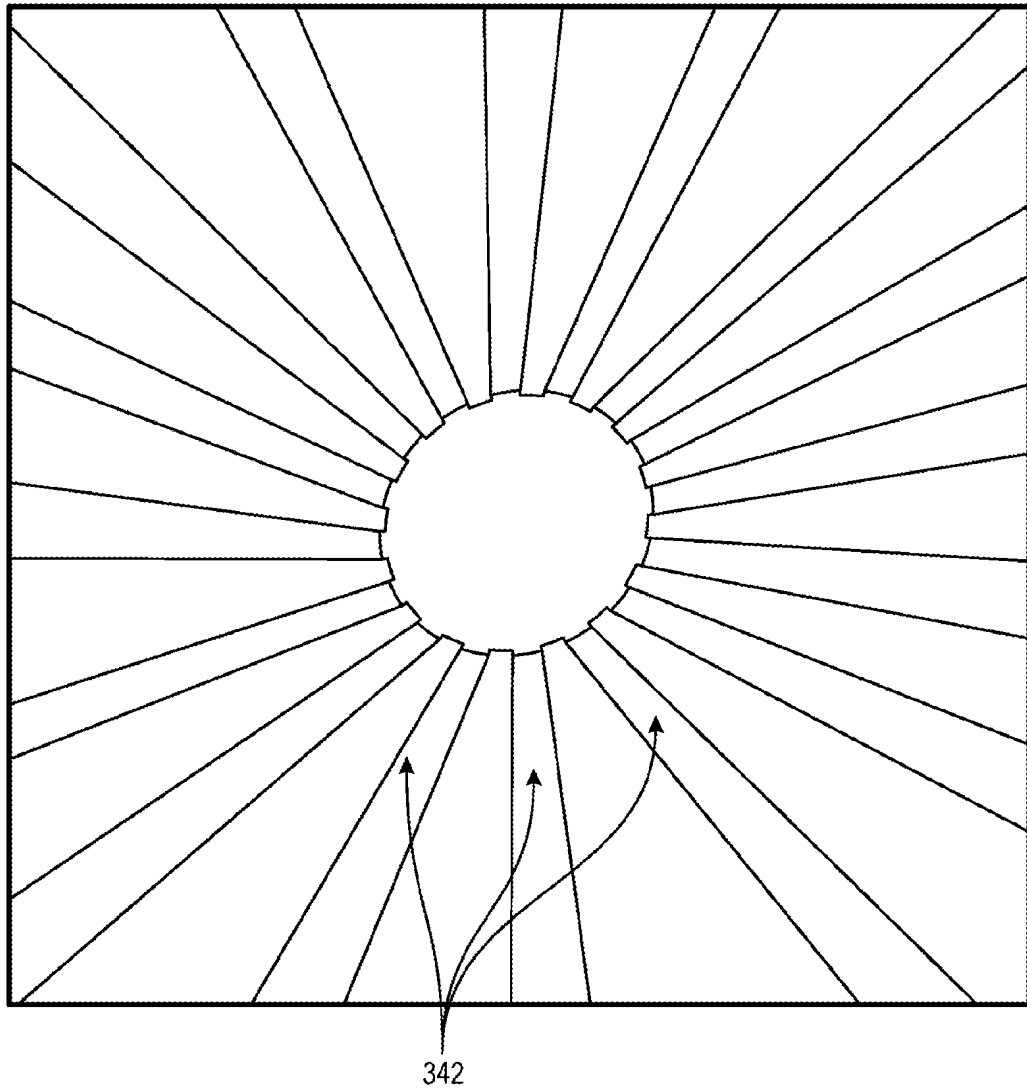


FIG. 4

120

**FIG. 5**

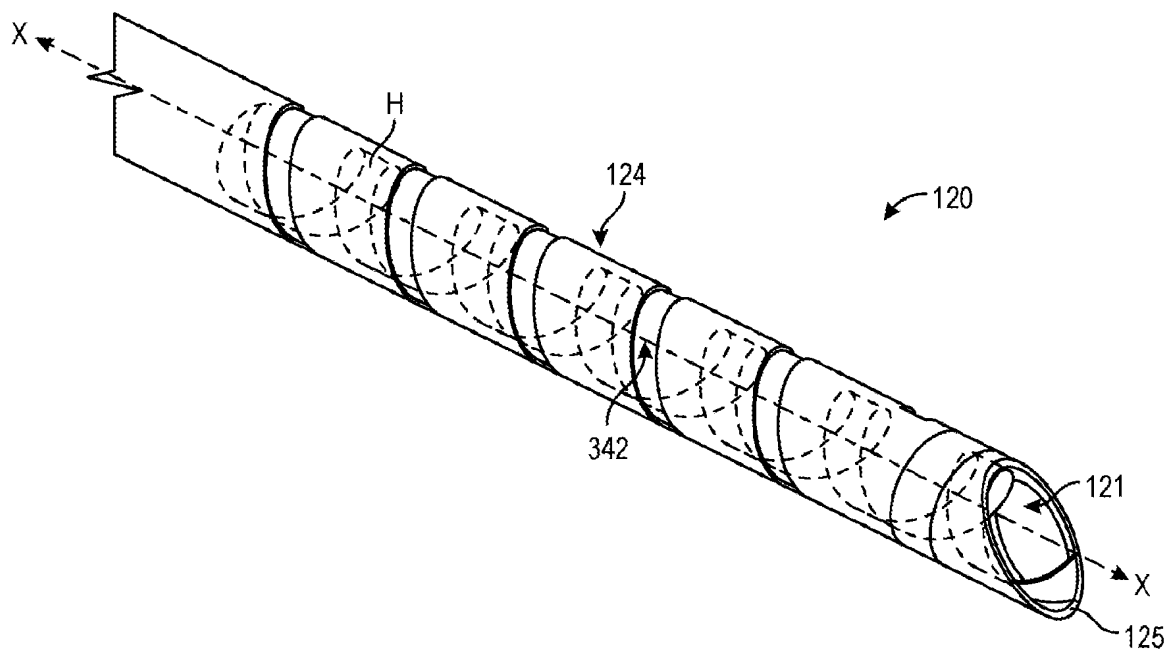


FIG. 6A

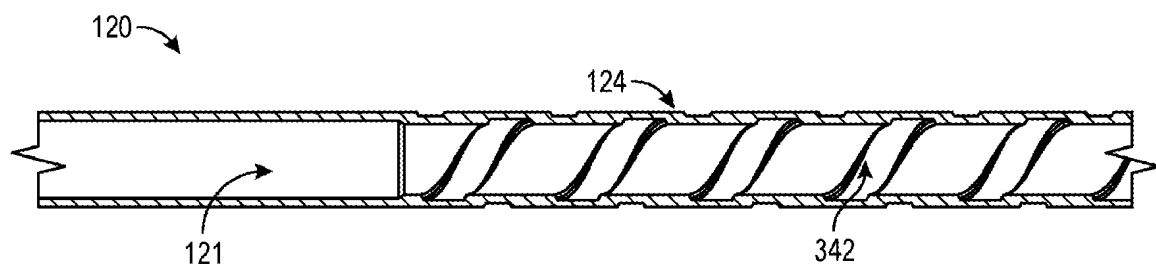
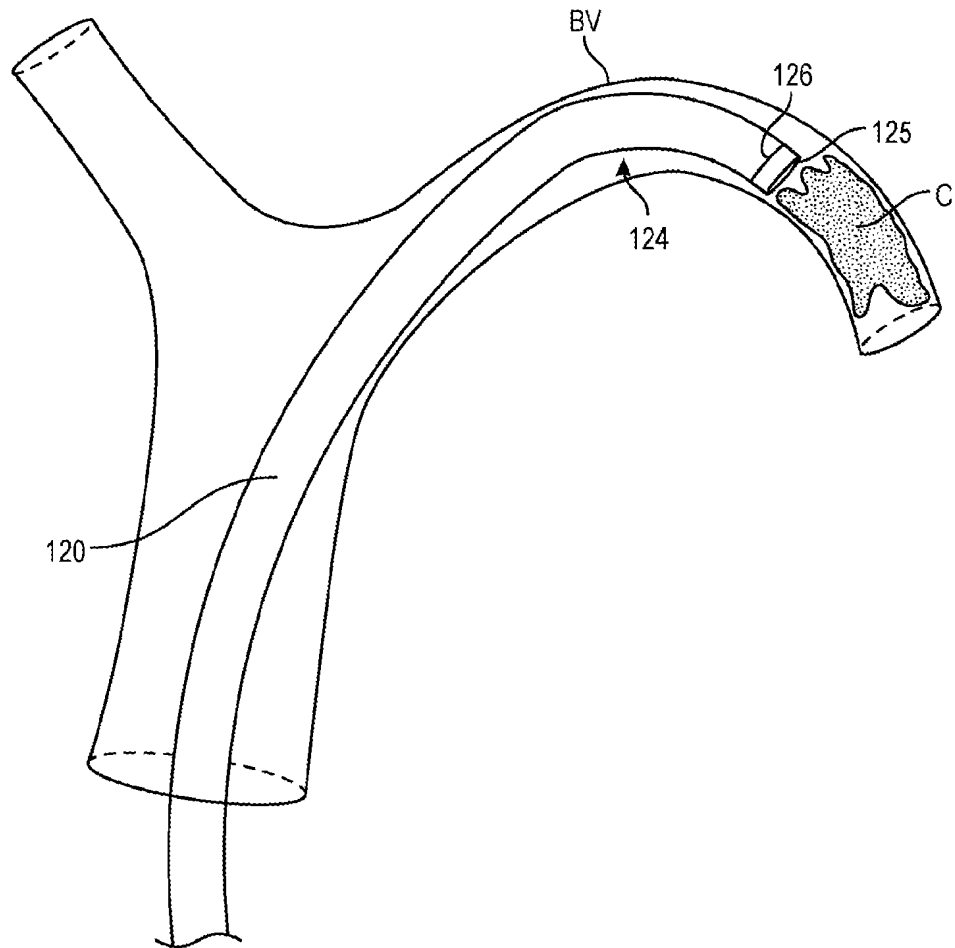


FIG. 6B

**FIG. 7A**

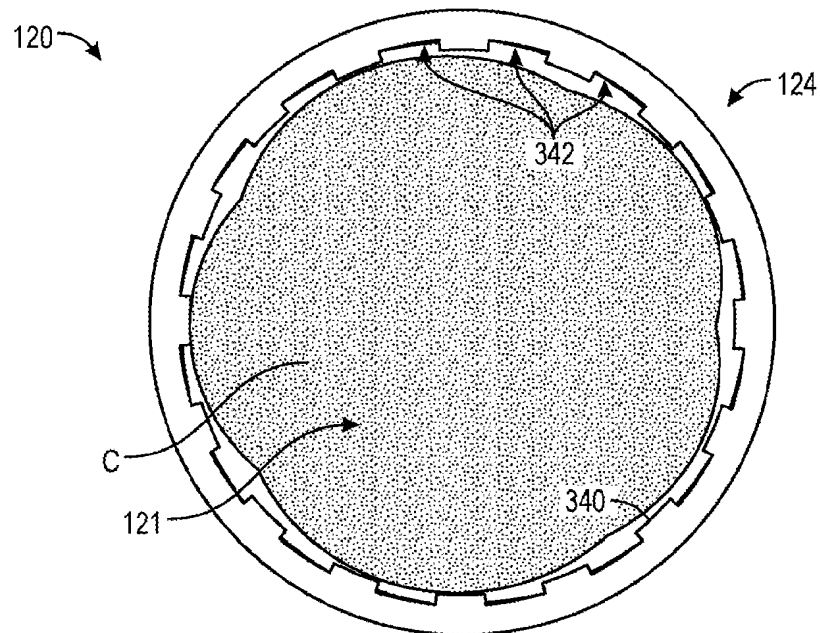


FIG. 8A

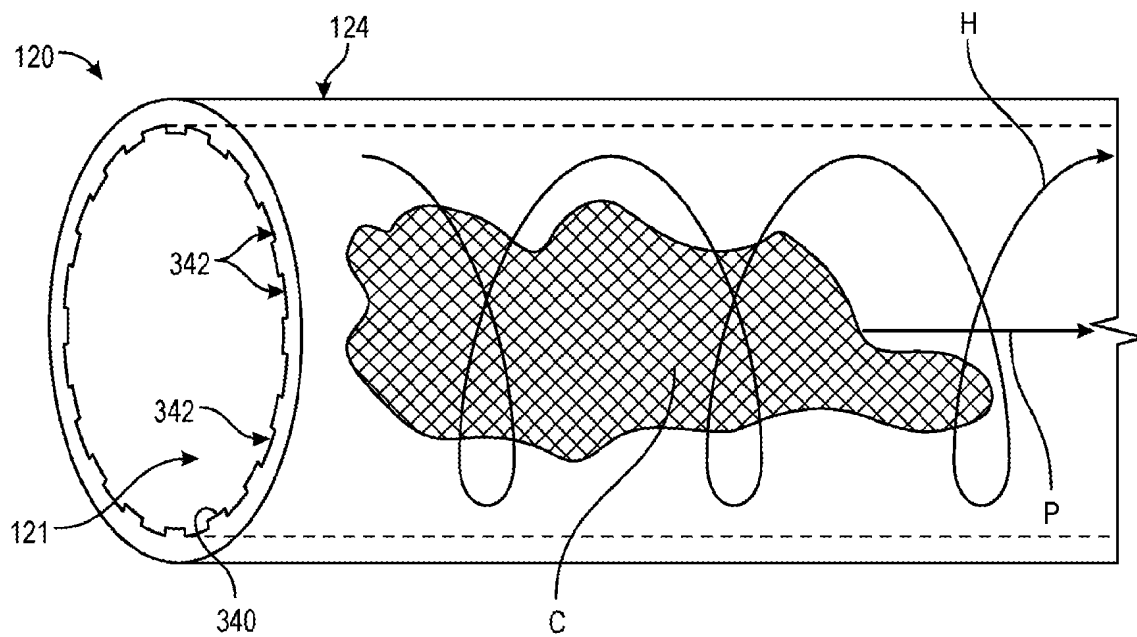


FIG. 8B

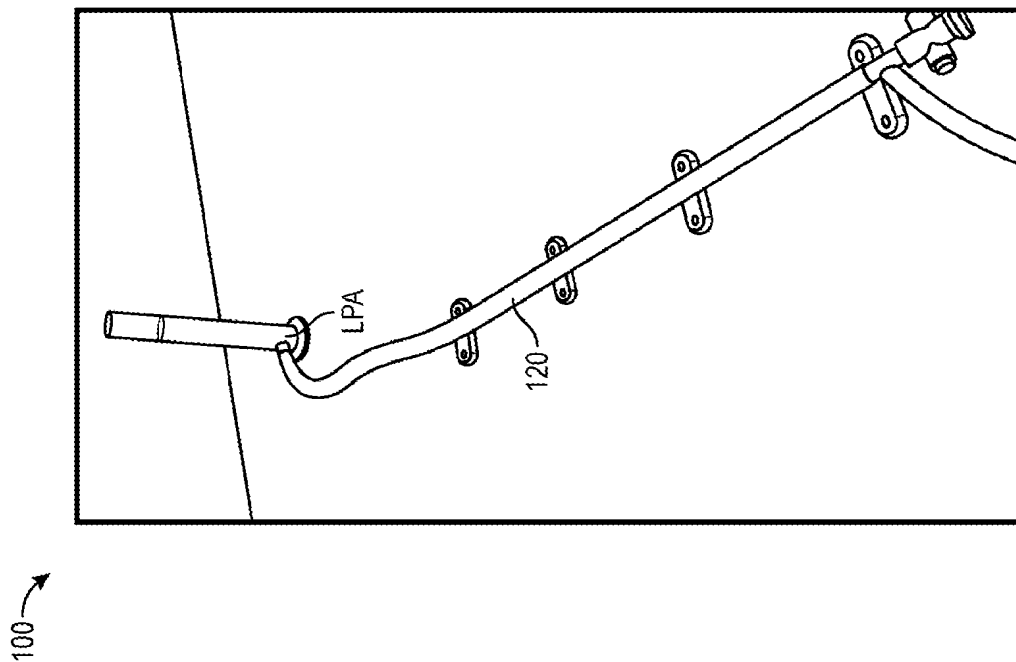


FIG. 9A

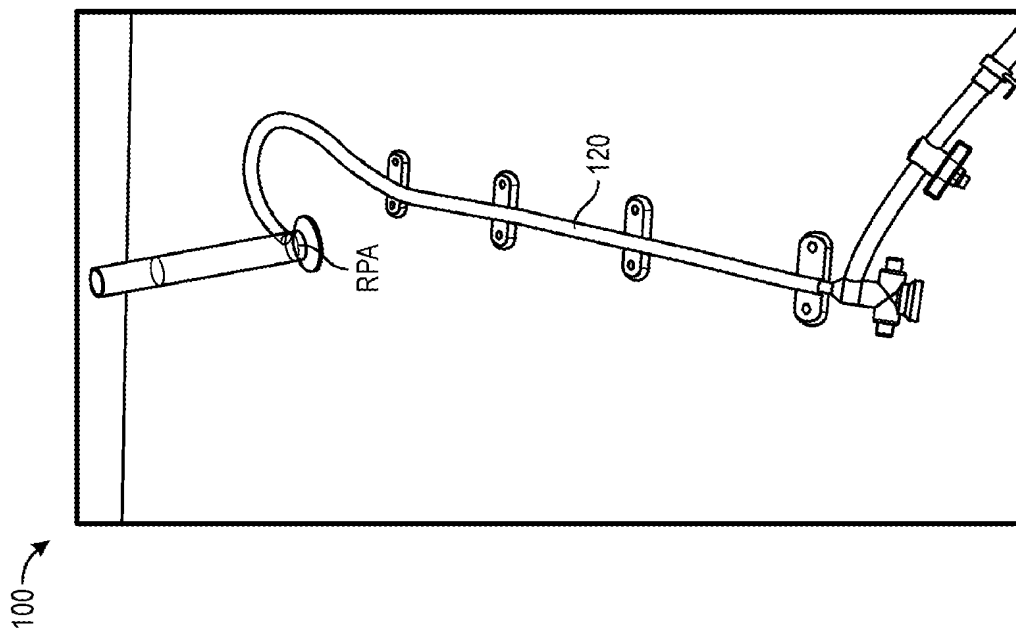


FIG. 9B

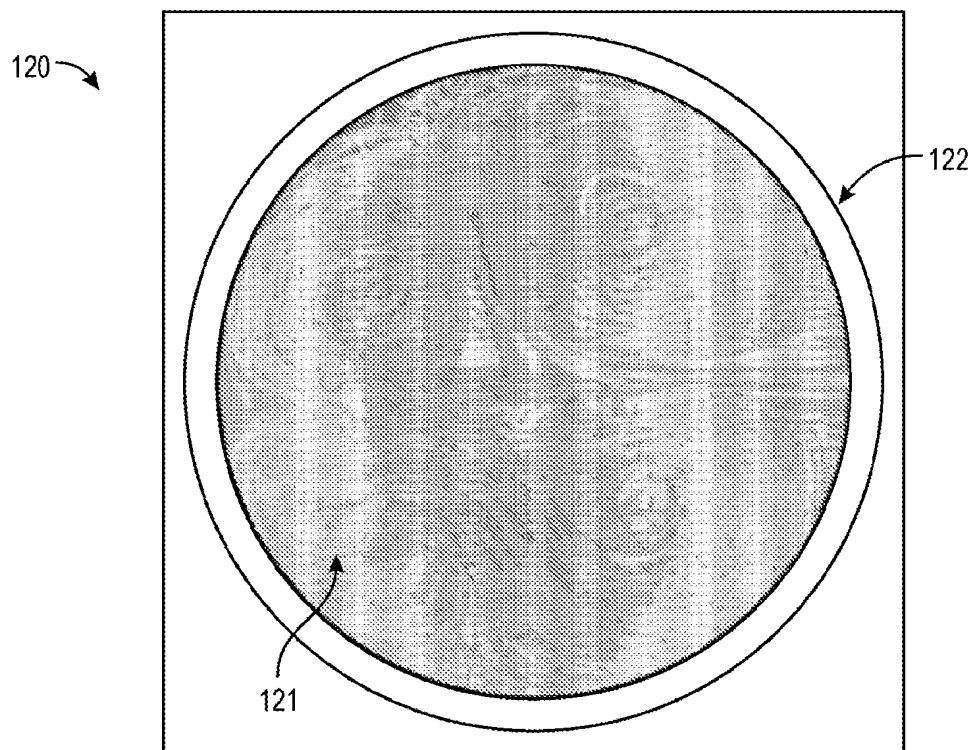


FIG. 9C

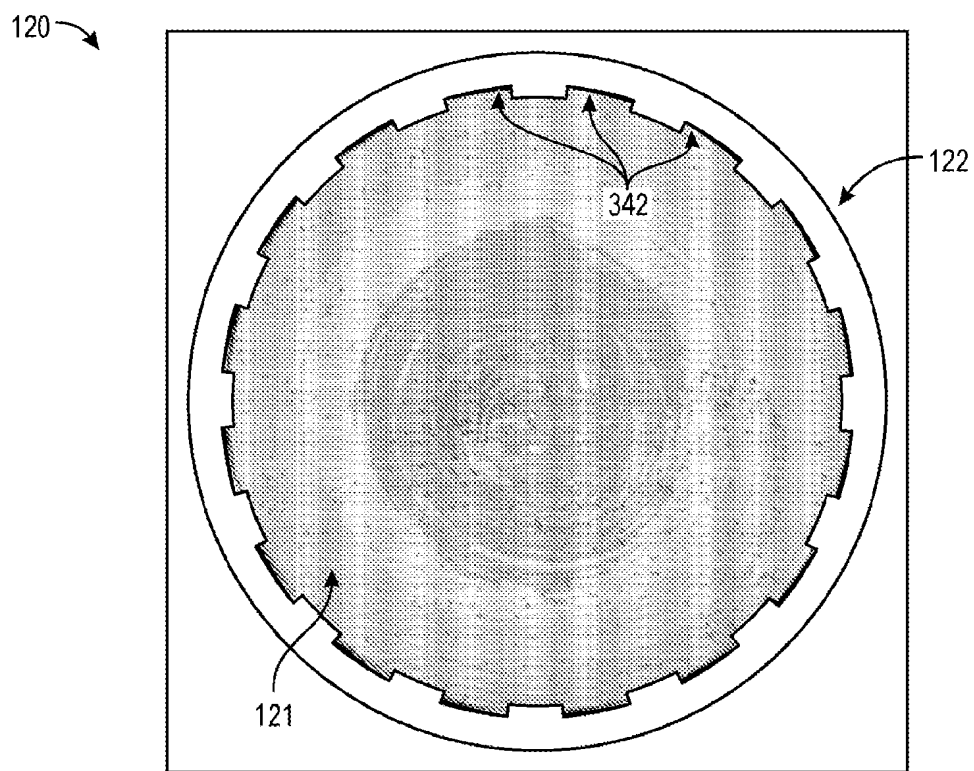
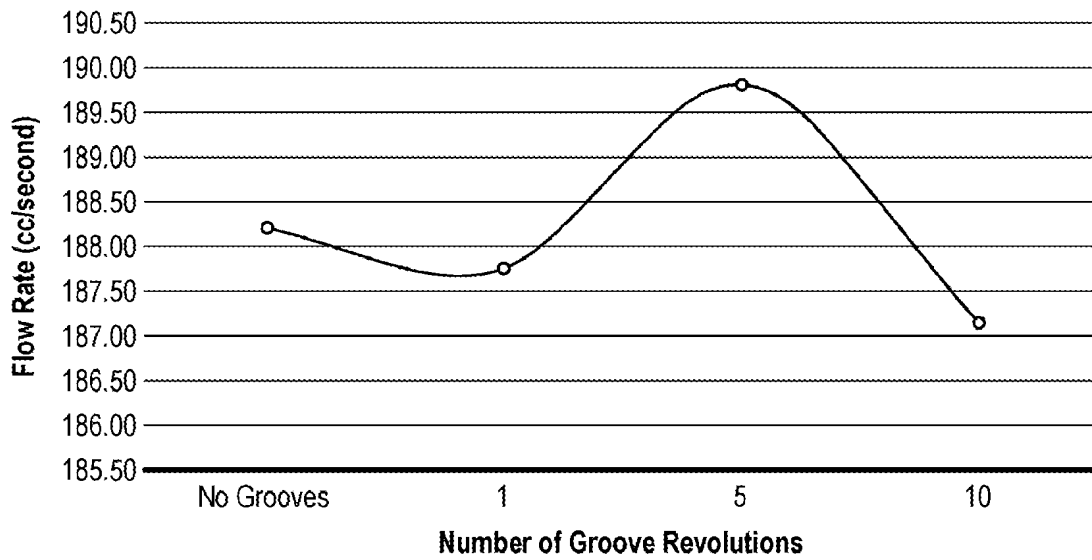
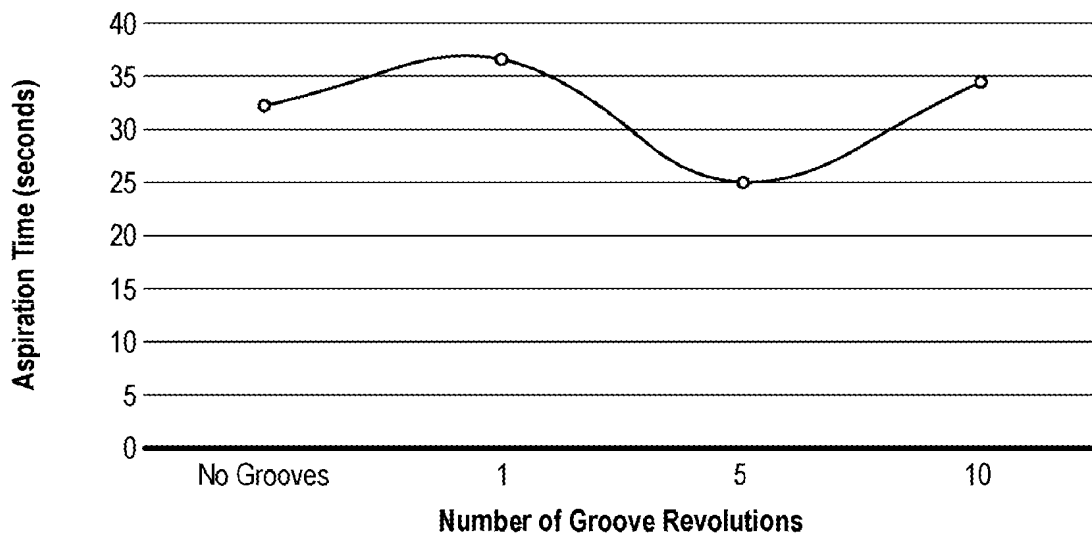
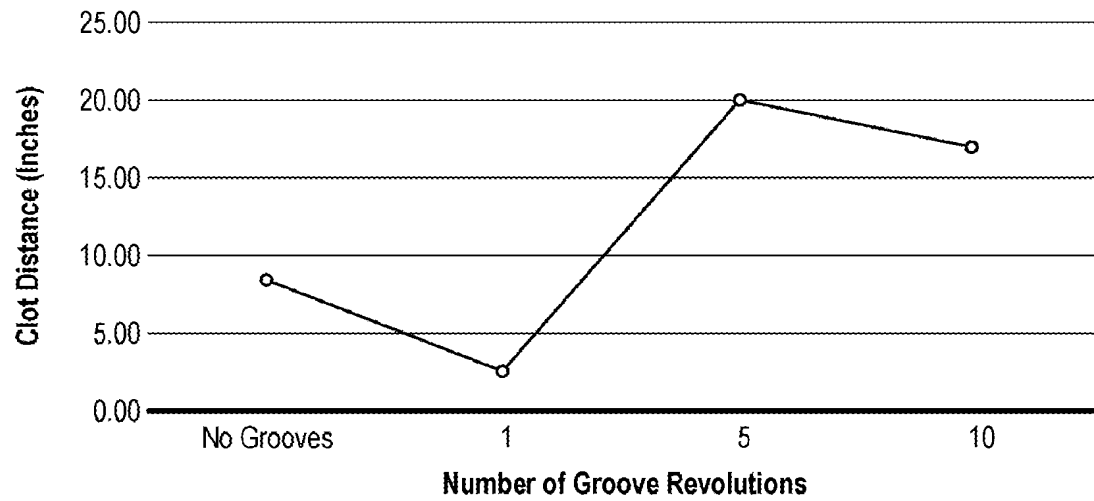
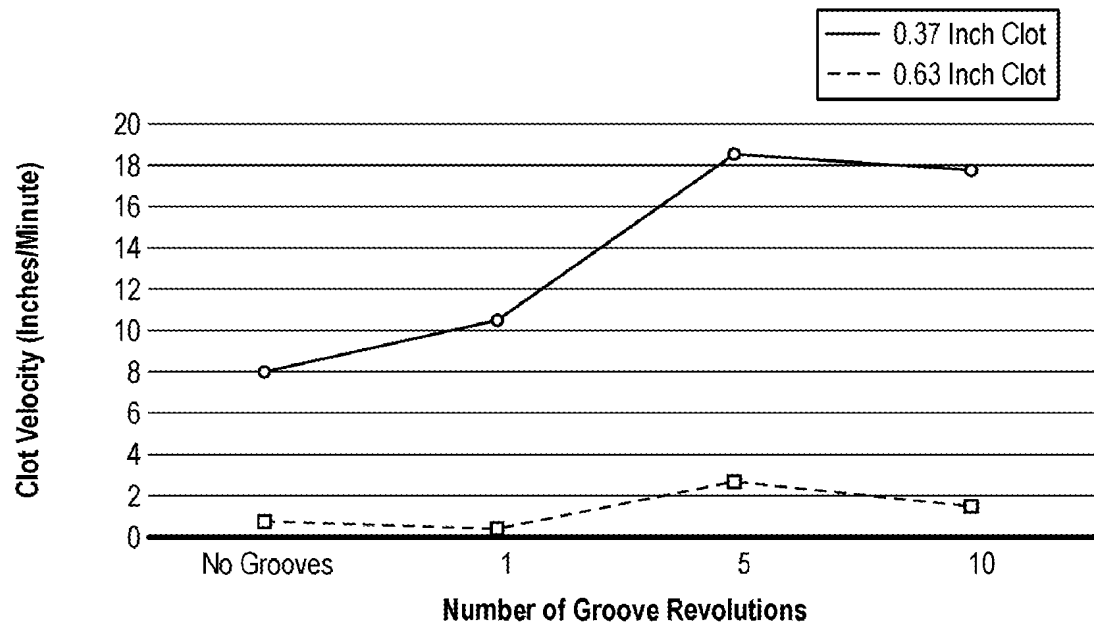
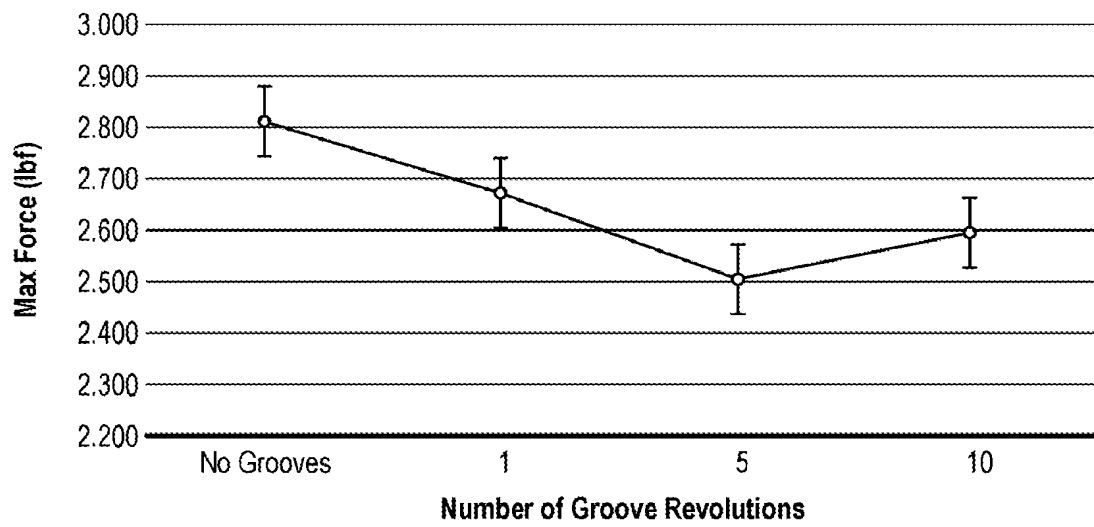
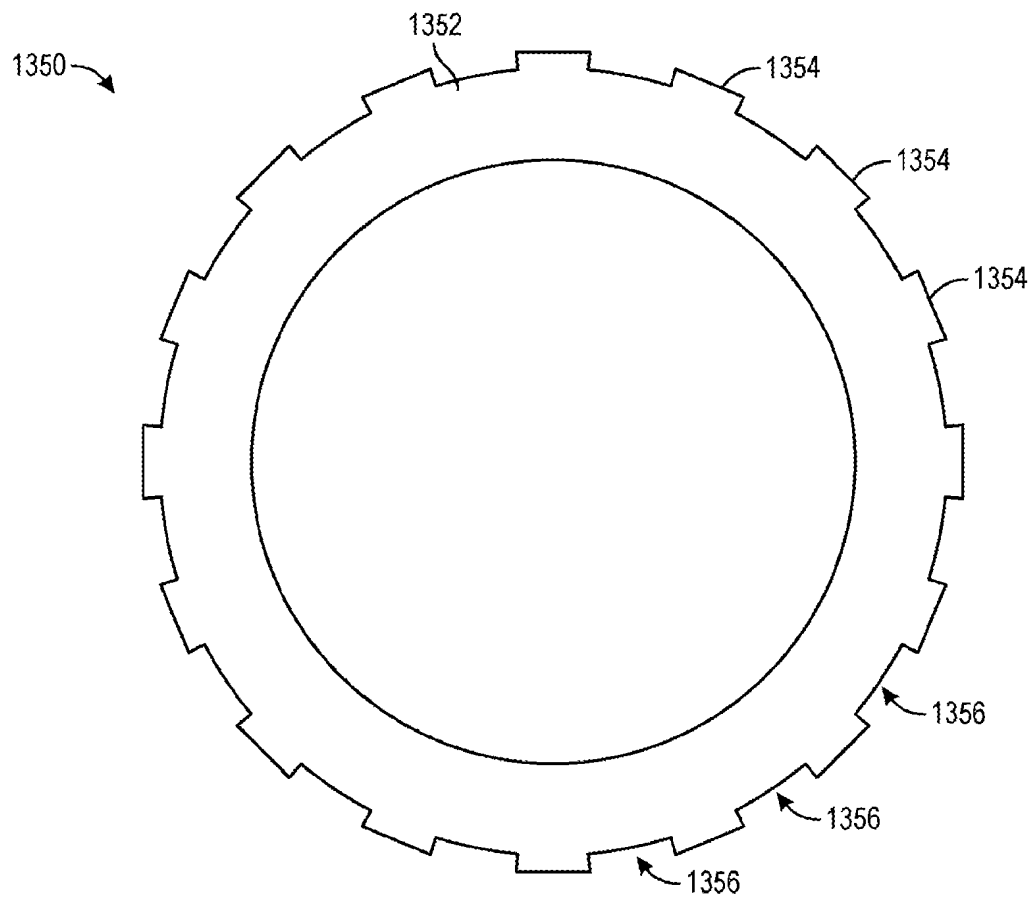
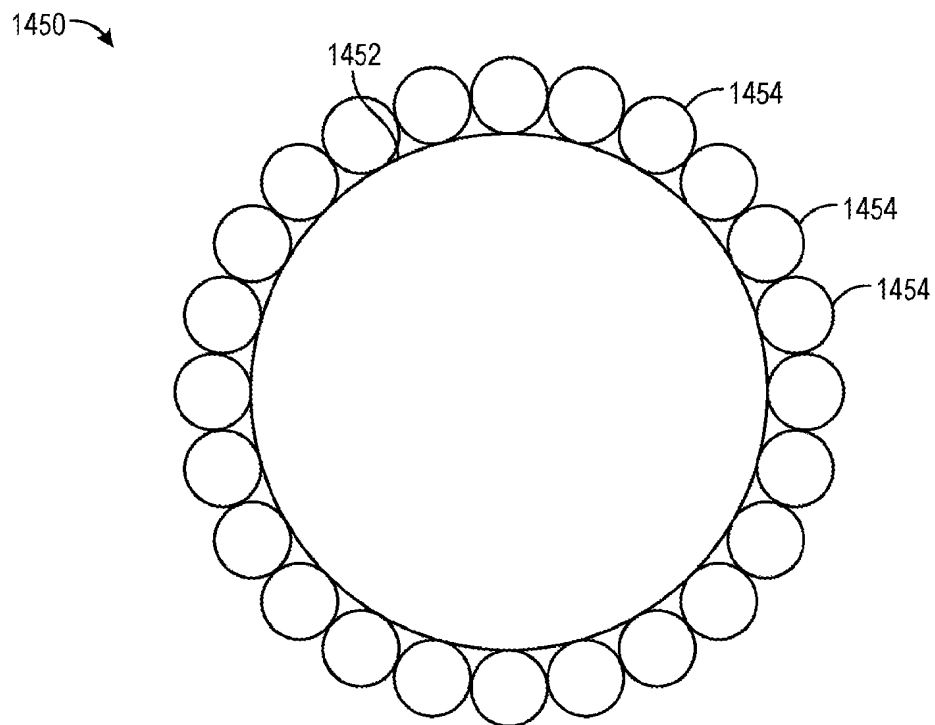


FIG. 9D

**FIG. 10A****FIG. 10B**

**FIG. 11A****FIG. 11B**

**FIG. 12****FIG. 13**

**FIG. 14A****FIG. 14B**

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US23/61256

A. CLASSIFICATION OF SUBJECT MATTER

IPC - INV. A61M 1/00 (2023.01)
ADD. A61B 17/22; A61M 25/00 (2023.01)
CPC - INV. A61M 1/84; A61M 25/0043; A61M 25/0045; A61M 25/005

ADD. A61B 2017/22079; A61B 2217/005; A61M 25/0023; A61M 2025/0073; A61M 2206/16; A61M 2206/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
See Search History document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
See Search History document

Electronic database consulted during the international search (name of database and, where practicable, search terms used)
See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2016/0030708 A1 (ANGIODYNAMICS INC.) 04 February 2016; figures 4, 8b; paragraphs 0008, 0009, 0030, 0036, 0038, 0039; abstract; claim 3	1-13, 15-21
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Y		14
X	US 2016/0135829 A1 (ANGIODYNAMICS INC.) 19 May 2016; figures 2a-4c, 7; paragraphs 0037, 0049	22-24
Y	US 2006/0264905 A1 (ESKRIDGE ET AL.) 23 November 2006; paragraphs 0005, 0027	14
A	US 5,244,619 A (BURNHAM) 14 September 1993; entire document	1-24
A	US 2017/0021130 A1 (DYE) 26 January 2017; entire document	1-24

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"E" earlier application or patent but published on or after the international filing date	"&" document member of the same patent family
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

24 April 2023 (24.04.2023)

Date of mailing of the international search report

JUN 07 2023

Name and mailing address of the ISA/

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Shane Thomas

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
18/358,837

RECEIPT DATE / TIME
08/14/2023 01:45:19 PM ET

ATTORNEY DOCKET #
111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 6598

FILED BY Michelle Burge

PATENT CENTER # 62610841

FILING DATE 07/25/2023

CUSTOMER # 25096

FIRST NAMED INVENTOR Richard Quick

CORRESPONDENCE ADDRESS -

AUTHORIZED BY Matthew Williams

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2023-08-14_IDS_1115528023US06.pdf	2	Information Disclosure Statement (IDS) Form (SB08)	94 KB

Warning: This is not a USPTO supplied IDS fillable form. Data in the form cannot be automatically loaded to other USPTO systems.

FOR_WO2023147353.pdf	52	Foreign Reference	9750 KB
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Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
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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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552.8023.US06

U.S. PATENTS AND PUBLICATIONS					
Examiner Initial*	Cite No	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	20070233043	10-04-2007	Dayton et al.	
	2.	8343167	01-01-2023	Henson	
	3.	8568465	10-29-2013	Freudenthal et al.	
	4.	20230241302	08-03-2023	Merritt et al.	
	5.	20230240705	08-03-2023	Rosenbluth et al.	
	6.	20230240706	08-03-2023	Rosenbluth et al.	
	7.	10183159	01-22-2019	Nobles et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initial*	Cite No	Foreign Document Number ²	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁵
	1.	WO2023147353	08-03-2023	Inari Medical, Inc.		

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	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

EXAMINER SIGNATURE			
Examiner Signature		Date Considered	
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw 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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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	3771
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552.8023.US06

CERTIFICATION STATEMENT

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

☐ 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. See 37 CFR 1.97(e) (1).

OR

☐ 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references. This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, Applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.

COPIES OF REFERENCES

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

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	/Matthew S. Williams/	Date (YYYY-MM-DD)	2023-08-14
Name/Print	Matthew S. Williams	Registration Number	77,516

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
18/358,837	07/25/2023		2020	111552.8023.US06	22	2

CONFIRMATION NO. 6598

25096
PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

FILING RECEIPT



0000000060379278

Date Mailed: 08/10/2023

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.

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Inventor(s)

Richard Quick, Mission Viejo, CA;

Applicant(s)

Inari Medical, Inc., Irvine, CA;

Power of Attorney: The patent practitioners associated with Customer Number 25096

Domestic Priority data as claimed by applicant

This application is a CON of 17/865,307 07/14/2022
which is a CON of 17/498,642 10/11/2021
which is a CON of 16/258,344 01/25/2019 PAT 11,154,314
which claims benefit of 62/622,691 01/26/2018

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: 08/09/2023

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 18/358,837**

Projected Publication Date: 11/16/2023

Non-Publication Request: No

Early Publication Request: No
Title

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED
SYSTEMS AND METHODS

Preliminary Class

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

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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.

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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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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.

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number
18/358,837

APPLICATION AS FILED - PART I

(Column 1)		(Column 2)		SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)	RATE(\$)		FEE(\$)	
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A		N/A		320	
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A		N/A		700	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A		N/A		800	
TOTAL CLAIMS (37 CFR 1.16(i))	22	minus 20 =	*			x	100 =	
			2			x	=	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2	minus 3 =	*				0	
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	
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0	
				TOTAL		TOTAL	1820	

* If the difference in column 1 is less than zero, enter "0" in column 2.

APPLICATION AS AMENDED - PART II

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

AMENDMENT B	(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)	RATE(\$)	ADDITIONAL FEE(\$)				
Total (37 CFR 1.16(i))	*	Minus	**	=	x	=	x	=	OR	x	=
Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=	x	=	OR	x	=
Application Size Fee (37 CFR 1.16(s))									OR		
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.



ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
18/358,837

RECEIPT DATE / TIME
08/08/2023 08:00:02 PM ET

ATTORNEY DOCKET #
111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 6598

FILED BY J iYoung Anderson

PATENT CENTER # 62583607

FILING DATE -

CUSTOMER # 25096

FIRST NAMED INVENTOR Richard Quick

CORRESPONDENCE ADDRESS -

AUTHORIZED BY Matthew Williams

Documents

TOTAL DOCUMENTS: 10

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2023-8-8 IDS SB08 - 111552.8023US6.PDF	35	Information Disclosure Statement (IDS) Form (SB08)	380 KB

Warning: This is not a USPTO supplied IDS fillable form. Data in the form cannot be automatically loaded to other USPTO systems.

NPL-Gross-Dump the Pump.PDF	4	Non Patent Literature	870 KB
NPL_ISR_PCT_2023-61256- June-7-2023-8-pages.PDF	8	Non Patent Literature	1063 KB
FOR_WO2006029270.PDF	33	Foreign Reference	1157 KB

FOR_EP2942624.PDF	24	Foreign Reference	1188 KB
FOR_WO2006124307.PDF	19	Foreign Reference	2080 KB
FOR_WO2016014955.PDF	63	Foreign Reference	2325 KB
FOR_WO2015179329.PDF	56	Foreign Reference	2433 KB
FOR_WO2023137341.PDF	75	Foreign Reference	3594 KB
NPL_ISR_WO_PCTUS2023060502_May_25_2023_9pages.PDF	9	Non Patent Literature	3976 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2023-8-8 IDS SB08 - 111552.8023US6.PDF	885C3A58D229277AB5666F8ABAEBA827B684FE86A9FF972A381E62026B16FE5F2D3AD7CB3693394A778B36112842D17D005DEA5CD64CDD864490F6F1D8CD380A
NPL-Gross-Dump the Pump.PDF	D44985D30C015BE8DA101967568EDF70598C9DCC517B882F1524CC5F8D5C8C53620135568E11D3A8E76C94DABDD42BADC78DE5603483BF94B00DA3679A300F1D
NPL_ISR_PCT_2023-61256-June-7-2023-8-pages.PDF	E29F558402CAA5ECA7B480DBF767FC910107364FF8EB3919C86E39BC20664311EDA23D81B18626667115B85F0FF8707387E626478C646A16AA39EB2CD5DE7AAA
FOR_WO2006029270.PDF	9F9FCC67AFD589CE61E4B384802B8F1B3B2118E927157C959323391A302F028ADA8961E7CC81A93CDF03C5DD57AD1D8FB16AE710689466AD8D1ED27132ACD968
FOR_EP2942624.PDF	76F180E3DB96728ABCFFD31B77A2404E0AC8EA38F6420ED879A30A22CD22FA1628FB338AD6869D29C985D62AFB79F292882F89866AD893AB9B9EB39BC5CE38DF

FOR_WO2006124307.PDF	4CA9E275B28C639DF92082C698747D391EB4FEFEEA1BB6C9 B742A1F4DE7964B77944A82E842650ED0069421D200988267A 5E6CE83FEC33F777AC3CCFF6120555
FOR_WO2016014955.PDF	DE12ACD76BAE4B0E156B6F9D382CAEBE3E6243ED877F0352 56811EF33F0A9463A0204B3777321B5207E9E06058DD462E99 A3EA229302CDF42B2A63C4E5792EF2
FOR_WO2015179329.PDF	0E04DA60C0BE3A128E3276DF1BDEF6C12334A947AC4DC54D 020969CCB8A4D895FA3EDE2B9B7081B0D8A6254206F95745B A6DCB402B89F84BA2B8082BF2D4C263
FOR_WO2023137341.PDF	0EED4348CDC2BC929DF5488A6BB3299B1CF492244B5F17616 256350DF062C9C554456D996FCC48B4DE6BB3EEAC7495B022 74727C8C04E2B6D5366DA5E9C17349
NPL_ISR_WO_PCTUS2023060 502_May_25_2023_9pages.PD F	D531F14961694901D7333C4BAA563CF184EF439838AFD5147B 2BDDC50612BF18C97B659466792D95F507F17FF02F9D7F5C18 06B1068BFC456412E490186AEEF2

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 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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	Not Yet Assigned
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552.8023.US06

U.S. PATENTS AND PUBLICATIONS					
Examiner Initial*	Cite No.	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	2846179	08-05-1958	Monckton	
	2.	2955592	10-11-1960	Maclean	
	3.	3088363	05-07-1963	W. Sparks	
	4.	3197173	07-27-1965	Taubenheim	
	5.	3435826	04-01-1969	T. J. Fogarty	
	6.	3515137	06-02-1970	Santomieri	
	7.	3892161	07-01-1975	Sokol	
	8.	3923065	12-02-1975	Nozick et al.	
	9.	4030503	06-21-1977	Clark, III	
	10.	4034642	07-12-1977	Iannucci et al.	
	11.	4222380	09-16-1980	Terayama	
	12.	4243040	01-06-1981	Beecher	
	13.	4287808	09-08-1981	Leonard et al.	
	14.	4324262	04-13-1982	Hall	
	15.	4393872	07-19-1983	Reznik et al.	
	16.	4469100	09-04-1984	Hardwick	
	17.	4523738	06-18-1985	Raftis et al.	
	18.	4551862	11-12-1985	Haber	
	19.	4604094	08-05-1986	Shook	
	20.	4646736	03-03-1987	Auth et al.	
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	23.	4883458	11-28-1989	Shiber	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
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U.S. PATENTS AND PUBLICATIONS					
Examiner Initial*	Cite No.	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	30.	5127626	07-07-1992	Hilal et al.	
	31.	5129910	07-14-1992	Phan et al.	
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	38.	5419774	05-30-1995	Willard et al.	
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	41.	5490859	02-13-1996	Mische et al.	
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	47.	5827229	10-27-1998	Auth et al.	
	48.	5873866	02-23-1999	Kondo et al.	
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	51.	5911710	06-15-1999	Barry et al.	
	52.	5941869	08-24-1999	Patterson et al.	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
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	Attorney Docket Number	111552.8023.US06

U.S. PATENTS AND PUBLICATIONS					
Examiner Initial*	Cite No.	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	59.	6068645	05-30-2000	Tu	
	60.	6152946	11-28-2000	Broome et al.	
	61.	6156055	12-05-2000	Ravenscroft	
	62.	6168579	01-02-2001	Tsugita	
	63.	6221006	04-24-2001	Dubrulet al.	
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	66.	6245078	06-12-2001	Ouchi	
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	69.	6306163	10-23-2001	Fitz	
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	74.	6413235	07-02-2002	Parodi	
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	76.	6458103	10-01-2002	Albert et al.	
	77.	6511492	01-28-2003	Rosenbluth et al.	
	78.	6514273	02-04-2003	Voss et al.	
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	81.	6544279	04-08-2003	Hopkins et al.	
	82.	6551342	04-22-2003	Shen et al.	
	83.	6589263	07-08-2003	Hopkins et al.	
	84.	6596011	07-22-2003	Johnson et al.	
	85.	6602271	08-05-2003	Adams et al.	
	86.	6605074	08-12-2003	Zadno-azizi et al.	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
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U.S. PATENTS AND PUBLICATIONS					
Examiner Initial*	Cite No.	Patent Number	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	88.	6620179	09-16-2003	Brook et al.	
	89.	6623460	09-23-2003	Heck	
	90.	6635068	10-21-2003	Dubrul et al.	
	91.	6645222	11-11-2003	Parodi et al.	
	92.	6660013	12-09-2003	Rabiner et al.	
	93.	6663650	12-13-2003	Sepetka et al.	
	94.	6692504	02-17-2004	Kurz et al.	
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	96.	6755847	06-29-2004	Eskuri	
	97.	6767353	07-27-2004	Shiber	
	98.	6800080	10-05-2004	Bates	
	99.	6824553	11-30-2004	Gene et al.	
	100.	6830561	12-14-2004	Jansen et al.	
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	Examiner Name	Not Yet Assigned
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38. **	International Search Report and Written Opinion for International App. No. PCT/US2018/055780, Date of Filing: October 13, 2018, Applicant: Inceptus Medical LLC., Date of Mailing: January 22, 2019, 8 pages.
39. **	International Search Report and Written Opinion for International App. No. PCT/US2019/045794, Date of Filing: August 8, 2019, Applicant: Inari Medical, Inc., Date of Mailing: November 1, 2019, 17 pages.
40. **	International Search Report and Written Opinion for International App. No. PCT/US2020/056067, Date of Filing: October 16, 2020; Applicant: Inari Medical, Inc., Date of Mailing: January 22, 2021, 8 pages.
41. **	International Search Report and Written Opinion for International App. No. PCT/US2020/055645, Date of Filing: December 17, 2020; Applicant: Inari Medical, Inc., Date of Mailing: April 14, 2021, 12 pages.
42. **	VORWERK, D. MD, et al., "Use of a Temporary Caval Filter to Assist Percutaneous Iliocaval Thrombectomy: Experimental Results." SCVIR, 1995, 4 pages.
43. **	WIKIPEDIA; Embolectomy; retrieved from the internet: https://en.wikipedia.org/wiki/Embolectomy ; 4 pgs.; retrieved/printed: 3/24/2016
44. **	O'SULLIVAN; Thrombolysis versus thrombectomy in acute deep vein thrombosis; <i>Interventional Cardiology</i> ; 3(5); pp. 589-596; October 2011

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	Not Yet Assigned
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552.8023.US06

45. **	CAPTURE VASCULAR SYSTEMS; (company website); retrieved from the internet: http://www.capturevascular.com ; 3 pgs.; retrieved/printed: 3/24/2016
46. **	EDWARDS LIFESCIENCES; Fogarty® Occlusion Catheters (product brochure); retrieved from the internet: http://web.archive.org/web/20150228193218/http://www.edwards.com/products/vascular/attraumaticocclusion/pages/occlusioncatheter.aspx ; ©2011; 2 pgs.; retrieved/printed: 3/24/2011
47. **	BOSTON SCIENTIFIC; Fetch(TM) 2 Aspiration Catheter (product information); retrieved from the internet: http://www.bostonscientific.com/en-US/products/thrombectomy-systems/fetch2-aspiration-catheter.html ; 2 pgs.; retrieved/printed: 3/24/2016
48. **	PENUMBRA, INC.; Indigo® System (product information); retrieved from the internet: http://www.penumbrainc.com/peripheralpercutaneous-thromboembolism/indigo-system ; 7 pgs.; retrieved/printed: 3/24/2016
49. **	YOUTUBE; Merci Retrieval System X Series Animation; uploaded March 16, 2009 (product information); posted on May 7, 2009 by SSMDDePAUL, time 1:09, retrieved from the internet: https://www.youtube.com/watch?v=MGX7deuFkhc ; 3 pgs.; retrieved/printed: 3/24/2016
50. **	COVIDIEN; Solitaire(TM) AS Neurovascular Remodeling Device (product information); retrieved from the internet: http://www.ev3.net/neuro/intl/remodeling-devices/solitaire-ab.htm ; ©2015; 2 pgs.; retrieved/printed: 3/24/2016
51. **	International Search Report and Written Opinion for International App. No. PCT/US21/35965, Date of Filing: June 4, 2021, Applicant: Inari Medical, Inc., Date of Mailing: September 28, 2021, 12 pages.
52. **	International Search Report and Written Opinion for International App. No. PCT/US21/45072 Date of Filing: August 6, 2021, Applicant: Inari Medical, Inc., Date of Mailing: January 20, 2022, 10 pages.
53. **	International Search Report and Written Opinion for International App. No. PCT/US21/58793; Date of Filing: November 10, 2021, Applicant: Inari Medical, Inc., Date of Mailing: March 16, 2022, 13 pages.
54. **	International Search Report and Written Opinion for International App. No. PCT/US21/59718; Date of Filing: November 17, 2021, Applicant: Inari Medical, Inc., Date of Mailing: March 22, 2022, 13 pages.
55. **	International Search Report and Written Opinion for International App. No. PCT/US21/59735; Date of Filing: November 17, 2021, Applicant: Inari Medical, Inc., Date of Mailing: March 22, 2022, 11 pages.
56.	International Search Report and Written Opinion for International App. No. PCT/US23/60502; Date of Filing: January 11, 2023, Applicant: Inari Medical, Inc., Date of Mailing: May 25, 2023, 9 pages.
57.	International Search Report and Written Opinion for International App. No. PCT/US23/61256; Date of Filing: January 25, 2023, Applicant: Inari Medical, Inc., Date of Mailing: June 7, 2023, 8 pages.
58.	Gross et al., "Dump the pump: manual aspiration thrombectomy (MAT) with a syringe is technically effective, expeditious, and cost-efficient," J NeuroIntervent Surg, 2018, 4 pages.

EXAMINER SIGNATURE

Examiner Signature		Date Considered	
--------------------	--	-----------------	--

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw 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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	18/358,837- Conf # 6598
	Filing Date	July 25, 2023
	First Named Inventor	Richard Quick
	Art Unit	Not Yet Assigned
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552.8023.US06

CERTIFICATION STATEMENT

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

☐ 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. See 37 CFR 1.97(e) (1).

OR

☐ 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references. This Information Disclosure Statement is not to be construed as a representation that: (i) a search has been made; (ii) additional information that may be material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the cited information is, or is considered to be, material to patentability. In addition, Applicant does not admit that any enclosed item of information constitutes prior art to the subject invention and specifically reserves the right to demonstrate that any such reference is not prior art.

COPIES OF REFERENCES

In accordance with 37 C.F.R. § 1.98(a)(2)(ii), Applicant has not submitted copies of U.S. patents and U.S. patent applications. Applicant submits herewith copies of foreign patents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2). Those documents which are marked with a double asterisk (**) next to the Cite No. in the attached form PTO/SB/08 are not supplied because they were previously cited by or submitted to the Office in prior application numbers **16/258,344**, filed on **January 25, 2019** and **17/865,307**, filed on **July 14, 2022** relied upon in this application for an earlier filing date under 35 U.S.C. § 120.

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	/Matthew S. Williams/	Date (YYYY-MM-DD)	2023-08-08
Name/Print	Matthew S. Williams	Registration Number	77,516

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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.**

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To: MATTHEW S. WILLIAMS PERKINS COIE LLP P.O. BOX 1247 SEATTLE, WA 98111-1247
RECEIVED PATENT DOCKETING MAY 31 2023 PERKINS COIE LLP

NOTIFICATION OF TRANSMITTAL OF
 THE INTERNATIONAL SEARCH REPORT AND
 THE WRITTEN OPINION OF THE INTERNATIONAL
 SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing <i>(day/month/year)</i>	MAY 25 2023
--	--------------------

Applicant's or agent's file reference 111552-8034W000	FOR FURTHER ACTION See paragraphs 1 and 4 below
International application No. PCT/US 23/60502	International filing date <i>(day/month/year)</i> 11 January 2023 (11.01.2023)
Applicant INARI MEDICAL, INC.	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

How? Directly to the International Bureau preferably through ePCT, or on paper to:

The International Bureau of WIPO, 34, chemin des Colombettes, 1211 Geneva 20, Switzerland

For more detailed instructions, see the PCT Applicant's Guide, International Phase, paragraphs 9.004 – 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ With regard to any protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. These comments will be made available to the public after international publication. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established.

Shortly after the expiration of 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within 19 months from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later); otherwise, the applicant must, within 20 months from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices. In respect of other designated Offices, the time limit of 30 months (or later) will apply even if no demand is filed within 19 months. For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide, National Chapters*.

Within 22 months from the priority date, the applicant may request that a supplementary international search be carried out by a different International Searching Authority that offers this service (Rule 45bis.1). The procedure for requesting supplementary international search is described in the *PCT Applicant's Guide, International Phase, paragraphs 8.006-8.032*.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8306	Authorized officer Kari Rodríguez Telephone No. PCT Helpdesk: 571-272-4300
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Form PCT/ISA/220 (revised January 2020)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 111552.8034WO00		FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/JP 23/80502	International filing date (day/month/year) 11 January 2023 (11.01.2023)	(Earliest) Priority Date (day/month/year) 11 January 2022 (11.01.2022)	
Applicant INARI MEDICAL, INC.			

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed.
☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found unsearchable (see Box No. II).

3. ☐ Unity of invention is lacking (see Box No. III).

4. With regard to the title,

- ☒ the text is approved as submitted by the applicant.
☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

- ☒ the text is approved as submitted by the applicant.
☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No. 1A
☒ as suggested by the applicant.
☐ as selected by this Authority, because the applicant failed to suggest a figure.
☐ as selected by this Authority, because this figure better characterizes the invention.
- b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 23/60502

A. CLASSIFICATION OF SUBJECT MATTER

IPC - INV. A61B 17/22, A61B 17/221 (2023.01)
- ADD.

CPC - INV. A61B 17/221

ADD. A61B 2017/2212

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

See Search History document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

See Search History document

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 9,301,769 B2 (Brady et al.) 05 April 2016 (05.04.2016), entire document	1-13, 16-20
Y		14
Y	US 2021/0393278 A1 (O'Malley et al.) 23 December 2021 (23.12.2021), entire document	14
A	US 2021/0038385 A1 (Popp et al.) 11 February 2021 (11.02.2021), entire document	1-20
A	US 2005/0203605 A1 (Dolan) 15 September 2005 (15.09.2005), entire document	1-20

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"D" document cited by the applicant in the international application

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"Z" document member of the same patent family

Date of the actual completion of the international search

22 March 2023

Date of mailing of the international search report

MAY 25 2023

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents

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

Facsimile No. 571-273-8300

Authorized officer

Karl Rodriguez

Telephone No. PCT Helpdesk: 571-272-4300

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To: MATTHEW S. WILLIAMS PERKINS COIE LLP P.O. BOX 1247 SEATTLE, WA 98111-1247 <div style="text-align: center;"> RECEIVED PATENT DOCKETING MAY 31 2023 PERKINS COIE LLP </div>		Date of mailing (day/month/year) MAY 25 2023	
Applicant's or agent's file reference 111552-8034WO00		FOR FURTHER ACTION See paragraph 2 below	
International application No. PCT/US 23/60502	International filing date (day/month/year) 11 January 2023 (11.01.2023)	Priority date (day/month/year) 11 January 2022 (11.01.2022)	
International Patent Classification (IPC) or both national classification and IPC IPC - INV. A61B 17/22, A61B 17/221 (2023.01) ADD. INV. A61B 17/221 CPC - ADD. A61B 2017/2212			
Applicant INARI MEDICAL, INC.			

1. This opinion contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 65.1bis(h) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Date of completion of this opinion 22 March 2023	Authorized officer Kari Rodriguez PCT Help Desk Telephone No. 571-272-4300
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Form PCT/ISA/237 (cover sheet) (revised July 2022)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JS 23/60502

Box No. 1 Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:



the international application in the language in which it was filed.



a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(s) and 23.1(h)).

2. ☐ This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43bis 1(h)).

3. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this opinion has been established on the basis of a sequence listing:

a. ☐

furnishing part of the international application as filed.

b. ☐

furnished subsequent to the international filing date for the purposes of international search (Rule 13ter.1(s)),



accompanied by a statement to the effect that the sequence listing does not go beyond the disclosure in the international application as filed.

4. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this opinion has been established to the extent that a meaningful opinion could be formed without a WIPO Standard ST.26 compliant sequence listing.

5. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 23/66502

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	14	YES
	Claims	1-13, 15-20	NO
Inventive step (IS)	Claims	NONE	YES
	Claims	1-20	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations:

Claims 1-13 and 15-20 lack novelty under PCT Article 33(2) as being anticipated by US 9,301,769 B2 to Brady et al. (hereinafter "Brady").

Regarding claim 1, Brady teaches a system for removing clot material from an implant positioned within a body vessel (Fig 1a; col 1, in 31-36), comprising:

a clot treatment device (device 1, Fig 1a; col 44, in 23-39) configured to be deployed within the implant,

wherein the clot treatment device includes a first end portion (see collar 885 at proximal end 893, Fig 35a; col 56, in 3-9), a second end portion (see end at distal collar 887, Fig 35b; col 56, in 23-28), and a plurality of struts (882, 883, Fig 35a; col 56, in 9-10) extending between the first end portion and the second end portion (see Fig 35a);

a handle including an actuator (11, Fig 1a; col 44, in 39-43, see discussion wherein physician is able to manually control the device via the handle);

a first elongate member (shaft distal end 890, Fig 56a; col 56, in 3-9), coupling the first end portion of the clot treatment device to the handle (see Fig 1a); and

a second elongate member (see elongate shaft 9 in Fig 1a and at distal stop 888, Fig 56a; col 56, in 3-9) coupling the second end portion of the clot treatment device to the handle (see Fig 1a).

wherein actuation of the actuator is configured to move the second elongate member relative to the first elongate member to reduce a distance between the first end portion and the second end portion to radially expand the struts (see first position of device in Fig 35b and second position of device in Fig 35a; col 44, in 39-46, see discussion wherein the handle is used to control and move the capture net).

Regarding claim 2, Brady teaches the system of claim 1. Brady further teaches wherein the implant is a stent (col 3, in 31-36; col 3, in 29-38).

Regarding claim 3, Brady teaches the system of claim 1. Brady further teaches wherein the first end portion is a proximal end portion of the clot treatment device (see where 885 is at end 890 and 893, Fig 35a; col 56, in 3-9), and

wherein the second end portion is a distal end portion of the clot treatment device (see end at distal collar 887, Fig 35b; col 56, in 23-28).

Regarding claim 4, Brady teaches the system of claim 3. Brady further teaches wherein the second elongate member (see elongate shaft 9 in Fig 1a and at distal stop 888, Fig 56a; col 56, in 3-9) extends through a lumen (col 19, in 43-49) of the first elongate member (shaft distal end 890, Fig 56a; col 56, in 3-9).

Regarding claim 5, Brady teaches the system of claim 1. Brady further teaches wherein the first end portion is a distal end portion of the clot treatment device, and wherein the second end portion is a proximal end portion of the clot treatment device (see Figs 1a and 35a, wherein the positioning of the end portions 893 and 887 is reflective about the perpendicular axis to the longitudinal axis of the elongate shaft 9 that coupled to the handle 11).

Regarding claim 6, Brady teaches the system of claim 1. Brady further teaches wherein actuation of the actuator is configured to move both the first elongate member and the second elongate member relative to the handle (see first position at 35b and second position at 35a; col 56, in 10-14; col 44, in 39-44).

Regarding claim 7, Brady teaches the system of claim 1. Brady further teaches wherein the handle is rotatable to rotate the clot treatment device relative to the implant (see flexibility of elongate shaft 9 relative to handle 11 shown as rotatable in Fig 1a).

Regarding claim 8, Brady teaches the system of claim 1. Brady further teaches wherein the handle is longitudinally movable to move the clot treatment device longitudinally relative to the implant (see handle in Fig 1a; col 44, in 39-43; col 56, in 10-14).

- Continued in Supplemental Box -

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 23/00502

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 15. Lack of antecedent basis for "the second elongate member" and "the first elongate member"

Claim 18. Semantics... "compressing" should be "comprising"

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 23/60502

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

- Box V.2. Citations and explanations -

Regarding claim 9, Brady teaches the system of claim 1. Brady also teaches wherein the handle is rotatable and longitudinally movable to rotate and longitudinally move the clot treatment device relative to the implant (see flexibility of elongate shaft 9 relative to handle 11 shown as rotatable in Fig 1a; col 44, in 39-43; col 56, in 10-14).

Regarding claim 10, Brady teaches the system of claim 1. Brady further teaches comprising a guide catheter (889, Fig 35b; col 7, in 13-21; col 26, in 8-31).

wherein the clot treatment device is configured to be

(a) covered within the guide catheter in a first state (889, Fig 35b; col 26, in 8-31) and

(b) uncovered from the guide catheter and expanded to a second state (Fig 35a; col 26, in 8-31).

Regarding claim 11, Brady teaches the system of claim 1. Brady further teaches wherein the struts extend generally axially between the first and second end portions and each have an undulating shape (882 and 883, Fig 35a; col 56, in 3-16).

Regarding claim 12, Brady teaches the system of claim 1. Brady further teaches

wherein the struts each extend axially between the first and second end portions (882 and 883, Fig 35a; col 56, in 3-16), and

wherein the clot treatment device does not include any crossmembers interconnecting the struts (Fig 35a).

Regarding claim 13, Brady teaches the system of claim 1. Brady further teaches wherein the actuator is a rotatable knob or a slider (handle 11, Fig 1a; col 12, in 3-42, wherein the handle actuates the expandable body to slide through a micro lumen).

Regarding claim 15, Brady teaches a method of removing clot material from an implant positioned within a body vessel (Fig 1a; col 1, in 31-36), the method comprising:

positioning a clot treatment device (device 1, Fig 1a; col 44, in 23-39) at least partially within the implant,

wherein the clot treatment device has

(a) a first end portion (see collar 885 at proximal end 893, Fig 35a; col 56, in 3-9),

(b) a second end portion (see end at distal collar 887, Fig 35b; col 56, in 23-28), and

(c) a plurality of struts (882 and 883, Fig 35a; col 56, in 9-10) extending between the first end portion and the second end portion (see Fig 35a)

moving the second elongate member (see elongate shaft 9 in Fig 1a and at distal stop 888, Fig 56a; col 56, in 3-9) relative to the first elongate member (shaft distal end 890, Fig 56a; col 56, in 3-9) to reduce a distance between the first end portion and the second end portion to radially expand the struts (see first position of device in Fig 35b and second position of device in Fig 35a; col 44, in 39-46, see discussion wherein the handle is used to control and move the capture net); and

after radially expanding the struts, rotating and/or translating the clot treatment device within the implant to materially engage the clot material with at least a portion of the struts (col 26, in 8-31).

Regarding claim 16, Brady teaches the method of claim 15. Brady further teaches

wherein the first end portion (see collar 885 at proximal end 893, Fig 35a; col 56, in 3-9) of the clot treatment device is coupled to a first elongate member (shaft distal end 890, Fig 56a; col 56, in 3-9),

wherein the second end portion (see end at distal collar 887, Fig 35b; col 56, in 23-28) of the clot treatment device is coupled to a second elongate member (see elongate shaft 9 in Fig 1a and at distal stop 888, Fig 56a; col 56, in 3-9), and

wherein moving the second elongate relative to the first elongate member comprises

actuating an actuator on a handle (11, Fig 1a; col 44, in 39-43, see discussion wherein physician is able to manually control the device via the handle) coupled to the first elongate member and the second elongate member (Figs 1a and 35a) to move the second elongate member relative to the first elongate member (see first position at 35b and second position at 35a; col 56, in 10-14; col 44, in 39-44; col 26, in 8-31).

Regarding claim 17, Brady teaches the method of claim 15. Brady further teaches wherein the struts each extend axially between the first and second end portions (882 and 883, Fig 35a; col 56, in 3-16), and

wherein the clot treatment device does not include any crossmembers interconnecting the struts (Fig 35a).

Regarding claim 18, Brady teaches the method of claim 15. Brady further teaches wherein the implant is a stent (col 3, in 31-36; col 3, in 28-36).

- Continued in Supplemental Box -

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

- Preceding Supplemental Box for V.2. Citations and explanations -

Regarding claim 19, Brady teaches a clot treatment device (device 1, Fig 1a; col 44, in 23-39) comprising:

a proximal end portion (see collar 885 at proximal end 890 and 893, Fig 35a; col 56, in 3-8);

a distal end portion (see end at distal collar 887, Fig 35b; col 56, in 23-28; and

a plurality of struts extending generally axially along a longitudinal axis between the proximal end portion and the distal end portion (882 and 883, Fig 35a; col 56, in 3-10),

wherein movement of the first end portion toward the second end portion is configured to radially expand the struts (see first position of device in Fig 35b and second position of device in Fig 35a; col 56, in 3-12);

individual ones of the struts include

a proximal portion extending from the proximal end portion (see struts 882 and 883 at proximal end 890, Fig 35a),

a distal portion extending from the distal end portion (see struts at distal end near 887, Fig 35a), and

a middle portion (see additional embodiment Figs 6 and 7)

(a) extending between the proximal portion and the distal portion (Figs 6 and 7) and

(b) having a hook-like shape in a direction about the longitudinal axis (Figs 6 and 7; col 49, in 53-58); and

individual ones of the struts have an undulating shape in a direction along the longitudinal axis (see struts 882 and 883, Fig 35a).

Regarding claim 20, Brady teaches the clot treatment device of claim 19. Brady further teaches wherein the clot treatment device does not include any cross-members interconnecting the struts (Figs 6, 7, and 35a).

Claim 14 lacks an inventive step under PCT Article 33(3) as being obvious over Brady in view of US 2021/0363278 A1 to O'Malley et al. (hereinafter "O'Malley").

Regarding claim 14, Brady teaches the system of claim 1. Brady does not specifically teach wherein the handle includes an indicator configured to indicate an amount that the struts are radially expanded. However, Brady teaches the handle operating an activation cable from the shaft to advance the radial struts that expand in operation (Figs 1a and 35a; col 56, in 3-14). Further, O'Malley teaches wherein the handle (shaft 106, Fig 1A; para [0097]) includes an indicator configured to indicate an amount that the struts are radially expanded (see indicator bands 107, Fig 1A; para [0097]). Accordingly, it would have been obvious to a person of ordinary skill in the art to combine a system for removing clot material as in Brady with a handle including an indicator configured to indicate an amount that the struts are radially expanded as in O'Malley so as to provide for an indication of advancement of the system into a patient.

Claims 1-20 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used by industry.

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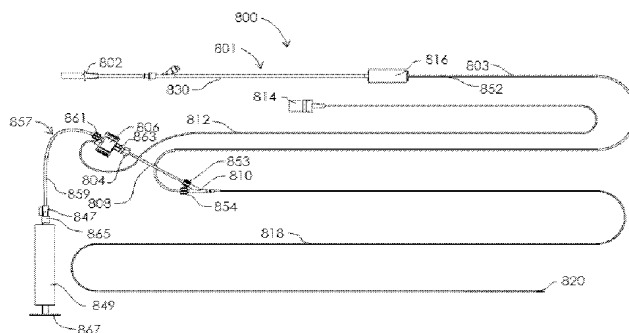


FIG. 21

(57) Abstract: A system for aspirating thrombus includes a catheter having a supply lumen having a distal end and an aspiration lumen configured to couple to a vacuum source and having an interior wall surface and an open distal end, an orifice at or near the distal end of the supply lumen, in fluid communication with the interior of the aspiration lumen, the orifice located proximally of the open distal end of the aspiration lumen, wherein the orifice is configured to create a spray pattern that impinges on the interior wall surface of the aspiration lumen when a distal end of the aspiration catheter is immersed within an aqueous environment, and a disposable tubing set having a first conduit configured to couple the supply lumen of the aspiration catheter to a fluid source, and a pump component associated with the first conduit and configured to detachably couple to a drive unit.

SYSTEMS AND METHODS FOR REMOVAL OF BLOOD AND THROMBOTIC MATERIAL

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present disclosure pertains generally to medical devices and methods of their use. More particularly, the present invention pertains to aspiration and thrombectomy devices and methods of use thereof.

Description of the Related Art

[0002] Several devices and systems already exist to aid in the removal of thrombotic material. These include simple aspiration tube type devices using vacuum syringes to extract thrombus into the syringe, simple flush-and-aspirate devices, more complex devices with rotating components the pull in, macerate and transport thrombotic material away from the distal tip using a mechanical auger, systems that use very high pressure to macerate the thrombus and create a venturi effect to flush the macerated material away.

[0003] All of the devices described above have limitations as a result of individual design characteristics. For example, simple aspiration catheters offer ease of use and rapid deployment but may become blocked or otherwise inoperable when faced with older, more organized thrombotic material. Such devices must be removed and cleared outside the body and then re-inserted into the vasculature, which lengthens the time needed for the procedure and increases the opportunity to kink the catheter shaft. Such kinks may reduce performance by decreasing the cross-sectional area of the catheter or may render the device inoperable.

[0004] Mechanical rotary devices use an auger to grab and carry the thrombus away from the target area. Some create transport force via vacuum bottles while others create differential pressure at the distal tip of the device with the auger acting as a low pressure pump. These devices typically work slowly and offer the physician no feedback as to when the device should be advanced further into the lesion.

[0005] Flushing type devices include manual flush type devices in which the physician manipulates a hand-driven pump to provide flowing saline at the tip of the device to break up and aspirate the thrombus material, which may introduce performance variations based on the ability of the physician to consistently pump the device over the duration of the procedure. Flushing devices also include high pressure flushing devices that macerate the thrombus and then, using a vortex created by the high pressure fluid, transport the emulsified thrombotic material to a collection bag. These devices are effective at removing all levels of thrombotic material, but the pressure created by the device is so great that its action against certain vessel walls may interrupt the heart muscle stimulation mechanism and create a bradycardia event in certain patients, sometimes requiring that a pacing lead be placed in the patient prior to use. Further, interacting with the thrombotic material outside of the catheter may allow loose material to escape the capture mechanism.

SUMMARY OF THE INVENTION

[0006] In one embodiment of the present invention, a system for aspirating thrombus includes an aspiration catheter having a supply lumen and an aspiration lumen, the supply lumen having a wall and a closed distal end, the aspiration lumen configured to couple to a vacuum source and having an interior wall surface, and an open distal end, an orifice in the wall of the supply lumen, in fluid communication with the interior of the aspiration lumen, the orifice located proximally of the open distal end of the aspiration lumen and adjacent the closed distal end of the supply lumen, wherein the orifice is configured to create a spray pattern when pressurized fluid is pumped through the supply lumen such that the spray pattern impinges on the interior wall surface of the aspiration lumen when a distal end of the aspiration catheter is immersed within an aqueous environment, and a disposable tubing set having a first conduit configured to couple to the supply lumen of the aspiration catheter to a fluid source, and a pump component associated with the first conduit and configured to detachably couple to a drive unit, such that motion from the drive unit is transferred to the pump component such that resultant motion of the pump component causes fluid from the fluid source to be injected through the supply lumen of the aspiration catheter, and through the orifice into the aspiration lumen.

[0007] In another embodiment of the present invention, a system for aspirating thrombus includes an aspiration catheter having a supply lumen and an aspiration lumen, the supply lumen having a distal end, the aspiration lumen configured to couple to a vacuum source and having an interior wall surface, and an open distal end, an orifice at or near the distal end of the supply lumen, in fluid communication with the interior of the aspiration lumen, the orifice located proximally of the open distal end of the aspiration lumen, wherein the orifice is configured to create a spray pattern when pressurized fluid is pumped through the supply lumen such that the spray pattern impinges on the interior wall surface of the aspiration lumen when a distal end of the aspiration catheter is immersed within an aqueous environment, and a disposable tubing set having a first conduit configured to couple the supply lumen of the aspiration catheter to a fluid source, and a pump component associated with the first conduit and configured to detachably couple to a drive unit, such that motion from the drive unit is transferred to the pump component such that resultant motion of the pump component causes fluid from the fluid source to be injected through the supply lumen of the aspiration catheter, and through the orifice into the aspiration lumen.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. 1 is a diagrammatic view of a system for aspirating thrombus according to an embodiment of the present invention.

[0009] FIG. 2 is a diagrammatic view showing more detail of the proximal portion of the system for aspirating thrombus of FIG. 1.

[0010] FIG. 3 is a diagrammatic view of the distal end portion of the system for aspirating thrombus of FIG. 1.

[0011] FIG. 4 is a plan view of disposable components of a system for aspirating thrombus according to an embodiment of the present invention.

[0012] FIG. 5 is a detailed view of detail 5 of FIG. 4.

[0013] FIG. 6 is a detailed view of detail 6 of FIG. 4.

[0014] FIG. 7 is a detailed view of detail 7 of FIG. 4.

[0015] FIG. 8 is a detailed view of detail 8 of FIG. 4.

[0016] FIG. 9 is a plan view of a distal end of an aspiration catheter of the system for aspirating thrombus of FIG. 4.

[0017] FIG. 10 is a sectional view of FIG. 9 taken through line 10-10, as viewed within a blood vessel.

[0018] FIG. 11 is a detailed view of detail 11 of FIG. 10.

[0019] FIG. 12 is elevation perspective view of a pump base according to an embodiment of the present invention.

[0020] FIG. 13 illustrates a piston of the system for aspirating thrombus being coupled to a saddle of a piston pump.

[0021] FIG. 14 is a cross-sectional view of the distal tip of the aspiration catheter of FIG. 9.

[0022] FIG 15 is a view a cassette for coupling to a pump base.

[0023] FIG. 16 is a sectional view of the cassette of FIG. 15.

[0024] FIG. 17 is a partially exploded view of the pump base of FIG. 12.

[0025] FIG. 18 is a graph of a pressure vs. time relationship of a piston pump.

[0026] FIG. 19 is an elevation view of a piston and a cassette of a piston pump according to an embodiment of the present invention.

[0027] FIG. 20 is a graph of a pressure vs. time relationship of a piston pump.

[0028] FIG. 21 is a plan view of disposable components of a system for aspirating thrombus according to an embodiment of the present invention.

[0029] FIG. 22 is a detailed view of a catheter of the system for aspirating thrombus of FIG. 21.

[0030] FIG. 23 is a detailed view of a tubing set of the system for aspirating thrombus of FIG. 21.

[0031] FIG. 24 is an exploded view of a saline pump drive unit according to an embodiment of the present invention.

[0032] FIG. 25 is an exploded view of a disposable piston pump head of the saline pump unit of FIG. 24.

[0033] FIG. 26 is a sectional view of an aspiration catheter of a system for aspirating thrombus within a blood vessel according to an embodiment of the present invention.

[0034] FIG. 27 is a sectional view of a catheter within a blood vessel delivering a drug to a target site.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

[0035] For the following defined terms, these definitions shall be applied, unless a different definition is given in the claims or elsewhere in this specification.

[0036] All numeric values are herein assumed to be modified by the term "about," whether or not explicitly indicated. The term "about" generally refers to a range of numbers that one of skill in the art would consider equivalent to the recited value (i.e., having the same function or result). In many instances, the terms "about" may include numbers that are rounded to the nearest significant figure.

[0037] The recitation of numerical ranges by endpoints includes all numbers within that range (e.g. 1 to 5 includes 1, 1.5, 2, 2.75, 3, 3.80, 4, and 5).

[0038] As used in this specification and the appended claims, the singular forms "a", "an", and "the" include plural referents unless the content clearly dictates otherwise. As used in this specification and the appended claims, the term "or" is generally employed in its sense including "and/or" unless the content clearly dictates otherwise.

[0039] The following detailed description should be read with reference to the drawings in which similar elements in different drawings are numbered the same. The drawings, which are not necessarily to scale, depict illustrative embodiments and are not intended to limit the scope of the invention.

[0040] FIG. 1 is a diagrammatic figure depicting an assisted aspiration system 10. The aspiration system 10 includes a remote hand piece 12 that contains a fluid pump 26 and an operator control interface 6. In one contemplated embodiment, the system 10 is a single use disposable unit. The aspiration system 10 may also include extension tubing 14, which contains a fluid irrigation lumen 2 (or high pressure injection lumen) and an aspiration lumen 4, and which allows independent manipulation of a catheter 16 without requiring repositioning of the hand piece 12 during a procedure performed with the aspiration system 10. Extension tubing 14 may also act as a pressure accumulator. High pressure fluid flow from the pump 26, which may comprise a displacement pump, pulses with each stroke of the pump 26, creating a sinusoidal pressure map with distinct variations between the peaks and valleys of each sine wave. Extension tubing 14 may be matched to the pump 26 to expand and contract in unison with each pump pulse to reduce the variation in pressure caused by the pump pulses to produce a smooth or smoother fluid flow at tip of catheter 16. Any tubing having suitable compliance characteristics may be used. The extension tubing 14 may be permanently attached to the pump 26 or it may be attached to the pump 26 by a connector 44. The connector 44 is preferably configured to ensure that the extension tubing 14 cannot be attached to the pump 26 incorrectly.

[0041] An interface connector 18 joins the extension tubing 14 and the catheter 16 together. In one contemplated embodiment, the interface connector 18 may contain a filter assembly 8 between high pressure fluid injection lumen 2 of the extension tubing 14 and a high pressure injection lumen 36 of the catheter 16 (FIG. 3). The catheter 16 and the extension tubing 14 may be permanently joined by the interface connector 18. Alternatively, the interface connector 18 may contain a standardized connection so that a selected catheter 16 may be attached to the extension tubing 14.

[0042] Attached to the hand piece 12 are a fluid source 20 and a vacuum source 22. A standard hospital saline bag may be used as fluid source 20; such bags are readily available to the physician and provide the necessary volume to perform the procedure. Vacuum bottles may provide the vacuum source 22, or the vacuum source 22 may be provided by a syringe, a vacuum pump or other suitable vacuum sources.

[0043] In one contemplated embodiment, the catheter 16 has a variable stiffness ranging from stiffer at the proximal end to more flexible at the distal end. The variation in the stiffness of the catheter 16 may be achieved with a single tube with no radial bonds between two adjacent tubing pieces. For example, the shaft of the catheter 16 may be made from a single length of metal tube that has a spiral cut down the length of the tube to provide shaft flexibility. Variable stiffness may be created by varying the pitch of the spiral cut through different lengths of the metal tube. For example, the pitch of the spiral cut may be greater (where the turns of the spiral cut are closer together) at the distal end of the device to provide greater flexibility. Conversely, the pitch of the spiral cut at the proximal end may be lower (where the turns of the spiral cut are further apart) to provide increased stiffness. In some embodiments, a single jacket may cover the length of the metal tube to provide for a vacuum tight catheter shaft. Other features of catheter 16 are described with reference to FIG. 3, below.

[0044] FIG. 2 is a diagrammatic view showing more detail of the hand piece 12 and the proximal portion of assisted catheter aspiration system 10. The hand piece 12 includes a control box 24 where the power and control systems are disposed. The pump 26 may in some embodiments be a motor driven displacement pump that has a constant output. The pump displacement relationship to the catheter volume, along with the location of the orifice 42 (exit) of the catheter high pressure lumen 36 within the

aspiration lumen 38 (FIG. 3), ensures that no energy is transferred to the patient from the saline pump as substantially all pressurized fluid is evacuated by the aspiration lumen. A prime button 28 is mechanically connected to a prime valve 30. When preparing the device for use, it is advantageous to evacuate all air from the pressurized fluid system to reduce the possibility of air embolization. By depressing the prime button 28, the user connects the fluid source 20 to the vacuum source 22 via the pump 26. This forcefully pulls fluid (for example 0.9 % NaCl solution, or “saline”, or “normal saline”, or heparinized saline) through the entire pump system, removing all air and positively priming the system for safe operation. A pressure/vacuum valve 32 is used to turn the vacuum on and off synchronously with the fluid pressure system. One contemplated valve 32 is a ported one way valve. Such a valve is advantageous with respect to manual or electronic valve systems because it acts as a tamper proof safety feature by mechanically and automatically combining the operations of the two primary systems. By having pressure/vacuum valve 32, the possibility of turning the vacuum on without also activating the fluid system is eliminated.

[0045] The operator control interface 6 is powered by a power system 48 (such as a battery or an electrical line), and may comprise an electronic control board 50, which may be operated by a user by use of one or more switches 52 and one or more indicator lamps 54. The control board 50 also monitors and controls several device safety functions, which include over pressure detection, air bubble detection, and vacuum charge. A pressure sensor 64 monitors pressure (i.e. injection pressure), and senses the presence of air bubbles. Alternatively, or in conjunction, an optical device 66 may be used to sense air bubbles. In one contemplated embodiment, the pump pressure is proportional to the electric current needed to produce that pressure. Consequently, if the electric current required by pump 26 exceeds a preset limit, the control board 50 will disable the pump 26 by cutting power to it. Air bubble detection may also be monitored by monitoring the electrical current required to drive the pump 26 at any particular moment. In order for a displacement pump 26 to reach high fluid pressures, there should be little or no air (which is highly compressible) present in the pump 26 or connecting system (including the catheter 16 and the extension tubing 14). The fluid volume is small enough that any air in the system will result in no pressure being generated at the pump head. The control board monitors the pump current for any abrupt downward change that may indicate that air has entered the system. If the rate of drop is faster than a preset limit,

the control board 50 will disable the pump 26 by cutting power to it until the problem is corrected. Likewise, a block in the high pressure lumen 36 (FIG. 3), which may be due to the entry of organized or fibrous thrombus, or a solid embolus, may be detected by monitoring the electrical current running the pump 26. In normal use, the current fluxuations of the pump 26 are relatively high. For example, the pump 26 may be configured so that there is a variation of 200 milliAmps or greater in the current during normal operation, so that when current fluxuations drop below 200 milliAmps, air is identified, and the system shuts down. Alternatively, current fluxuations in the range of, for example, 50 milliAmps to 75 milliAmps may be used to identify that air is in the system. Additionally, an increase in the current or current fluxuations may indicate the presence of clot or thrombus within the high pressure lumen 36. For example, a current of greater than 600 milliAmps may indicate that thrombus is partially or completely blocking the high pressure lumen 36, or even the aspiration lumen 38 (FIG. 3).

[0046] A vacuum line 56, connected to the vacuum source 22, may be connected to a pressure sensor 58. If the vacuum of the vacuum source 22 is low (i.e. the absolute value pressure has decreased) or if a leak is detected in the vacuum line 56, the control board 50 disables the pump 26 until the problem is corrected. The pressure sensor 58 may also be part of a safety circuit 60 that will not allow the pump 26 to run if a vacuum is not present. Thereby, a comprehensive safety system 62, including the safety circuit 60, the pressure sensor 64 and/or the optical device 66, and the pressure sensor 58, requires both pump pressure and vacuum pressure for the system to run. If a problem exists (for example, if there is either a unacceptably low pump pressure or an absence of significant vacuum), the control board 50 will not allow the user to operate the aspiration system 10 until all problems are corrected. This will keep air from being injected into a patient, and will assure that the aspiration system 10 is not operated at incorrect parameters. Alternatively, in lieu of a direct connection (e.g., electrical, optical), the pressure sensor 58 can be configured to send a wireless signal to the control board 50, or any other component (e.g., antenna) coupled to or in communication with the control board 50, to remotely control operation of the pump 26. The remote control may be possible, whether the pump is within the sterile field or outside the sterile field.

[0047] FIG. 3 is a diagrammatic view of the distal end portion 68 of the assisted catheter aspiration system 10, showing more details of the catheter 16. The

catheter 16 in some embodiments is a single-operator exchange catheter and includes a short guidewire lumen 34 attached to the distal end of the device. The guidewire lumen 34 can be between about 1 and about 30 cm in length, or between about 5 and about 25 cm in length, or between about 5 and about 20 cm in length, or approximately 13.5 cm in length. In other embodiments, a full-length guidewire lumen (extending the length of the catheter 16) may be used. For example, a catheter 16 sized to be used on peripheral blood vessels, including peripheral arteries, may incorporate a full-length guidewire lumen. In some embodiments, the aspiration itself may also serve as a guidewire lumen. An aspiration lumen 38 includes a distal opening 40 which allows a vacuum (for example, from vacuum source 22) to draw thrombotic material into the aspiration lumen 38. A high pressure lumen 36 includes a distal orifice 42 that is set proximally of distal opening 40 by a set amount. For example, distal orifice 42 can be set proximally of distal opening 40 by about 0.508 mm (0.020 inches), or by $0.508 \text{ mm} \pm 0.076 \text{ mm}$ ($0.020 \text{ inches} \pm 0.003 \text{ inches}$) or by another desired amount. The orifice 42 is configured to spray across the aspiration lumen to macerate and/or dilute the thrombotic material for transport to vacuum source 22, for example, by lowering the effective viscosity of the thrombotic material. The axial placement of the fluid orifice 42 is such that the spray pattern interaction with the opposing lumen wall preferably produces a spray mist and not a swirl pattern that could force embolic material out from the distal opening 40. The spray pattern may be present at least when a distal end of the catheter 16 is within an aqueous environment, such as a body lumen, including a blood vessel. The aqueous environment may be at body temperature, for example between about 35.0°C and about 40.0°C, or between about 36.0°C and about 38.0°C. The system may be configured so that the irrigation fluid leaves the pump at a pressure of between about 3.447 megapascal (500 pounds per square inch) and about 10.342 megapascal (1500 pounds per square inch). In some embodiments, after a pressure head loss along the high pressure lumen 36, the irrigation fluid leaves orifice 42 at between about 4.137 megapascal (600 pounds per square inch) and about 8.274 megapascal (1200 pounds per square inch), or between about 4.816 megapascal (650 pounds per square inch) and about 5.861 megapascal (850 pounds per square inch).

[0048] FIG. 4 illustrates a system for aspirating thrombus 100 according to an embodiment of the present invention. The system for aspirating thrombus 100 depicted in FIG. 4 represents disposable components 101, comprising a tubing set 103 and an

aspiration catheter 118, which are configured to attach to a vacuum source 22, a fluid source 20 (FIGS. 1 and 2), a pressure monitor (not shown), and a pump base 200 (FIG. 12). The system for aspirating thrombus 100 is also configured to be used with a guidewire. Beginning with the components of the tubing set 103, a spike 102 (shown in more detail in FIG. 5) is configured to couple to a fluid source 20 such as a saline bag. The saline bag may have a volume of saline equal to about 1000 ml or about 500 ml. The saline may be heparinized, or may contain one or more therapeutic agents. The saline may be at room temperature, or may be warmed or cooled. A connector 104 (shown in more detail in FIG. 7), for example a luer connector, is configured to couple to a vacuum source 22. The vacuum source 22 may be a vacuum bottle having a volume of between 20 ml and 500 ml. The vacuum source 22 may instead be a 60 ml syringe whose plunger is pulled back after coupling to the connector 104. This may be a lockable plunger, which is locked in order to maintain the evacuated plunger position. In some cases, the vacuum source 22 may be a 20 ml syringe or a 30 ml syringe. An exemplary syringe with a lockable plunger is the VacLok® syringe sold by Merit Medical Systems, Inc. of South Jordan, UT, USA. The vacuum source 22 may also be a vacuum pump, with or without a collection container. A pressure transducer 106 capable of measuring vacuum (including positive pressure sensors that are configured to measure positive pressure, but are capable of measuring negative pressure) is coupled to a vacuum line 108 via a y-connector 110. Signals from the pressure transducer 106 travel along a cable 112 (FIG. 7), which also supplies voltage to the pressure transducer 106. A connector 114 (also shown in FIG. 6) couples the cable 112 to a pressure monitor or to the pump base 200. A cassette 116 is a disposable component attachable to the pump base 200 (FIG. 12) for allowing pressurized injection of a liquid injectate (such as saline). The cassette 116 is described in more detail in relation to FIG. 6. The aspiration catheter 118 having a distal end 120 is shown in more detail in FIG. 8.

[0049] Turning to FIG. 5, the spike 102 communicates with extension tubing 122. Liquid injectate is pumped downstream at the piston pump, which pulls more liquid injectate (for example from a saline bag) through a check valve 126 and through a supply tube 130. An injection port 128 may be used for injecting other materials into the system, or for removing air or priming the system. The spike 102 may be packaged with a removable protective spike cover 124.

[0050] The cassette 116, as seen in FIG. 6, pulls liquid injectate from the supply tube 130, and pressurizes (in conjunction with the pump base 200) an injection tube 152. More detail of the cassette 116 will be described along with the description of the entire piston pump. FIG. 7 shows more detail of the pressure transducer 106 for measuring the vacuum. The pressure transducer 106 connects to the y-connector 110 with a luer fitting 154. The injection tube 152 and the vacuum line 108 communicate to lumens of a catheter shaft 142. For example, the injection tube 152 may be fluidly connected to a distal supply tube 168 (FIGS. 9-11), for example a polyimide or stainless steel or nitinol tube having high strength thin walls. This distal supply tube 168 may reside within the catheter shaft 142, with the annulus between forming an aspiration lumen 160 (FIGS. 9-11). A strain relief 156 protects the catheter shaft 142 from kinking and other damage. In any cases in which luer fittings 154 are used (at any of the connections), a custom luer with an added o-ring may be used in order to allow the connection to withstand elevated pressures. In some embodiments, a bespoke connector may be utilized, to increase high pressure endurance. In some embodiments, pressures as high as 6.89 megapascal (1,200 pounds per square inch) or greater may be achieved without leakage or without causing decoupling of the catheter.

[0051] Turning to FIG. 8, the aspiration catheter 118 is illustrated as a single-operator exchange catheter and includes a guidewire tube 132 attached to the distal end 120 on one side of the aspiration catheter 118. The guidewire tube 132 can be between about 1 and about 30 cm in length, or between about 5 and about 25 cm in length, or between about 5 and about 20 cm in length, or approximately 13.5 cm in length. The guidewire tube 132 has a distal end 136 and a proximal end 138, and a single guidewire lumen 134 passing between the two ends 136, 138. The guidewire lumen 134 may be configured to be compatible with a 0.014" guidewire, a 0.018" guidewire, or a number of other guidewire diameters. A lumen inner diameter may be about 0.406 mm (0.016 inches) for compatibility with a 0.014" guidewire. The guidewire tube 132 may be constructed of a number of materials, including nylon, polyethylene, PEBAX®, polyester, PET, or may be constructed from composite or coextruded materials. For example an inner layer may comprise high density polyethylene or FEP, PTFE, ETFE, or other materials for high lubricity, and an outer layer may include PEBAX, nylon or other materials, for combination mechanical strength and flexibility. A tie layer may be used between the inner and outer layers, for example linear low density polyethylene. The

catheter 118 may include a composite catheter shaft 142 having an inner support structure 144 covered with a polymer jacket 146. The inner support structure 144 may be a tubular braid or one or more helical coils, for example, made with stainless steel flat or round wires. The inner support structure 144 may also be spiral cut hypodermic tubing, for example made from 304 stainless steel or nickel-titanium. The spiral cut hypodermic tubing may have a pitch measuring about 4 to 6 millimeters, or about 5 millimeters at the proximal end for increased stiffness, transitioning to a pitch of about 0.75 to 1 mm or about 0.87 mm, at the distal end 150 of the inner support structure 144. In between the these two different pitch sections, may be intermediate pitch sections, for example, a section having a pitch of between about 2 mm and about 5 mm, and another section having a pitch of about 1 mm to about 2.5 mm. The inner support structure 144 may end at a transition zone 148, so that the polymer jacket 146 alone extends to the distal end 136 of the aspiration catheter 118. A catheter tip portion 140 is described in more detail in relation to FIGS. 9-11.

[0052] FIGS. 9-11 show an open distal end 158 of an aspiration lumen 160 for aspirating thrombus. A skive 162 may be formed in the polymer jacket 146, to aid entry of thrombus 164 that is aspirated into the aspiration lumen 160 (in the direction of arrow 180) by the combination of the vacuum created by the vacuum source 22. The skive 162 also minimizes the chances of the open distal end 158 being sucked against a blood vessel wall 166. A distal supply tube 168 has a closed distal end 170, for example, it may occluded during manufacture using adhesive, epoxy, hot melt adhesive or an interference member. Alternatively, the distal supply tube 168 may be closed off by melting a portion of it. The distal supply tube 168 has a lumen 176 extending its length and an orifice 172 formed through its wall 174 at a location adjacent and proximal to the closed distal end 170. The orifice 172 may have a diameter between about 0.0508 mm (0.002 inches) and about 0.1016 mm (0.004 inches), or about 0.0787 mm (0.0031 inches). The inner diameter of the distal supply tube 168 may be between about 0.3048 mm (0.012 inches) and about 0.4826 mm (0.019 inches), or between about 0.3556 mm (0.014 inches) and about 0.4318 mm (0.017 inches) or about 0.3937 mm (0.0155 inches). The lumen 176 of the distal supply tube 168 is a continuation of an overall flow path emanating from the fluid source 20 including the extension tubing 122, the supply tube 130, the interior of the cassette 116, and the injection tube 152. In some embodiments, the lumen 176 of the distal supply tube 168 may taper, for example, from an inner diameter of about 0.3937

mm (0.0155 inches) at a proximal portion to an inner diameter of about 0.2974 mm (0.011 inches) at a distal portion. In some embodiments, the equivalent of a taper may be achieved by bonding different diameter tubing to each other, resulting in a stepped-down tubing inner diameter. In some embodiments, different diameter tapered tubing may be bonded to each other, for a combination of tapering and step-down of diameter. As described in conjunction with the piston pump, a pump output pressure wave of about 4.137 megapascal (600 pounds per square inch) to about 5.516 megapascal (800 pounds per square inch) causes a liquid injectate to flow through the flow path, including a the distal supply tube 168 (arrows 182), and causes a fluid jet 178 to exit the orifice 172 at a high velocity. The fluid jet 178, in absence of flow through the aspiration lumen 160 (for example if there is no vacuum), would impinge upon an inner wall 181 of the aspiration lumen 160 directly adjacent the orifice 172. Depending on the amount of vacuum present, the fluid jet, may curve as shown. The fluid jet 178 serves to macerate thrombus 164 that enters the aspiration lumen 160, and dilutes it. The flow rate of the liquid injectate (e.g. saline) and the amount of vacuum are controlled so that about 50% to about 70% of the volume of the mixture of the saline and blood flowing through the proximal aspiration lumen 160 is blood. Or about 60% of the volume is blood. This maceration and dilution assures that there is continuous flow through the aspiration lumen 160 so that it will not clog. The fluid jet 178 is configured to be contained within the aspiration lumen 160, and to not exit into a blood vessel or other body lumen.

[0053] The axial center of the orifice 172 is about 0.3302 mm (0.013 inches) to about 0.4826 mm (0.019 inches) proximal to the most proximal portion of the open distal end 158, as illustrated by distance D in FIG. 11. FIG. 14 is a cross-section of the catheter tip portion 140 at the axial center of the orifice 172. The orifice 172 it is oriented approximately along a vertical midline 184 of the aspiration lumen 160, or within a range of $\pm a$, there where angle a is about 20° . The angle a , may be varied in different embodiments between about 1° and about 45° , or between about 20° and about 35° . The guidewire tube 132 may be secured to the polymer jacket 146 with attachment materials 186, such as adhesive, epoxy, hot melt or other materials. The guidewire tube 132 may be secured along its entire length, or at discrete locations along its length, in order to maximize flexibility. The distal supply tube 168 may be secured within the aspiration lumen 160 with attachment materials 188, such as adhesive, epoxy, hot melt or other materials. The polymer jacket 146 may comprise a number of different materials,

including PEBAX, nylon, or polyurethane. In some embodiments, the polymer jacket may be partially melt bonded to the distal supply tube 162 and/or the guidewire tube 132, in order to minimize the wall thickness of the assembly.

[0054] FIG. 12 illustrates a pump base 200 for coupling the cassette 116 of the system for aspiration of thrombus 100. A housing 202 is attached to an IV pole clamp 204, and contains the control circuitry and the motor for operating a piston pump system 300 (FIG. 13) which comprises the combined pump base 200 and the cassette 116. By action of a motor and cam within the pump base 200, a saddle 206 is cyclically actuated (up and down) within a window 208 to move a piston 210 within the cassette 116 (FIG. 13). Pegs 212 of the cassette 116 insert into cavities 216 in the pump base 200. Biased snaps 214 lock into one or more grooves 218 in the pump base 200. Either the cavities 216 or the grooves 218, may have one or more switches which sense the presence of the cassette 116. For example, the cassette for one particular model may have a first number (or combination) of pegs 212 or biased snaps 214, which another particular model may have a different number (or combination) of pegs 212 or biased snaps 214, which is recognized by the system. A smooth surface 224 of an elastomeric frame 222 engages edges 220 of the cassette 116, for enhanced protection. An upper space 226 is configured to engage, or closely match the supply tube 130 and a lower space 228 is configured to engage, or closely match the injection tube 152. The saddle 206 has a semi-cylindrical cavity 236 which snaps over a cylindrical engagement surface 238 on the piston 210. The saddle also has an upper edge 240 and a lower edge 242 for axially engaging a first abutment 244 and a second abutment 246, respectively, of the piston 210. A user interface 230 on the pump base 200 has one or more buttons 232 and one or more indicators 234, which allow the user to operate and assess the operation of the system 100. For example, the buttons may include a start button to begin pumping, a stop button to stop pumping, a prime button to prime the system with a fluid injectate and purge out air, or a temporary pause button. Other data entry keys are also possible. The cassette 116 may include one or more interface components 248. For example, a resistor, whose value the pump base 200 is able to measure via contacts 247, 249 when the cassette 116 is attached to the pump base. This allows the pump base to determine the appropriate parameter for operating a specific model of the system 100. For example, a first resistor having a first resistance may be used with a first model and a second resistor having a second resistance may be used with another model. Alternatively, the interface component 248 may

incorporate an RFID chip, such as a read RFID chip or a read/write RFID chip. This may allow specific data (pump operating pressures, RPM of motor output, etc.) to be recorded within the pump base or to connected hardware and identified for each patient.

[0055] FIG. 15 and 16 illustrate the cassette 116 with most of its internal components visible. FIG. 16 is a sectional view of the cassette 116. The cassette 116 comprises an internal supply cylinder 252 and an internal injection cylinder 254, which are cylindrical cavities extending within the cassette 116. The piston 210 includes a supply side shaft 256 and an injection side shaft 258, the supply side shaft 256 including an o-ring 266 for sealably interfacing with the supply cylinder 252 and the injection side shaft 258 including an o-ring 268 for sealably interfacing with the injection cylinder 254. Each of the o-rings 266, 268 are within a cylindrical groove 290, 292 around each respective shaft portion 256, 258. An internal ball valve 272 (FIG. 16) stops injectate (saline) from flowing through an internal channel 274 in the supply side shaft 256 of the piston 210 when the piston 210 moves in a first direction 276, but the internal ball valve 272 allows injectate to flow through the internal channel 274 and through an internal channel 282 in the injection side shaft 258 when the piston 210 moves in a second direction 278. The ball valve 272 is axially held between a spherical annular recess 284 in the interior of the supply side shaft 256 and a recess having thru channels 286 in the injection side shaft 258. The supply side shaft 256 and the injection side shaft 258 may be held together with a threaded connection 288. When the piston 210 moves in the first direction 276, the injection side shaft 258 of the piston 210 and o-ring 268 force injectate through the injection tube 152. A protective tube 280 is shown over the injection tube 152. In FIG. 15, the injection side shaft 258 is shown at the bottom of an injection pulse. Injectate is filtered through an in-line filter 262, which may be a 40 to 50 micron filter, having an approximate thickness of 0.762 mm (0.030 inches). The in-line filter 262 is configured to keep particulate out of the injectate. Even though injectate is circulated through the aspiration catheter 118, and not into the blood vessel, the filtering provided by the in-line filter 262 is an extra safety step. However, this step helps assure that particulate does not block the small orifice 172 (FIG. 11). When the piston 210 moves in the second direction 278, the supply side shaft 256 of the piston 210 and the o-ring 266 sealably move together within the supply cylinder 252, but the ball valve 272 allows the injectate to pass through the internal channels 274, 282 of the piston 210 and fill the injection cylinder 254. The injectate is able to enter from the supply tube 130 through a

check valve assembly 270 comprising an o-ring 264 and a check valve 250. The check valve 250 allows injectate to enter the interior of the cassette 116 from the supply tube 130, but not to move from the cassette 116 to the supply tube 130. The check valve 250 may be configured so that air, due at least in part to its low viscosity, will not be able to cause the check valve 250 to move (open), thus not allowing air to progress through the system. In some embodiments, the piston 210 may be a single piece (monolithic) design with a bore into which a check-valve is press-fit or bonded. A check valve compatible with this assembly may be supplied by the Lee Company of Westbrook, CT, USA.

[0056] The volume of injectate injected per cycle may range from about 0.02 ml to about 41 ml, or from about 0.04 ml to about 2.0 ml, or about 0.06 ml to about 0.08 ml, or about 0.07 ml. The usable volume (volume that can be injected) of the injection cylinder 254 may be configured to be less than the usable volume (volume that can be filled from) of the supply cylinder 252, in order to assure sufficient filling of the injection cylinder 254. For example, the usable volume of the injection cylinder 254 may be about 0.05 ml to about 0.12 ml, and the usable volume of the supply cylinder 252 may be about 0.07 ml to about 0.16 ml. A usable volume ratio R_U of between about 1.15 and about 2.00, or between about 1.25 and about 1.85, or about 1.40 is contemplated, where:

$R_U = V_{SCU}/V_{ICU}$, wherein:

V_{SCU} = Usable volume of the supply cylinder 252, and

V_{ICU} = Usable volume of the injection cylinder 254.

[0057] A mean flow rate of between about 5 ml/minute and about 100 ml/minute. In some embodiments for use in coronary applications, 20 ml/minute may be desired. In some embodiments for use in peripheral applications, 50 ml/minute may be desired.

[0058] FIG. 18 illustrates a graph 600 of a pressure (P) vs. time (T) curve 602 of a piston pump. Peaks 604 and valley 606 of the curve 602 can be dependent upon the design of the piston and cylinders of the piston pump, particularly of the usable volume ratio R_U . Turning to FIG. 19, a piston 608 is illustrated having a first diameter D_1 and a second diameter D_2 measured at the compressed o-rings 601, 603 (when placed within cylinders 605 and 607 of a cassette 609). The diameters of the cylinders 605, 607 are thus

also defined as diameters D_1 and D_2 . When the diameters D_1 , D_2 , and the lengths of the cylinders 605, 607 are adjusted such that the the usable volume ratio R_U is optimized as previously described, a curve 610 as illustrated in FIG. 20 may be produced. The curve 610 has less-defined peaks 614 and valleys 616, and thus produces less variation of flow amplitude, and a more balanced injection.

[0059] The partially exploded pump base 200 in FIG. 17 illustrates the internal mechanisms for linear (up and down) actuation of the saddle 206, which is attached to a saddle stage 310. A motor 302 is controlled by a circuit board 304 and operated by the user interface 230 (FIG. 12), whose indicators 234 are lit by LEDs 306. The motor 302 turns a cam 316, in which includes a path 330. The saddle stage 310 has a pin 318 extending from its back side. The pin 318 may be press fit, bonded or screwed in place within the saddle stage 310. The saddle stage 310 is secured with screws to two slides 312, 314 through holes 326, 328, such that rotary motion of the cam 316 causes the pin 318 to track along the path 330 of the cam 316, thus causing the saddle stage 310 attached to the slides 312, 314 to slide upward and downward in cyclic motion. The shape of the cam determines the amount of acceleration and deceleration in the motion. Upper posts 322 and lower posts 324 serve as guides and/or stops of the saddle stage 310. The connector 114 of the pressure transducer 106 for measuring vacuum may be plugged into socket 308 (also shown in FIG. 12), and pressure related signals may be processed by the circuit board 304. The entire pump base 200 is reusable.

[0060] The inner contour diameter of the cam 316 may be sized and/or shaped to control the stroke length of the piston 210 and the amount of pulsatility (i.e., the difference between the high and low pressure). In some cases, decreasing the stroke length decreases the amount of pulsatility. In applications within the heart, such as coronary artery applications, lowering the amount of pulsatility can reduce the incidence of bradycardia. To compensate for a lower stroke length, and to maintain a sufficient total flow rate, the speed of the rotation of the cam (i.e. rotations per minute), can be increased, for example by increasing motor output speed, either by gearing or by increased applied voltage.

[0061] Another embodiment of a system for aspirating thrombus 800 is illustrated in FIG.21. The system for aspirating thrombus 800 includes, three major

components: the pump base 200 of FIG. 12, an aspiration catheter 818, and a tubing set 803. The aspiration catheter 818 and the tubing set 803 represent disposable components 801, and the pump base 200 is a reusable component. It is not necessary to sterilize the pump base 200 as it is kept in a non-sterile field or area during use. The aspiration catheter 818 and the tubing set 803 may each be supplied sterile, after sterilization by ethylene oxide gas, electron beam, gamma, or other sterilization methods. The aspiration catheter 818 may be packaged and supplied separately from the tubing set 803, or the aspiration catheter 818 and the tubing set 803 may be package together and supplied together. Alternatively, the aspiration catheter 818 and tubing set may be packaged separately, but supplied together (i.e., bundled). As shown in FIGS. 21 and 22. The aspiration catheter 818 and tubing set 803 share many of the same features as the aspiration catheter 118 and tubing set 103 of FIG. 4, but are configured to allow easier separation from each other, and additional procedural adaptability. The aspiration catheter 818 has a distal end 820 comprising a guidewire tube 832 having a distal tip 836, and a proximal end 819 comprising a y-connector 810. The catheter shaft 842 of the aspiration catheter 818 is connected to the y-connector 810 via a protective strain relief 856. In other embodiments, the catheter shaft 842 may be attached to the y-connector 810 with a luer fitting. The y-connector 810 may comprise a first female luer 851 which communicates with a catheter supply lumen (as in the catheter 118 of FIGS. 4, 8-11), and a second female luer 855 which communicates with a catheter aspiration lumen (as in catheter 118 of FIGS. 4, 8-11).

[0062] Turning to FIG. 23, the tubing set 803 is shown in more detail. A spike 802 for coupling to a fluid source 20 (FIG. 1) allows fluid to enter through extension tubing 822 and a check valve 826, and into supply tube 830. An optional injection port 828 allows injection of materials or removal of air, as described in relation to previous embodiments. A cassette 816 is used in conjunction with the pump base 200, and is similar in structure and function to the cassette 116 in FIGS. 15-16. Fluid is pumped into injection tube 852 from cassette 816. A male luer 854 is configured to attach to the female luer 851 of the y-connector 810.

[0063] Returning to FIG. 21, accessories 857 are illustrated that are intended for applying a vacuum source 22, including a syringe 849 having a plunger 867, to the catheter 818. The syringe 849 is attached to syringe extension tubing 859 via the luer 865

of the syringe 849. A stopcock 847 may be used to hold maintain the vacuum, or the plunger 867 may be a locking variety of plunger. A luer 861 of the syringe extension tubing 859 is connected to an pressure transducer 806, the pressure transducer 806 having a male luer 863 for connection to a connector (e.g., female luer) 804 of vacuum line 808. A male luer 853 at the end of the vacuum line 808 may be detachably secured to the female luer 855 of the y-connector 810 of the aspiration catheter 818. Signals from the pressure transducer 806 are carried through cable 812 to a connector 814. The connector 814 is plugged into the socket 308 (FIG. 12) of the pump base 200. Pressure related signals may be processed by the circuit board 304 of the pump base 200. The pressure transducer 806 may be power from the pump base 200, via cable 812. The accessories 857 may also be supplied sterile to the user.

[0064] In use, the pump base 200 resides outside the sterile field. Because operation of the pump base 200 may be controlled by the presence or absence of a pressure, a user who is working in the sterile field may turn the pump on or off without touching the non-sterile pump base 200. For example, the pump may be started by placing a vacuum on the system (e.g., pulling the plunger 867 of the syringe 849). The pump may in turn be stopped by removing the vacuum on the system (unlocking the plunger 867 of the syringe 849 and allowing to to release, or opening the stopcock 847). The syringe 849 or the combination syringe 849 and stopcock 847 may act as a sterile on/off button of the pump vase 200. Alternatively, the aspiration catheter 818 may be initially used without the pump base 200, with only aspiration being applied to the aspiration lumen. If in certain cases, if the aspiration lumen becomes clogged, the distal end 820 of the aspiration catheter 818 may be backed off of the thrombus, and the pump base 200 and tubing set 803 may be coupled to the aspiration catheter 818, to then operate with forced saline injection, for increased aspiration, and clear the aspiration lumen. This will also help stop any thrombus that is blocking the aspiration lumen from being inadvertently delivered into the blood vessel of the patient.

[0065] FIGS. 24 and 25 illustrate a saline pump drive unit 400 having a completely disposable pump head 500. The saline pump drive unit 400 is configured to be usable with the catheters 16, 118 described herein, or other embodiments of aspiration systems comprising fluid injection. In FIG. 24, a bottom case 402 and a top case 404 having a label 406 are secured together with screws 408. Contained within the bottom

case 402 and top case 404 are a battery pack 410 and an electronic control module 412. A battery cover 416 holds the battery pack 410 in place. In some embodiments, the battery pack 410 may supply a voltage of 18 Volts DC, but systems utilizing other voltages are possible. A user interface 414 enables operation of the saline pump drive unit. A vacuum bottle sleeve 418 may be used when a vacuum bottle is incorporated as the vacuum source 22. A spike 420 is connectable to a fluid source 20, and fluid injectate passes from the fluid source 20 through extension tubing 422 to a disposable piston pump head 500. Saline may be primed through the system by an automatic priming (“self-priming”) system described herein in relation to prior embodiments, or may be primed by gravity from a saline bag that is located (for example on an IV pole) above the rest of the system. A valve on the lowest portion of the system may be opened in order to prime the entire system.

[0066] As illustrated in FIG. 25, the disposable piston pump head 500 is configured to couple to a motor shaft 504 of a motor 502, that is powered by the battery pack 410 of the saline pump drive unit 400. A motor plate 506 and a main body 508 of the disposable piston pump head 500 are secured to each other with screws 510, and hold the internal components of the disposable piston pump head 500. First and second follower plates 512, 514 are held together with screws 516 and bosses 518 extending from the first follower plate 512. The first and second follower plates 512, 514 rotatably hold a cam 520. The cam may be assymetric (as illustrated) or alternatively may be symmetric. The asymmetry may be incorporated in order to control the amount of noise in the pump, the contours serving to customize the shape of the pressure wave, and of the function of the pump. First and second bushings 522, 524 are rotatably held on first and second pins 526, 528. The pins 526, 528 insert into cylindrical cavities 530, 532 in each of the follower plates 512, 514.

[0067] In use, a user attaches the disposable piston pump head 500 to the motor 502 of the saline pump drive unit 400 by bringing the motor plate 506 close to the motor shaft 504 so that a d-shaped hole 534 in the cam 520 can be pressed over the d-shaped motor shaft 504. Alternatively, the d-shapes may be other non-circular shapes, including, but not limited to elliptical, oval, or rectangular. In operation the motor 502 turns the motor shaft 504, which in turn turns the cam 520. The cam 520 turns, forcing the bushings 522, 524 to push the first and second follower plates 512, 514 back and forth in

a first direction 536 and a second direction 538. A saddle 544 is carried on the second follower plate 514, and a piston 210 may be coupled to the saddle 544 in the same manner as described herein with other embodiments. A supply cylinder 552 and an injection cylinder 554 in the main body 508 are analogous to the supply cylinder 252 and injection cylinder 254 of the cassette 116 of the system 100. The piston 210 of the cassette 116 may be used in the disposable piston pump head 500. The labelled components related to the piston 210 in FIG. 25 are similar to those described in relation to the piston 210 in FIGS. 15 and 16. The outer diameter of the cam 520 may be sized and/or shaped to control the stroke length of the piston 210 and the amount of pulsatility (i.e., the difference between the high and low pressure). In some cases, decreasing the stroke length decreases the amount of pulsatility. In applications within the heart, such as coronary artery applications, lowering the amount of pulsatility can reduce the incidence of bradycardia. To compensate for a lower stroke length, and to maintain a sufficient total flow rate, the speed of the rotation of the cam (i.e. rotations per minute), can be increased, for example by increasing motor output speed, either by gearing or by increased applied voltage. A vacuum spike 546 is used for coupling to the vacuum source 22, for example a vacuum bottle held within the vacuum bottle sleeve 418. A vacuum switch valve 540, which is activated against the bias of a spring 542, may be used to allow pump activation. For example, the electronic control module 412 may be configured to initiate the operation of the motor 502 automatically when the vacuum switch valve 540 sends a signal corresponding to movement of the vacuum switch valve 540, which occurs when a significant vacuum is achieved. This control may be instead of or in addition to control from a vacuum pressure transducer, such as pressure transducer 106. The turning on of the vacuum may thus be used to simultaneously turn on the motor 502, so that a single input begins the operation of the saline pump drive unit 400. Additionally, a vacuum source 22 may be controlled by the electronic control module 412 (for example, by opening or closing a solenoid), when a minimum injectate pressure is measured by an additional pressure transducer. For example, when a pressure of about 0.62 megapascal (90 pounds per square inch) or greater is measured, the vacuum may be activated or communicated to the system. An advantage of the saline pump drive unit 400 is that the user is required only to assemble a single component onto the shaft 504 of the motor 502.

[0068] As previously described, the systems according to any of the embodiments of the present invention may be configured such that active flow of saline

(or other) injectate is not possible without concurrent vacuum being applied for aspiration. Also, the systems may be configured such aspiration is not possible without saline (or other) injectate flow. The systems according to any of the embodiments of the present invention may be configured such that current driving the pump (for example the current driving the motor 302, 502) is monitored, or by any alternative monitoring method, such that when a change in condition occurs, for example, air in the injection system, or clogs in any of the catheter lumens or extension tubes, or leaks within the system, the system shuts down, in order to avoid events such as injection of air into the blood vessels, or catheter or system failure.

[0069] FIG. 26 illustrates an aspiration catheter 700 inserted within a blood vessel 165. The aspiration catheter 700 includes a guidewire lumen 702 secured to the distal end 704 of the aspiration catheter 700 which allows the aspiration catheter 700 to be tracked over a guidewire 706. A supply lumen 708 is secured within an aspiration lumen 710. The supply lumen 708 extends through a tapering tube 712. In some embodiments, the tapering tube 712 may be constructed of polyimide. In some embodiments, the tapering tube 712 may have a luminal inner diameter that tapers from its proximal end to its distal end. For example, in some embodiments, the luminal inner diameter may taper from about 0.3937 mm (0.0155 inches) to about 0.2794 mm (0.011 inches). The supply lumen 708 extends generally parallel to the aspiration lumen 710, however a distal end 714 of the tapering tube 712 curves towards an interior wall surface 716 of the aspiration lumen 710, thus allowing an open end 718 of the supply lumen 708 to act as an orifice for applying a spray pattern 720. The open end 718 of the supply lumen 708 may further promote a jet or spray effect by having an internal diameter that is less than about 0.203 mm (0.008 inches). In some embodiments, the open end 718 of the supply lumen 708 may have an internal diameter that is between about 0.076 mm (0.003 inches) and about 0.102 mm (0.004 inches). The center of the open end 718 orifice may in some embodiments be about 0.3302 mm (0.013 inches) to about 0.4826 mm (0.019 inches) proximal to the most proximal portion 724 of the open distal end 722 of the aspiration lumen 710, as illustrated by distance D in FIG. 26. The most distal portion 726 of the open distal end 722 of the aspiration lumen 710 is slightly distal of the most proximal portion 724 in the embodiment illustrated, and thus has an angled skive, but the skive angle A_s is not severe. A skive angle A_s of between about 75° and about 89° , or between about 80° and about 85° may be used, in order to allow a large portion of

thrombus being pulled into the open distal end 722 of the aspiration lumen 710 to be struck by high velocity exiting jet (e.g. saline) flow, as illustrated with the spray pattern 720.

[0070] FIG. 27 illustrates the catheter 700 of FIG. 26 being utilized to deliver a drug 730 to a target site 732 within a blood vessel 165. The target site 732 may include an atherosclerotic lesion 728 and/or a thrombus 734. Whereas the aspiration of thrombus, as in FIG. 26, involves actively applying a vacuum (e.g., from a vacuum source) on the aspiration lumen 710, the drug delivery illustrated in FIG. 27, though utilizing the same catheter 700, allows the metering of a fine, precision volume flow rate of drug 730 to be delivered into the vessel. This is achieved by having significantly less vacuum applied to the aspiration lumen 710, or no vacuum applied to the aspiration lumen. The precision metering in small, controlled volumes, provides efficient use of typically expensive drugs, with minimal wasted drug. In some embodiments, the drug 730 may be delivered at body temperature. In other embodiments, the drug 730 may be warmed, and delivered at an elevated temperature, for example, to increase the activity and effectiveness of a drug. This may be done, for example, to get a more effective dose, with a smaller volume of drug. In other embodiments, the drug 730 may be cooled and delivered at a reduced temperature (i.e., in relation to the body temperature). The drug 730 may be cooled to control the activity level, or to delay the activity of the drug (e.g., so that it is active downstream, at a location that is not reachable by the catheter 700). In some cases, the drug 730 may be cooled in order to apply a conjunctive therapeutic cooling effect on the tissue being treated. In some cases, the therapeutic cooling effect may be achieved from cooled saline or other aqueous non-drug media alone.

[0071] Some of the drugs 730 which may be delivered include thrombolytic agents (clot busting drugs), such as streptokinase, tissue plasminogen activator (t-PA), recombinant or genetically-engineered tissue plasminogen activator, tenecteplase (TNK), urokinase, staphylokinase, and reteplase. Alternatively, stem cells or “cocktails” containing stem cells may be delivered. In some cases, glycoprotein inhibitors (GPI’s) may be injected through the supply lumen 708 of the aspiration catheter 700. Saline or other aqueous solutions may be delivered alone for selective dilution of blood at the target site 732. In some applications, a solution may be used which is capable of exhibiting a phase change, for example, when its pressure or temperature is changed. In these

applications, a liquid may be injected that becomes a gas when exiting from a small orifice, for example at the open end 718 of the supply lumen 708. Alternatively, a gas may be injected that becomes a liquid when being force through a small orifice, such as the open end 718 of the supply lumen 708. In any of the applications in which drugs 730 or other materials are injected intravascularly through the catheter 700, the injection of the drugs 730 or other materials may occur before, during, after, or instead of an aspiration procedure. Returning to the aspiration catheter 818 of FIGS 21-22, if, during an aspiration procedure, it is desired to deliver drugs down the supply lumen and into the vessel, the tubing set 803 may be removed from the aspiration catheter 818 by disconnecting the male luer 854 of the tubing set 803 from the female luer 851 of the aspiration catheter 818, and the drug may be injected directly into the supply lumen at the female luer 851, for example, by a syringe or metering system, including a syringe/syringe pump combination. By also removing the vacuum source from the female luer 855 of the aspiration catheter 818, when aspiration lumen now serves as an overflow, so that the fluid being delivered into the patient (e.g., intravascularly) is maintained at a controlled rate. The volume of the supply lumen is relatively very small, so only a small volume of drug is needed to fill the supply lumen, and thus reach the distal top of the aspiration catheter 818. This, at the end of the procedure, very little drug is wasted, or needs to be disposed, allowing for a very cost-effective procedure.

[0072] In the embodiments described herein, a sterile fluid path is provided extending all the way from the fluid source 20 to the distal opening 40/open distal end 158 of the catheter 16, 118. In both the embodiments of the system 100 of FIGS. 4-17, the system 800 of FIGS. 21-23, and the embodiments of FIGS. 24-25, a disposable catheter and disposable pump set are configured to be supplied sterile, and coupled to a non-sterile (reusable) pump base 200 or pump motor 502. These combinations allow for reusability of the more expensive components, and for reusability (and maximized sterility) of the less expensive components, thus maximizing cost containment and patient safety at the same time.

[0073] In some cases, parts or all of the devices described herein may be doped with, made of, coated with, or otherwise include a radiopaque material. Radiopaque materials are understood to be materials capable of producing a relatively bright image on a fluoroscopy screen or another imaging technique during a medical procedure. Some

examples of radiopaque materials can include, but are not limited to, gold, platinum, palladium, tantalum, tungsten alloy, polymer material loaded with a radiopaque filler, and the like. One or more hydrophilic or hydrophobic lubricious coatings may be used in order to improve trackability of the aspiration catheter 118 through the blood vessels.

[0074] In some instances, a degree of MRI compatibility may be imparted into parts of the devices described herein. For example, to enhance compatibility with Magnetic Resonance Imaging (MRI) machines, it may be desirable to make various portions of the devices described herein from materials that do not substantially distort MRI images or cause substantial artifacts (gaps in the images). Some ferromagnetic materials, for example, may not be suitable as they may create artifacts in an MRI image. In some cases, the devices described herein may include materials that the MRI machine can image. Some materials that exhibit these characteristics include, for example, tungsten, cobalt-chromium-molybdenum alloys (e.g., UNS: R30003 such as ELGILOY®, PHYNOX®, and the like), nickel-cobalt-chromium-molybdenum alloys (e.g., UNS: R30035 such as MP35-N® and the like), nitinol, and the like, and others.

[0075] In some instances, some of the devices described herein may include a coating such as a lubricious coating or a hydrophilic coating. Hydrophobic coatings such as fluoropolymers provide a dry lubricity. Lubricious coatings improve steerability and improve lesion crossing capability. Suitable lubricious polymers are well known in the art and may include silicone and the like, hydrophilic polymers such as high-density polyethylene (HDPE), polytetrafluoroethylene (PTFE), polyarylene oxides, polyvinylpyrrolidones, polyvinylalcohols, hydroxy alkyl celluloses, algins, saccharides, caprolactones, and the like, and mixtures and combinations thereof. Hydrophilic polymers may be blended among themselves or with formulated amounts of water insoluble compounds (including some polymers) to yield coatings with suitable lubricity, bonding, and solubility.

[0076] In one embodiment of the present invention, a system for aspirating thrombus includes an aspiration catheter having a high pressure supply lumen and an aspiration lumen, the supply lumen having a proximal end configured to attach to a piston pump and a closed distal end, the aspiration lumen having a proximal end configured to attach to a vacuum source and an open distal end; a first orifice in a side wall of the

supply lumen which communicates directly with the interior of the aspiration lumen, the first orifice located proximal to the open distal end of the aspiration lumen and adjacent the closed distal end of the supply lumen; the piston pump configured to generate a cyclic pressure cycle when attached to the supply lumen, wherein the first orifice creates a spray pattern at least in conjunction with a peak of the piston pump pressure cycle such that the spray pattern impinges on an interior wall of the aspiration lumen when a distal end of the aspiration catheter is immersed within an environment having a temperature of between about 36°C and 38°C, such that the spray is at an angle of between about 20° in each direction of the vertical midline of the aspiration lumen.

[0077] In another embodiment of the present invention, a system for aspirating thrombus includes an aspiration catheter having a high pressure supply lumen and an aspiration lumen, the supply lumen having a proximal end configured to attach to a piston pump and a closed distal end, the aspiration lumen having a proximal end configured to attach to a vacuum source and an open distal end; a first orifice in a side wall of the supply lumen which communicates directly with the interior of the aspiration lumen, the first orifice located proximal to the open distal end of the aspiration lumen and adjacent the closed distal end of the supply lumen; the piston pump configured to generate a cyclic pressure cycle when attached to the supply lumen, wherein the first orifice creates a spray pattern at least in conjunction with a peak of the piston pump pressure cycle such that the spray pattern impinges on an interior wall of the aspiration lumen when a distal end of the aspiration catheter is immersed within an environment having a temperature of between about 36°C and 38°C; a disposable cassette having a supply cylinder, an injection cylinder and a piston, the disposable cassette configured to releasably couple to at least a motor of the piston pump, the piston configured to actuate into the supply cylinder while actuating out of the injection cylinder, causing the injection cylinder to increase its volume of a liquid injectate, the piston further configured to actuate into the injection cylinder while actuating out of the supply cylinder, causing the injection cylinder to decrease its volume by injecting the liquid injectate, and causing the liquid injectate to travel through the supply lumen of the aspiration catheter.

[0078] In another embodiment of the present invention, a system for aspirating thrombus includes an aspiration catheter having a high pressure supply lumen and an aspiration lumen, the supply lumen having a proximal end configured to attach to a piston

pump and a closed distal end, the aspiration lumen having a proximal end configured to attach to a vacuum source and an open distal end; a first orifice in a side wall of the supply lumen which communicates directly with the interior of the aspiration lumen, the first orifice located proximal to the open distal end of the aspiration lumen and adjacent the closed distal end of the supply lumen; the piston pump configured to generate a cyclic pressure cycle when attached to the supply lumen, wherein the first orifice creates a spray pattern at least in conjunction with a peak of the piston pump pressure cycle such that the spray pattern impinges on an interior wall of the aspiration lumen when a distal end of the aspiration catheter is immersed within an environment having a temperature of between about 36°C and 38°C; wherein the piston pump includes a supply cylinder, an injection cylinder and a piston, the piston configured to actuate into the supply cylinder while actuating out of the injection cylinder, causing the injection cylinder to increase its volume of a liquid injectate, the piston further configured to actuate into the injection cylinder while actuating out of the supply cylinder, causing the injection cylinder to decrease its volume by injecting the liquid injectate, and causing the liquid injectate to travel through the supply lumen of the aspiration catheter; wherein the piston is configured to engage with a saddle associated with the piston pump, the saddle configured for cyclic linear motion, wherein motion of the saddle in a first direction actuates the piston out of the supply cylinder and motion of the saddle in a second direction actuates the piston into the supply cylinder.

[0079] In another embodiment of the present invention, a system for aspirating thrombus includes an aspiration catheter having a high pressure supply lumen and an aspiration lumen, the supply lumen having a proximal end configured to attach to a piston pump and a closed distal end, the aspiration lumen having a proximal end configured to attach to a vacuum source and an open distal end; a first orifice in a side wall of the supply lumen which communicates directly with the interior of the aspiration lumen, the first orifice located proximal to the open distal end of the aspiration lumen and adjacent the closed distal end of the supply lumen; the piston pump configured to generate a cyclic pressure cycle when attached to the supply lumen, wherein the first orifice creates a spray pattern at least in conjunction with a peak of the piston pump pressure cycle such that the spray pattern includes a jet; wherein the piston pump includes a supply cylinder, an injection cylinder and a piston, the piston configured to actuate into the supply cylinder while actuating out of the injection cylinder, causing the injection cylinder to increase its

volume of a liquid injectate, the piston further configured to actuate into the injection cylinder while actuating out of the supply cylinder, causing the injection cylinder to decrease its volume by injecting the liquid injectate, and causing the liquid injectate to travel through the supply lumen of the aspiration catheter; wherein a usable volume ratio R_U between the supply cylinder and the invention cylinder is between about 1.15 and about 2.00. Additionally, the usable volume ratio R_U may be between about 1.25 and about 1.85. Additionally, the usable volume ratio R_U may be about 1.40.

[0080] In another embodiment of the present invention a method for delivery of a drug includes providing a catheter including a supply lumen and an aspiration lumen, the supply lumen having a distal end, the aspiration lumen configured to couple to a vacuum source and having an interior wall surface, and an open distal end, an orifice at or near the distal end of the supply lumen, in fluid communication with the interior of the aspiration lumen, the orifice located proximally of the open distal end of the aspiration lumen, wherein the orifice is configured to create a spray pattern when pressurized fluid is pumped through the supply lumen such that the spray pattern impinges on the interior wall surface of the aspiration lumen when a distal end of the aspiration catheter is immersed within an aqueous environment, providing a disposable tubing set having a first conduit configured to couple the supply lumen of the catheter to a fluid source, and a pump component associated with the first conduit and configured to detachably couple to a drive unit, such that motion from the drive unit is transferred to the pump component such that resultant motion of the pump component causes fluid from the fluid source to be injected through the supply lumen of the catheter, and through the orifice into the aspiration lumen, coupling the supply lumen of the catheter to a fluid source, wherein the fluid source contains at least a first drug for intravascular delivery, inserting the catheter within a blood vessel of a patient and advancing the catheter to a target site, coupling the pump component to a drive unit, and operating the drive unit to cause the pump component to inject at least some of the first drug in the region of the target site.

[0081] It should be understood that this disclosure is, in many respects, only illustrative. Changes may be made in details, particularly in matters of shape, size, and arrangement of steps without exceeding the scope of the invention. The scope of the invention is, of course, defined in the language in which the appended claims are expressed.

[0082] While embodiments of the present invention have been shown and described, various modifications may be made without departing from the scope of the present invention. The invention, therefore, should not be limited, except to the following claims, and their equivalents. Embodiments of the present invention are contemplated to have utility in a variety of blood vessels, including but not limited to coronary arteries, carotid arteries, intracranial/cerebral arteries, inferior and superior vena cavae and other veins (for example, in cases of deep venous thrombosis), peripheral arteries, shunts, grafts, vascular defects, and chambers of the heart. This includes, but is not limited to, any vessel having a diameter of about two mm or greater. An aspiration catheter 118 outer diameter of about seven French or less is contemplated for many of the applications, though in certain applications, it may be larger. In some embodiments, an aspiration catheter 118 diameter of about six French or less is contemplated. Embodiments of the present invention may even be used in non-vascular applications, for example body lumens or cavities having material accumulations that need to be macerated and/or removed.

[0083] It is contemplated that various combinations or subcombinations of the specific features and aspects of the embodiments disclosed above may be made and still fall within one or more of the inventions. Further, the disclosure herein of any particular feature, aspect, method, property, characteristic, quality, attribute, element, or the like in connection with an embodiment can be used in all other embodiments set forth herein. Accordingly, it should be understood that various features and aspects of the disclosed embodiments can be combined with or substituted for one another in order to form varying modes of the disclosed inventions. Thus, it is intended that the scope of the present inventions herein disclosed should not be limited by the particular disclosed embodiments described above. Moreover, while the invention is susceptible to various modifications, and alternative forms, specific examples thereof have been shown in the drawings and are herein described in detail. It should be understood, however, that the invention is not to be limited to the particular forms or methods disclosed, but to the contrary, the invention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the various embodiments described and the appended claims. Any methods disclosed herein need not be performed in the order recited. The methods disclosed herein include certain actions taken by a practitioner; however, they

can also include any third-party instruction of those actions, either expressly or by implication.

WHAT IS CLAIMED IS:

1. A system for aspirating thrombus comprising:
an aspiration catheter having a supply lumen and an aspiration lumen, the supply lumen having a wall and a closed distal end, the aspiration lumen configured to couple to a vacuum source and having an interior wall surface, and an open distal end;
an orifice in the wall of the supply lumen, in fluid communication with the interior of the aspiration lumen, the orifice located proximally of the open distal end of the aspiration lumen and adjacent the closed distal end of the supply lumen, wherein the orifice is configured to create a spray pattern when pressurized fluid is pumped through the supply lumen such that the spray pattern impinges on the interior wall surface of the aspiration lumen when a distal end of the aspiration catheter is immersed within an aqueous environment; and
a tubing set having a first conduit configured to couple to the supply lumen of the aspiration catheter to a fluid source, and a pump component associated with the first conduit and configured to detachably couple to a drive unit, such that motion from the drive unit is transferred to the pump component such that resultant motion of the pump component causes fluid from the fluid source to be injected through the supply lumen of the aspiration catheter, and through the orifice into the aspiration lumen.
2. The system of claim 1, wherein the aqueous environment has a temperature of between about 36°C and 38°C.
3. The system of claim 1, wherein the pump component comprises a piston.
4. The system of claim 3, wherein the piston is slidably contained within a supply cylinder and an injection cylinder, the piston configured to actuate into the supply cylinder while actuating out of the injection cylinder, thus causing the injection cylinder to increase its volume of fluid supplied from the fluid source, and wherein the piston is further configured to actuate into the injection cylinder while actuating out of the supply cylinder, thus causing the injection cylinder to decrease its volume by injecting fluid supplied from the fluid source into the supply lumen of the aspiration catheter.
5. The system of claim 4, wherein the piston includes an inner bore having a one-way valve.
6. The system of claim 1, wherein the spray pattern is defined by an angle of between about 1° to about 45° in each direction of the vertical midline of the aspiration lumen.

7. The system of claim 6, wherein the spray pattern is defined by an angle of between about 20° to about 35° in each direction of the vertical midline of the aspiration lumen.

8. The system of claim 1, wherein a usable volume ratio R_U between the supply cylinder and the injection cylinder is between about 1.15 and about 2.00.

9. The system of claim 8, wherein the usable volume ratio R_U between the supply cylinder and the injection cylinder is between about 1.25 and about 1.85.

10. The system of claim 1, wherein the open distal end of the aspiration lumen has a most distal portion and a most proximal portion, and wherein an axial center of the orifice is about 0.3302 mm to about 0.4826 mm proximal to the most proximal portion of the open distal end of the aspiration lumen.

11. The system of claim 1, further comprising a vacuum-activated interface configured to cause the drive unit to start to operate or to remain in an operating condition when a vacuum pressure at the vacuum-activated interface is less than a threshold value, and configured to cause the drive unit to stop or to remain in a non-operating condition when the vacuum pressure at the vacuum-activated interface is greater than the threshold value.

12. The system of claim 11, wherein the vacuum-activated interface comprises a vacuum switch valve.

13. The system of claim 11, wherein the vacuum-activated interface comprises a pressure transducer.

14. The system of claim 1, wherein the open distal end of the aspiration lumen is angled in relation to the longitudinal axis of the aspiration lumen.

15. A system for aspirating thrombus comprising:
an aspiration catheter having a supply lumen and an aspiration lumen, the supply lumen having a distal end, the aspiration lumen configured to couple to a vacuum source and having an interior wall surface, and an open distal end;
an orifice at or near the distal end of the supply lumen, in fluid communication with the interior of the aspiration lumen, the orifice located proximally of the open distal end of the aspiration lumen, wherein the orifice is configured to create a spray pattern when pressurized fluid is pumped through the supply lumen such that the spray pattern impinges on the interior wall surface of the aspiration lumen when a distal end of the aspiration catheter is immersed within an aqueous environment; and

a tubing set having a first conduit configured to couple the supply lumen of the aspiration catheter to a fluid source, and a pump component associated with the first conduit and configured to detachably couple to a drive unit, such that motion from the drive unit is transferred to the pump component such that resultant motion of the pump component causes fluid from the fluid source to be injected through the supply lumen of the aspiration catheter, and through the orifice into the aspiration lumen.

16. The system of claim 15, wherein the supply lumen of the aspiration catheter extends generally parallel to the aspiration lumen, and wherein the distal end of the supply lumen curves towards the interior wall surface of the aspiration lumen.

17. The system of claim 16, wherein the distal end of the supply lumen has an internal diameter that is less than about 0.203 mm.

18. The system of claim 17, wherein the distal end of the supply lumen has an internal diameter that is between about 0.076 mm and about 0.102 mm.

19. The system of claim 16, wherein the open distal end of the aspiration lumen has a most distal portion and a most proximal portion, and wherein an axial center of the orifice is about 0.3302 mm to about 0.4826 mm proximal to the most proximal portion of the open distal end of the aspiration lumen.

20. The system of claim 16, wherein the aqueous environment has a temperature of between about 36°C and 38°C.

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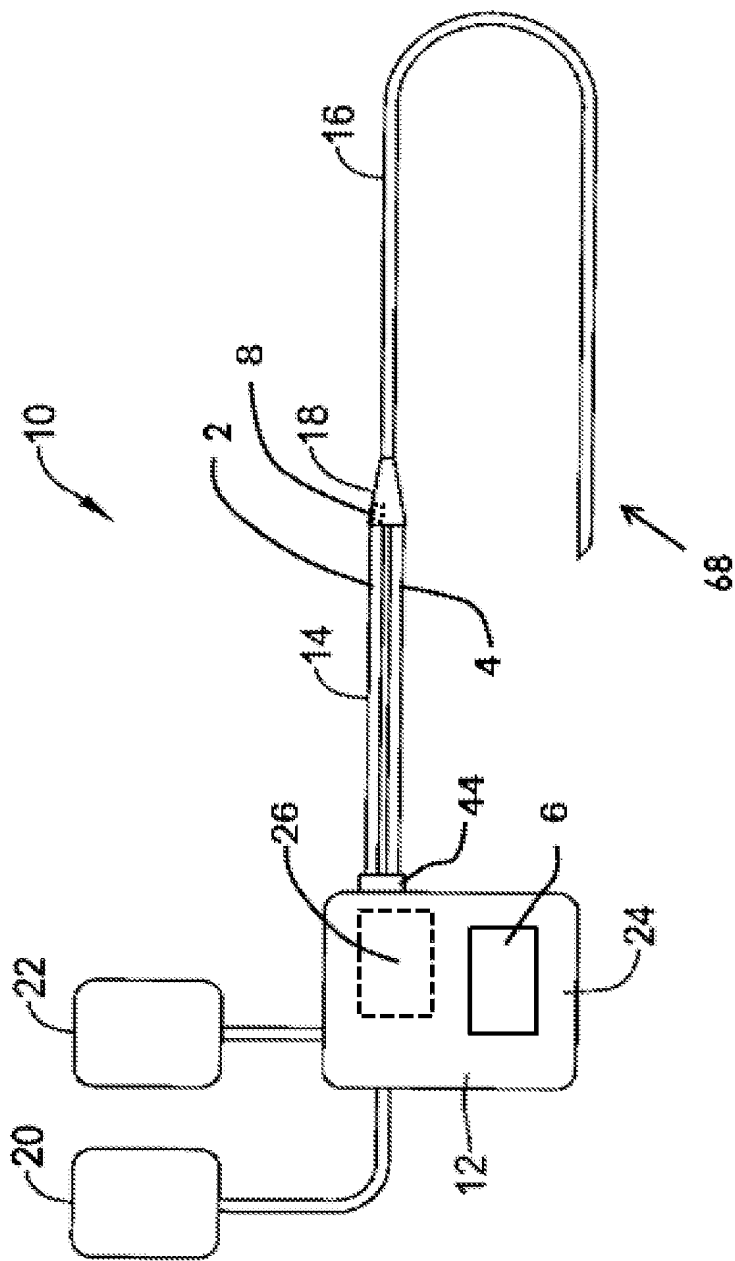


FIG. 1

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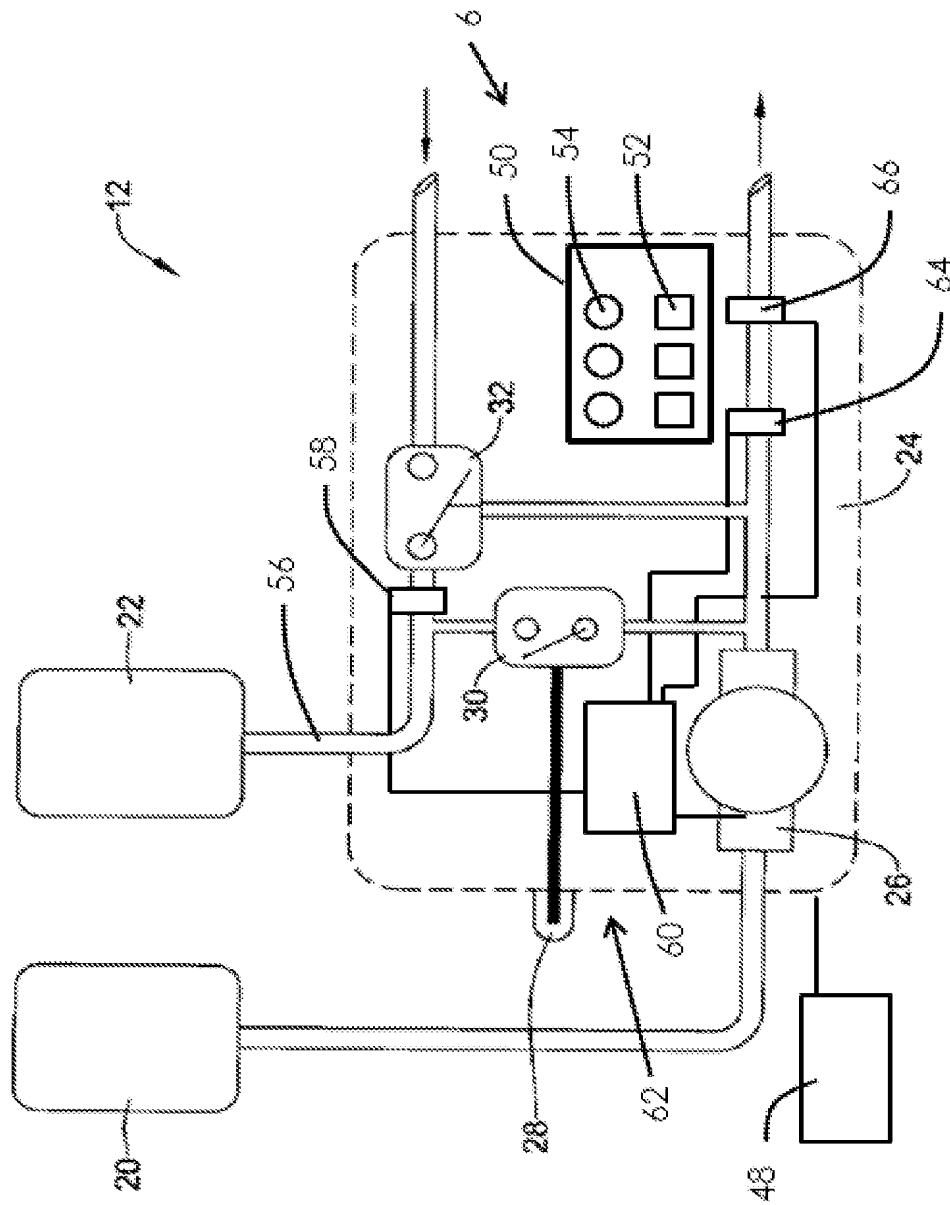


Fig. 2

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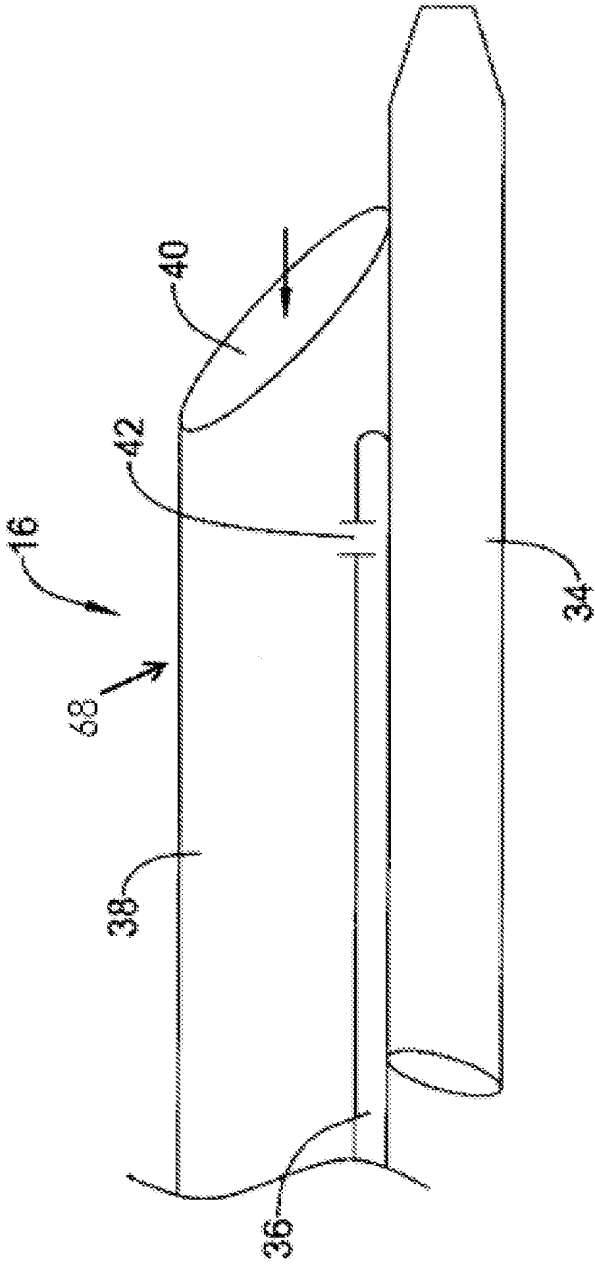


FIG. 3

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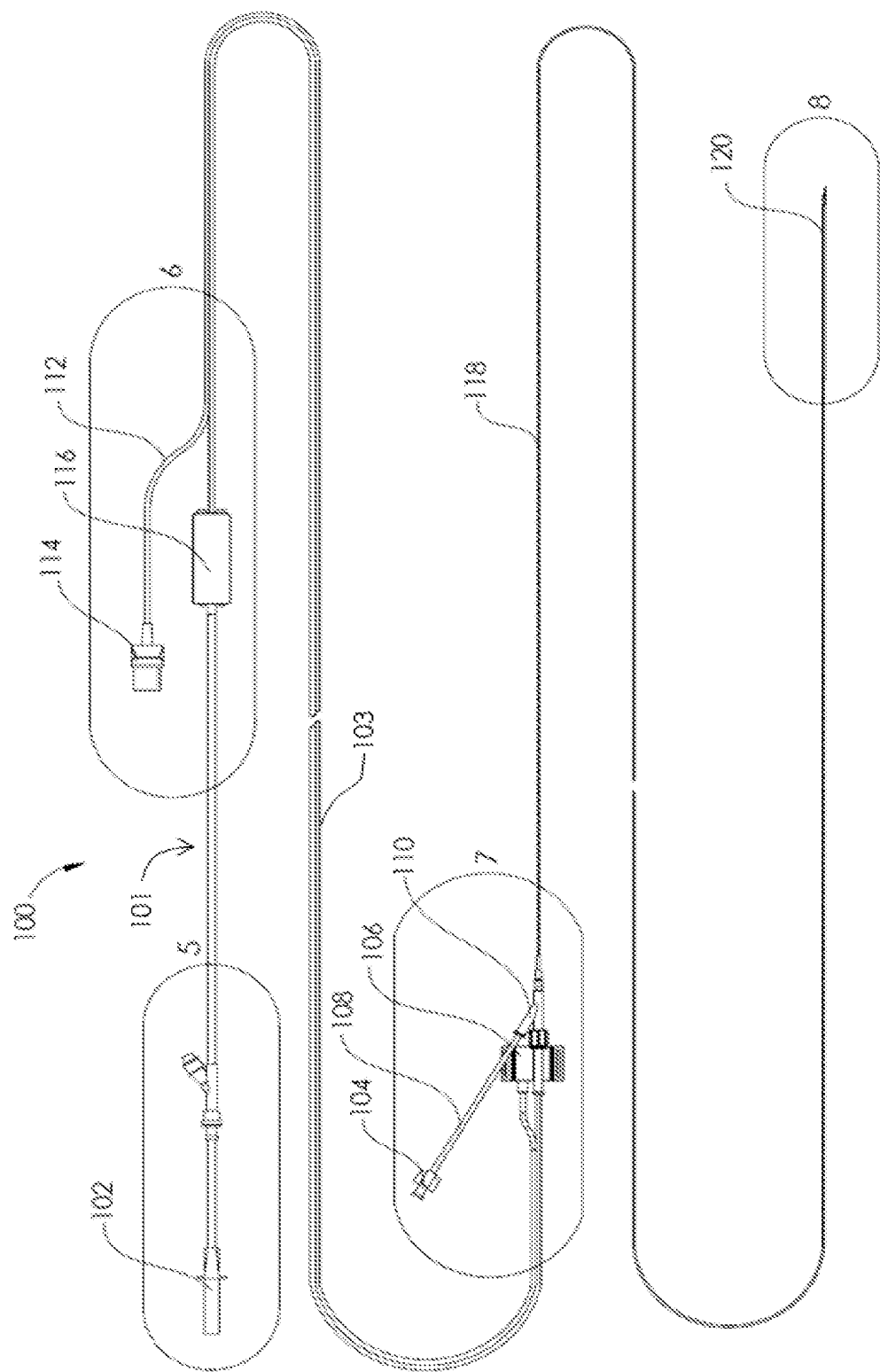


FIG. 4

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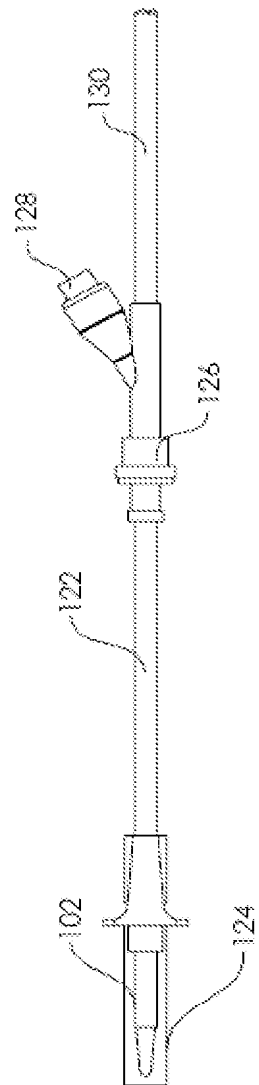


FIG. 5

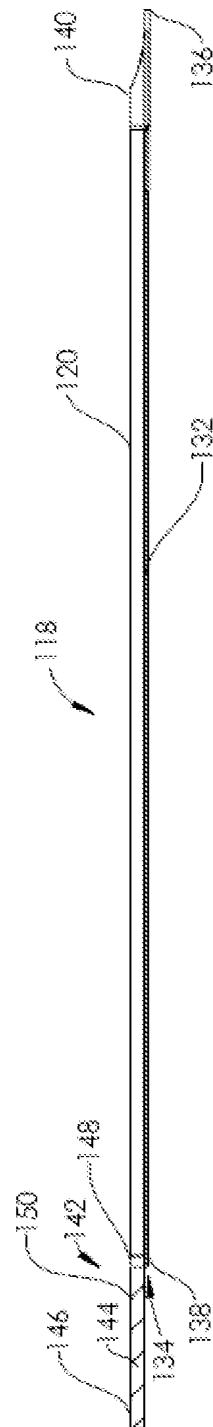


FIG. 8

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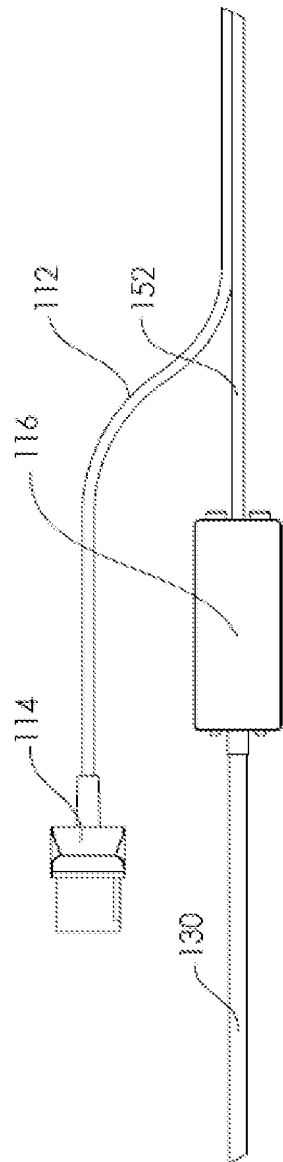


FIG. 6

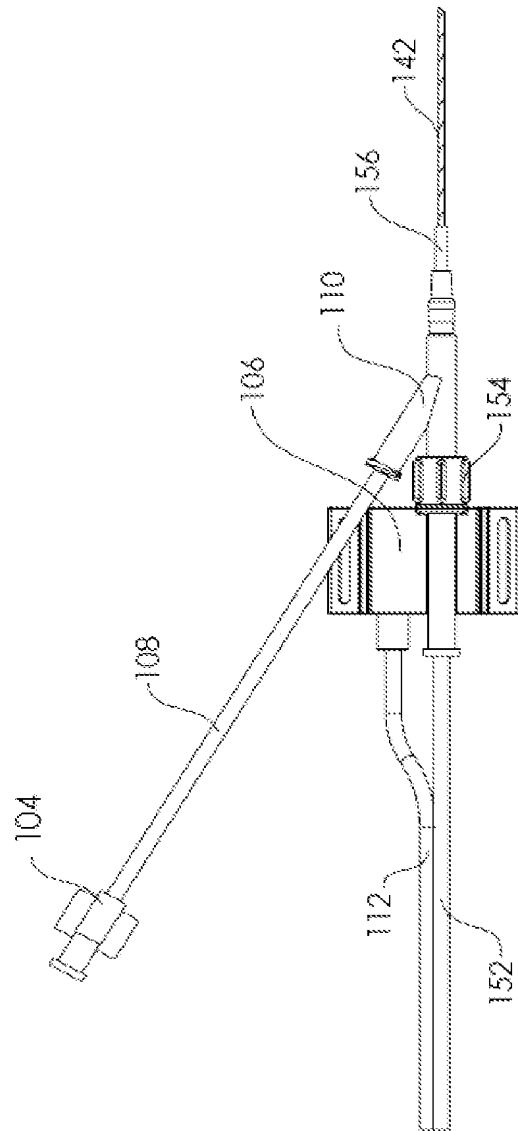
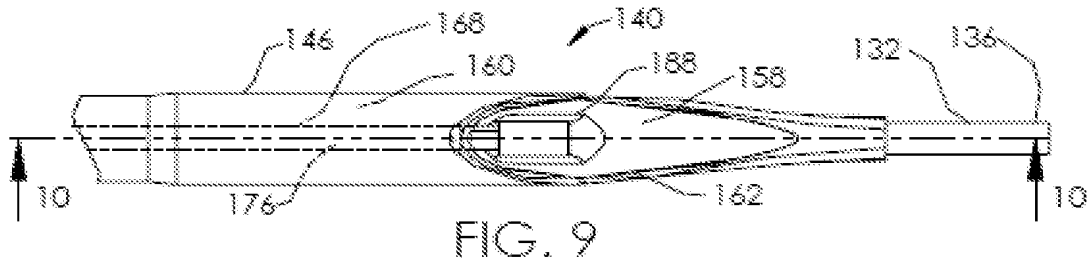
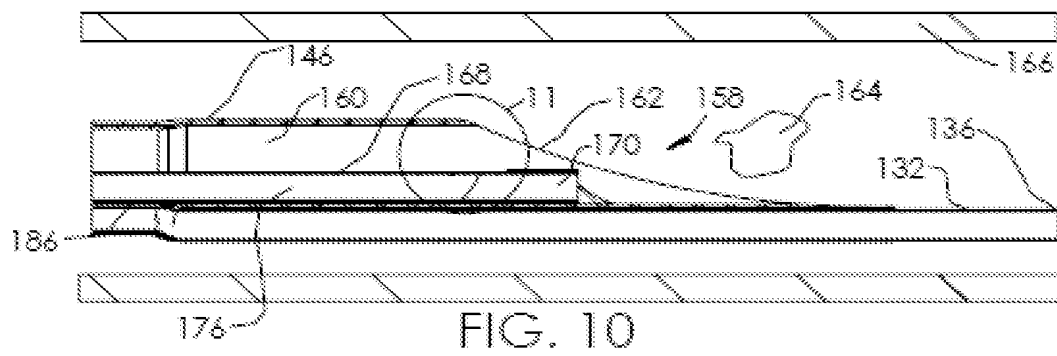
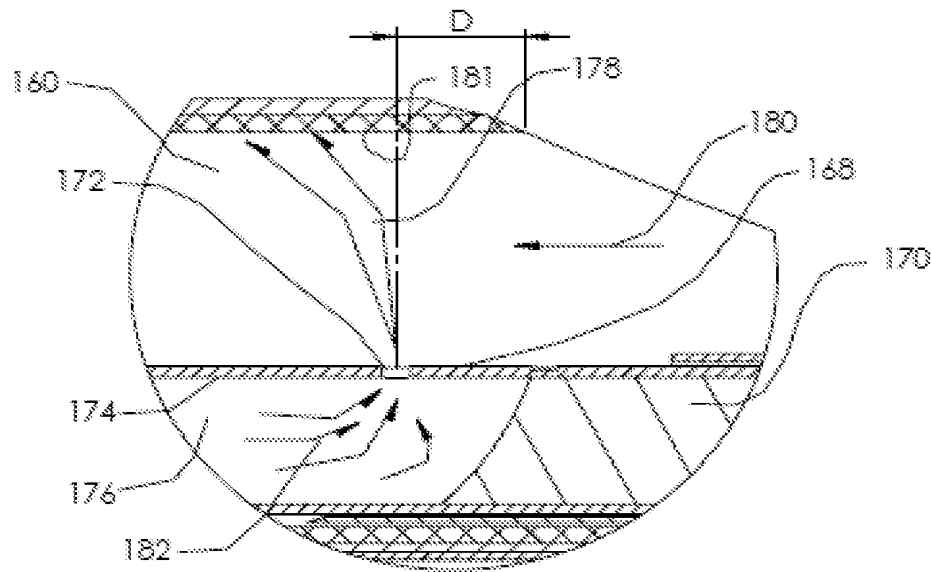


FIG. 7

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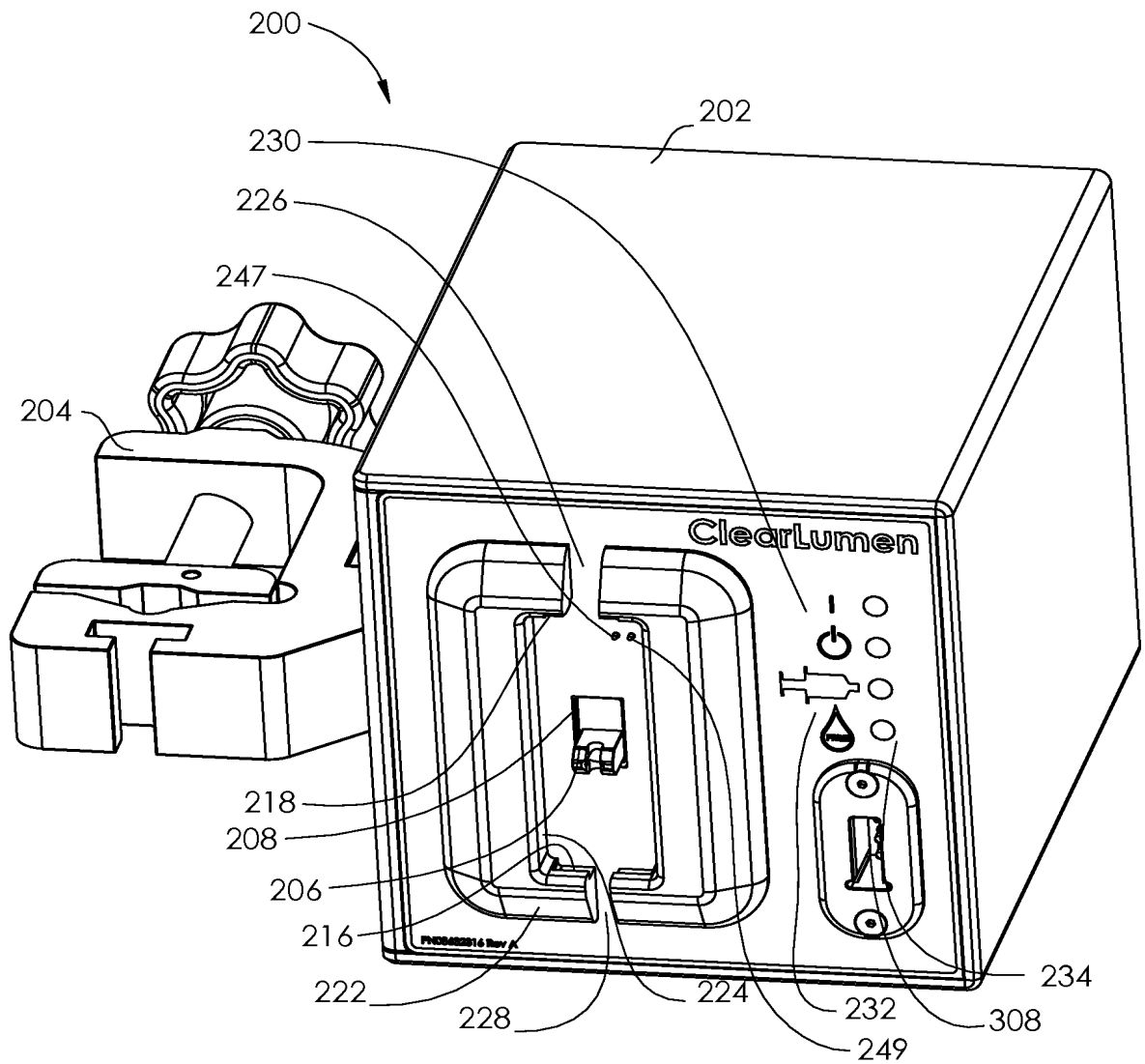
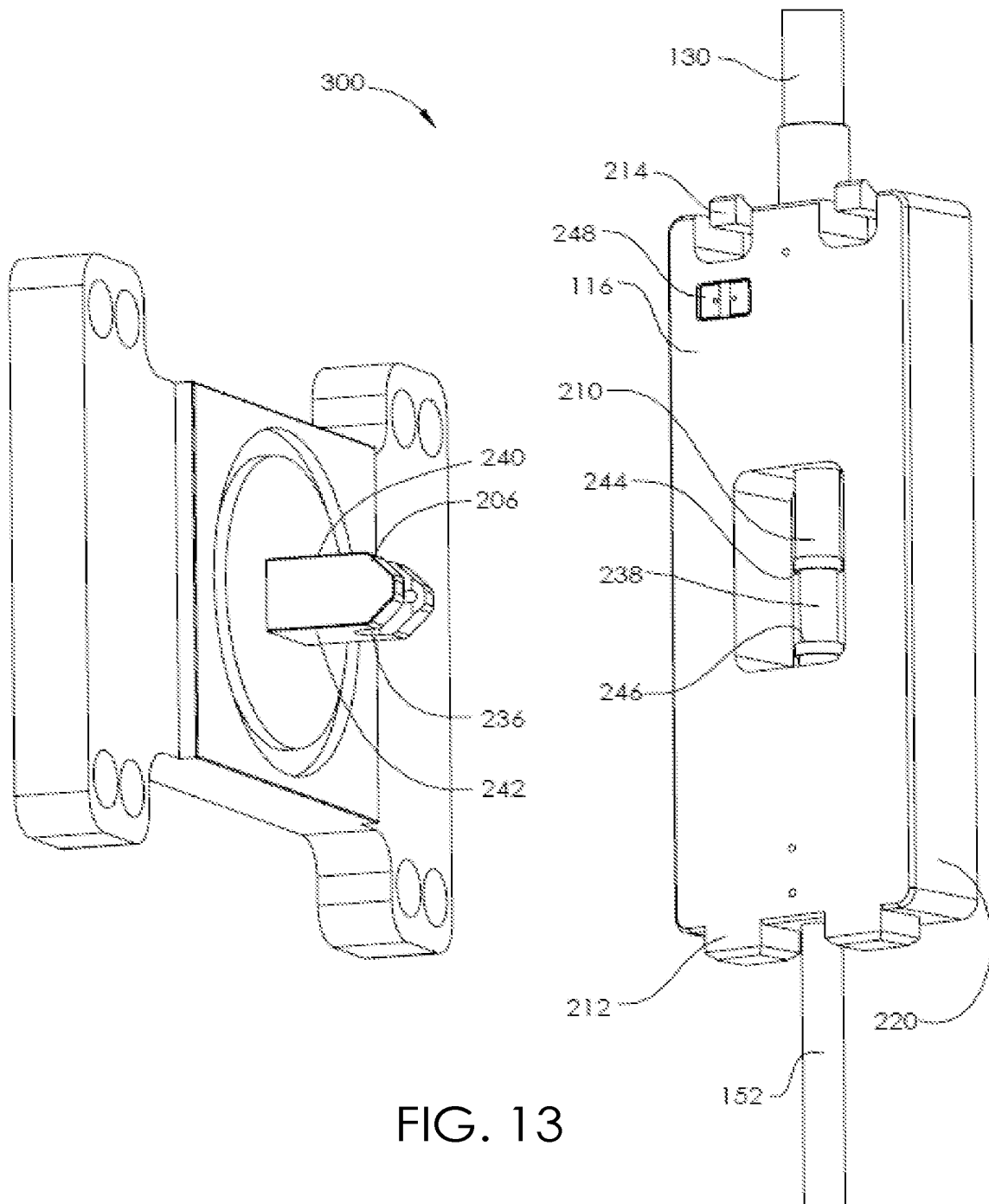


FIG. 12

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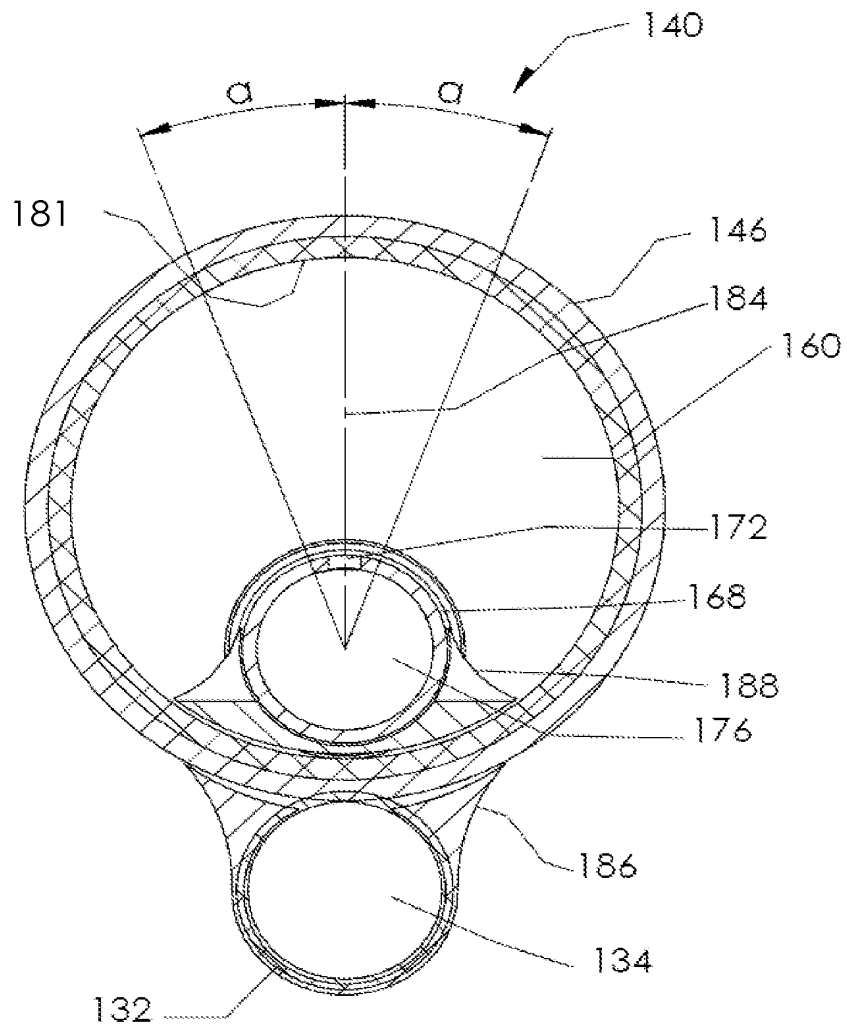


FIG. 14

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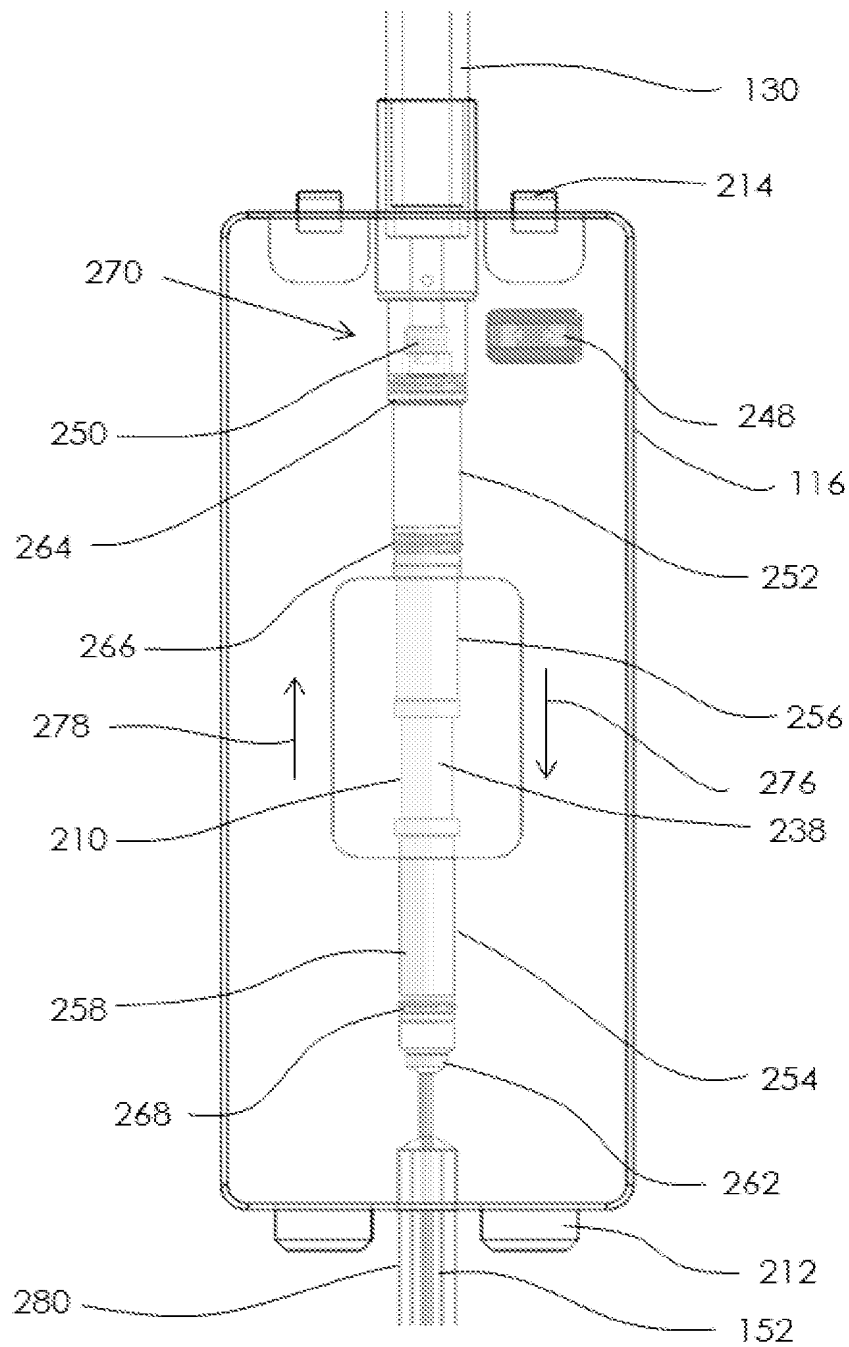


FIG. 15

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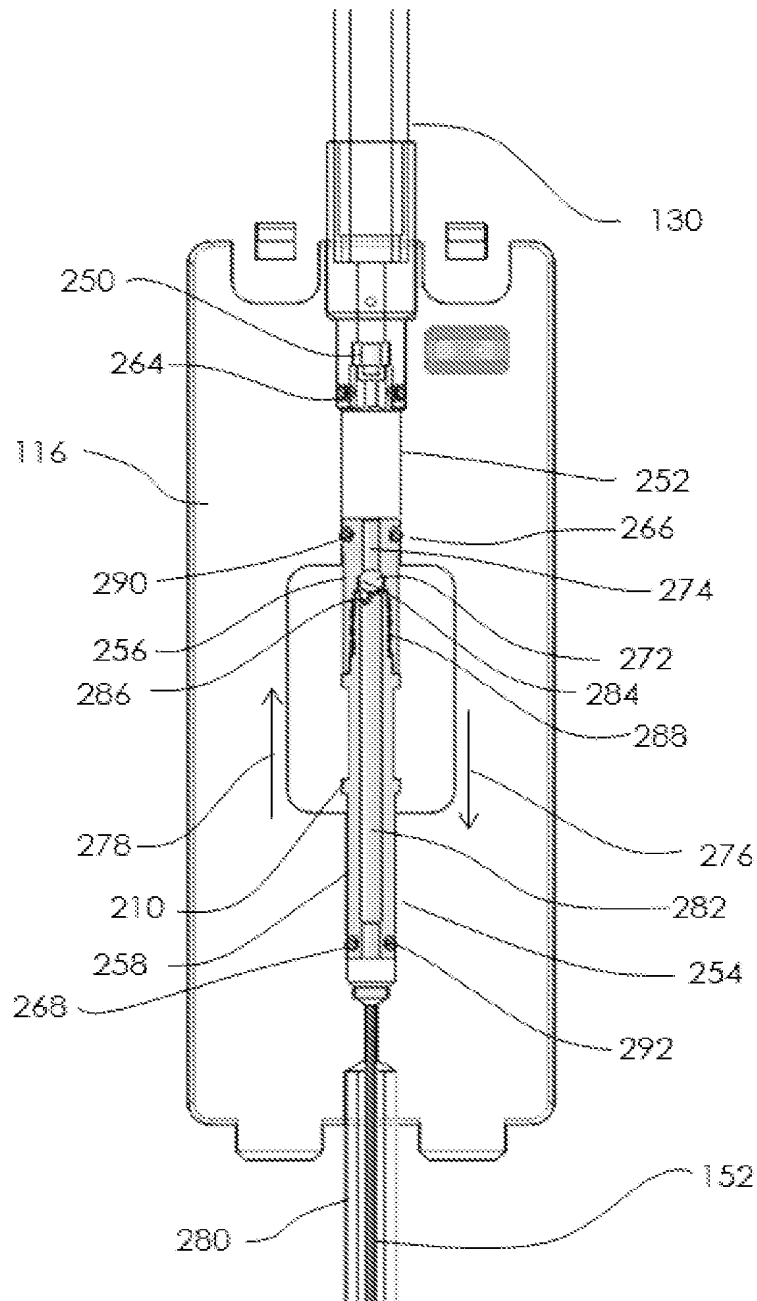


FIG. 16

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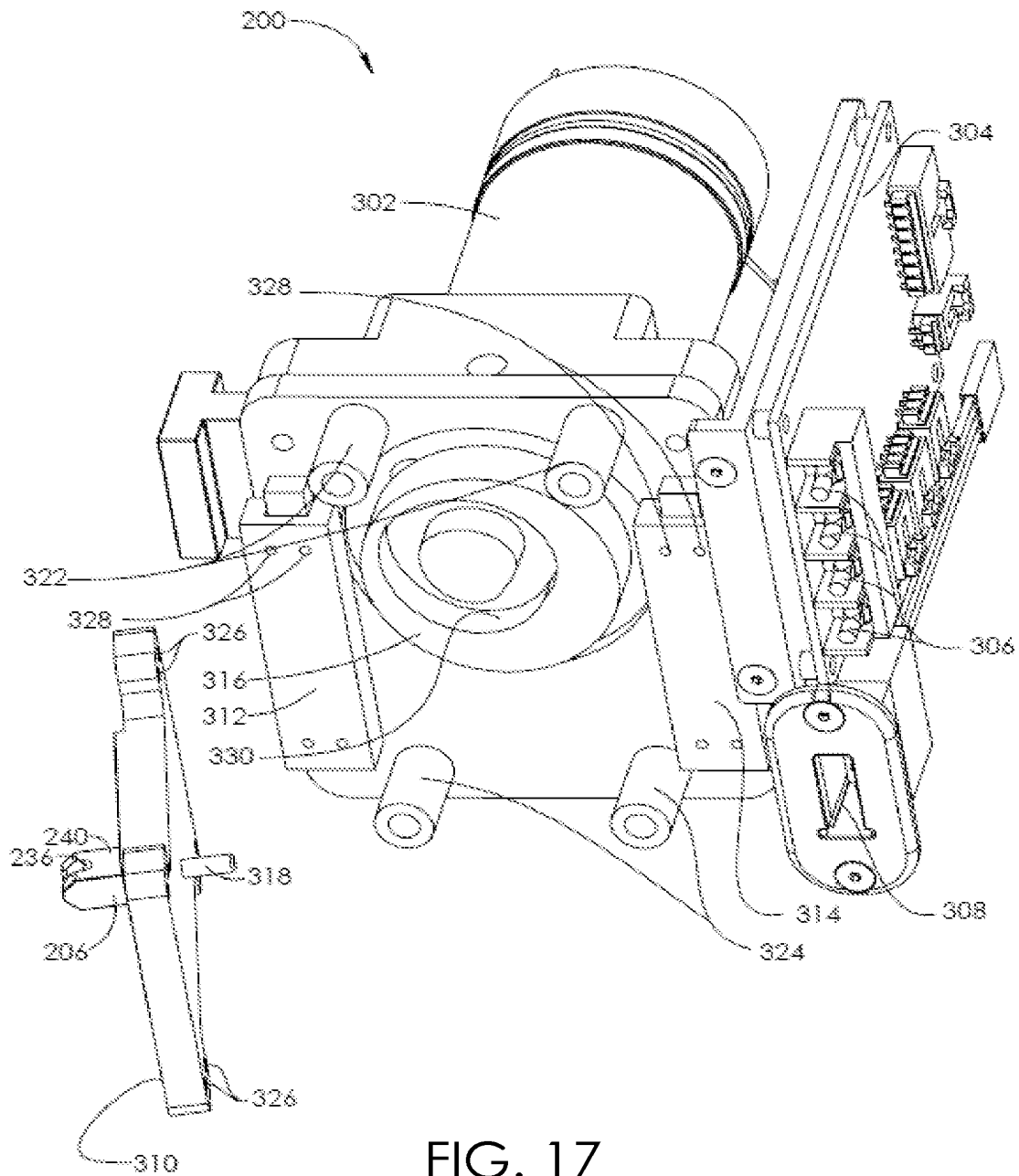


FIG. 17

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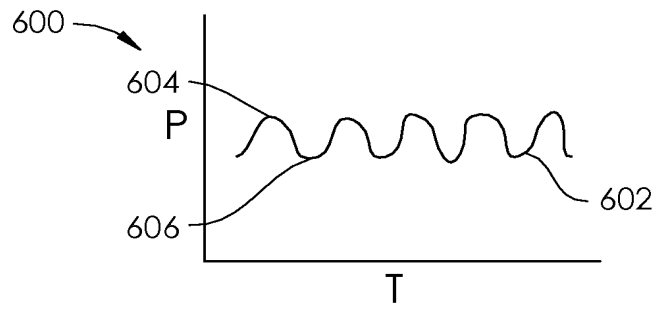


FIG. 18

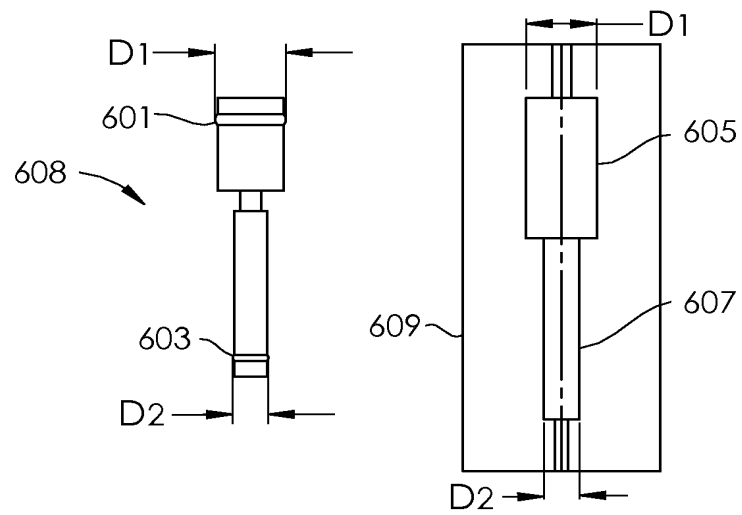


FIG. 19

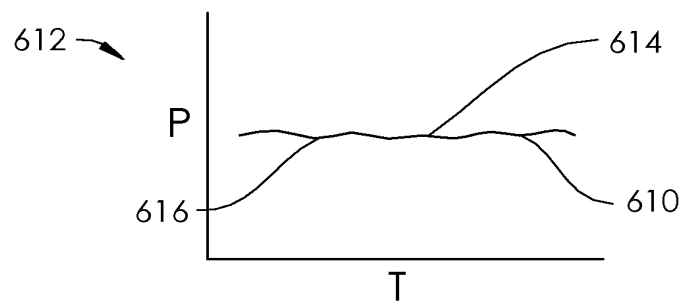


FIG. 20

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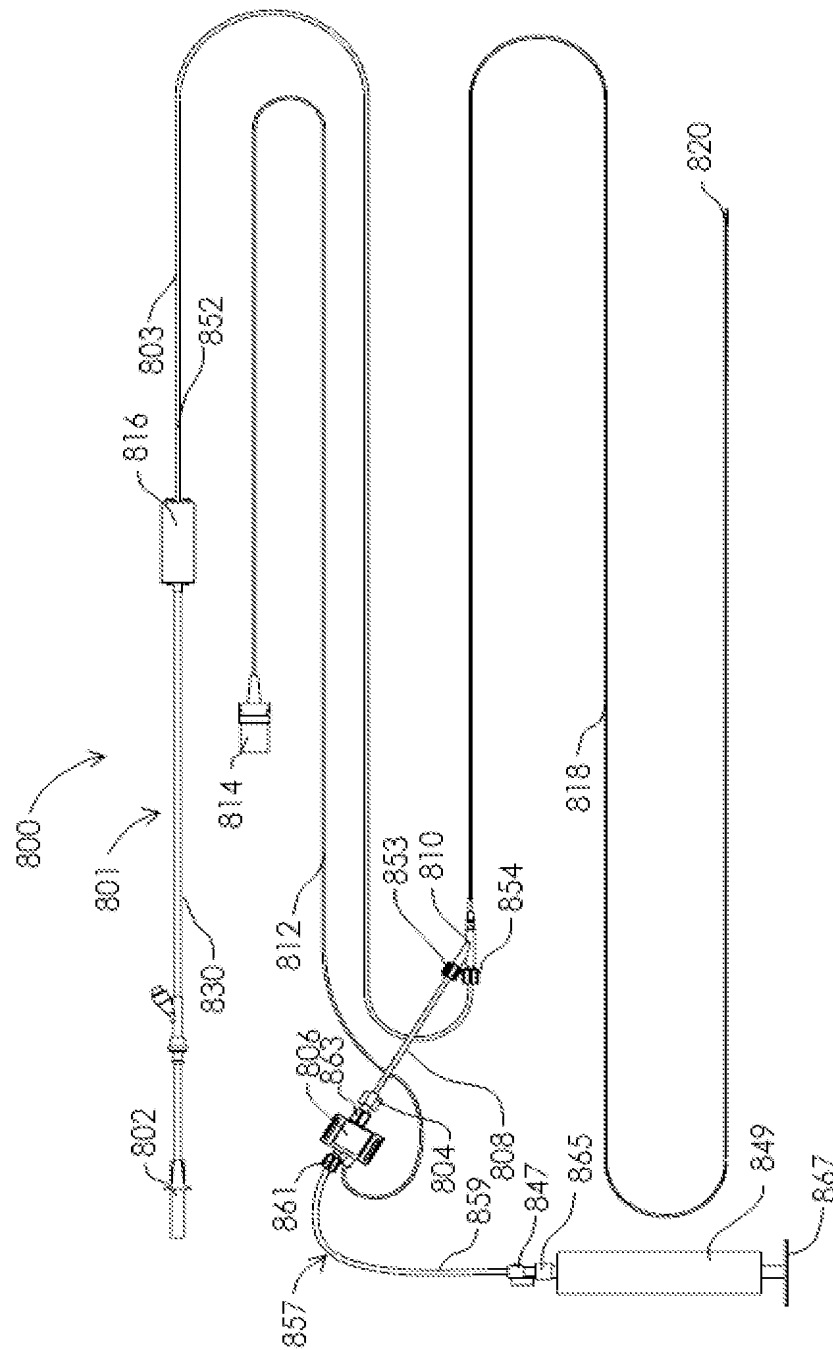


FIG. 21

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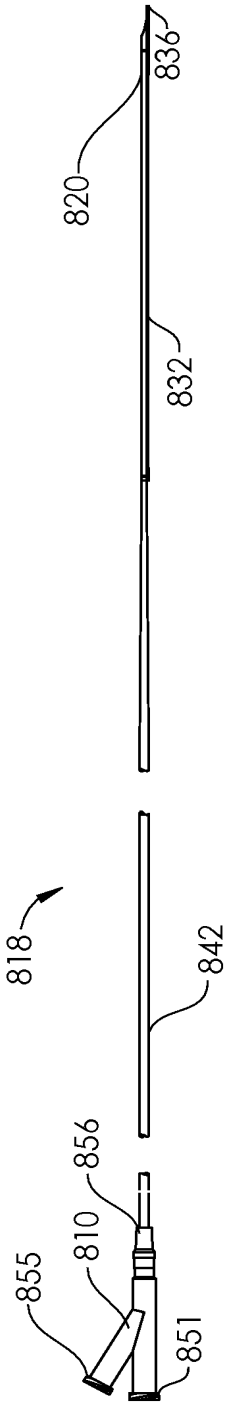


FIG. 22

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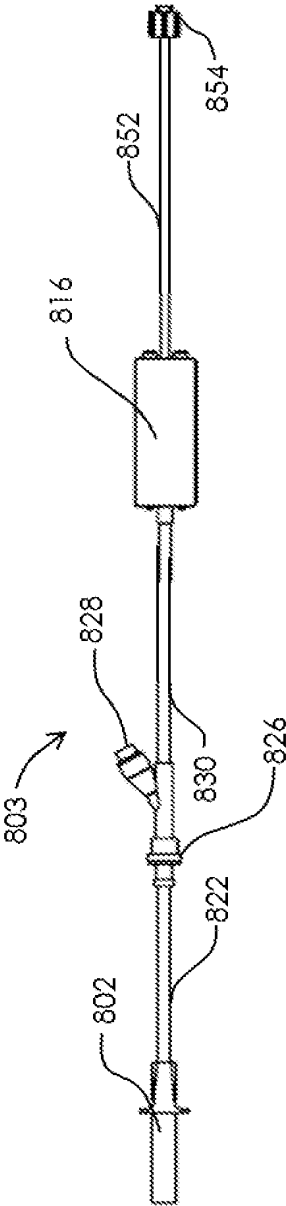


FIG. 23

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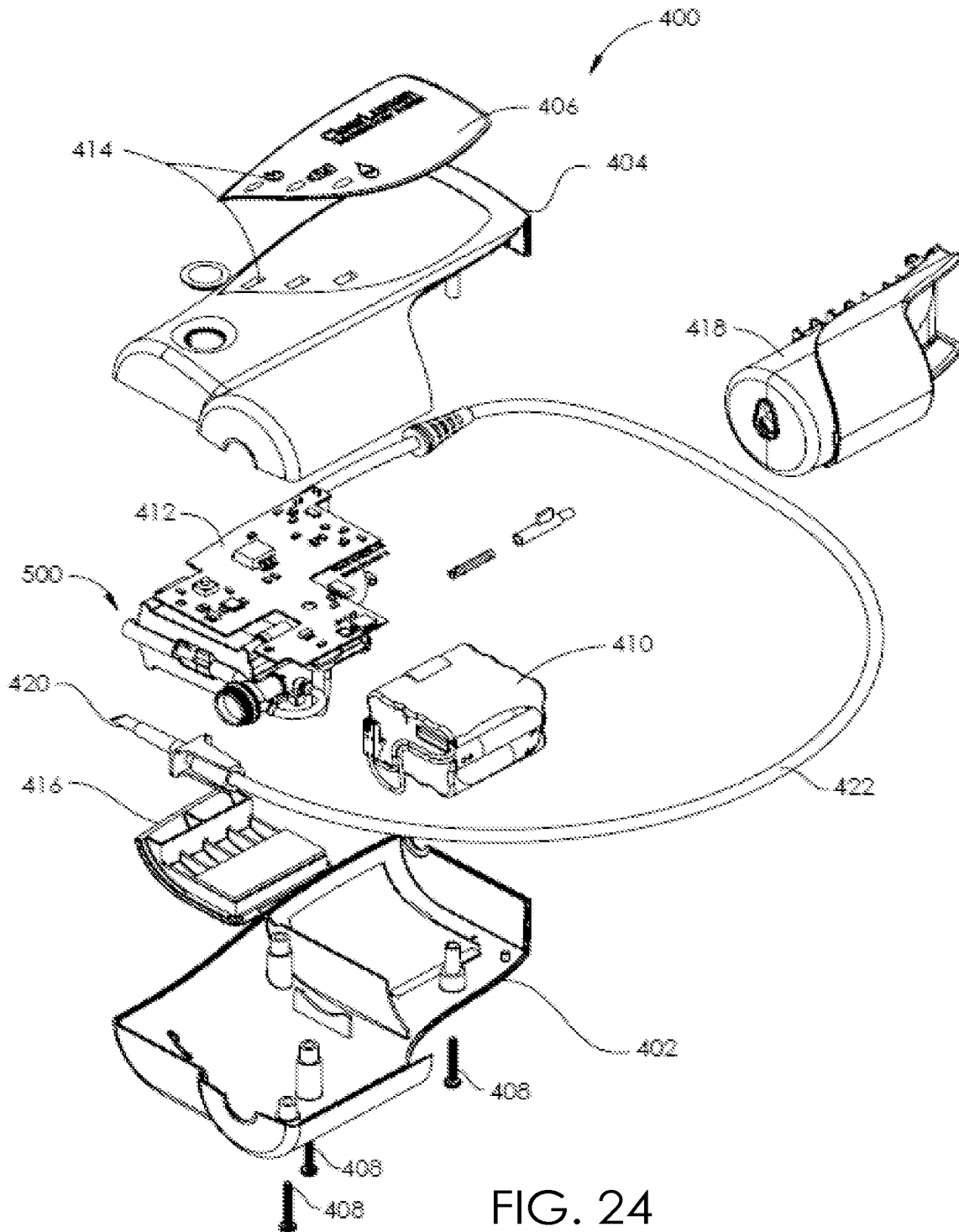


FIG. 24

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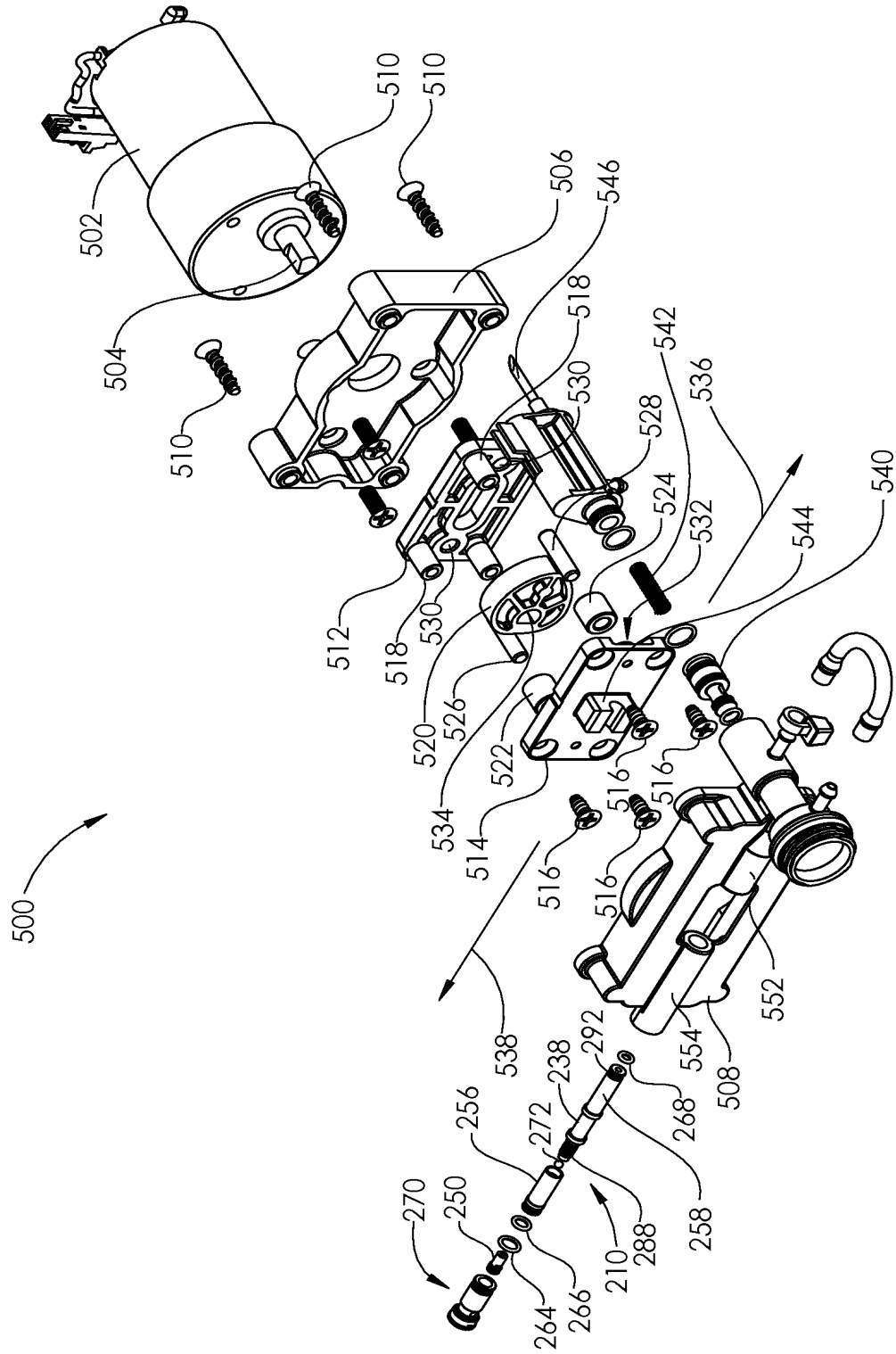


FIG. 25

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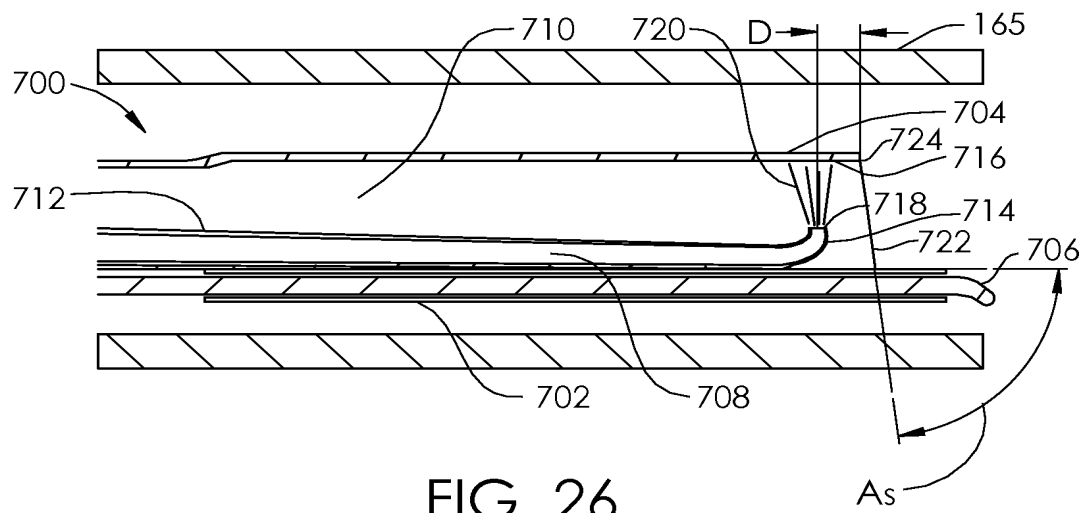


FIG. 26

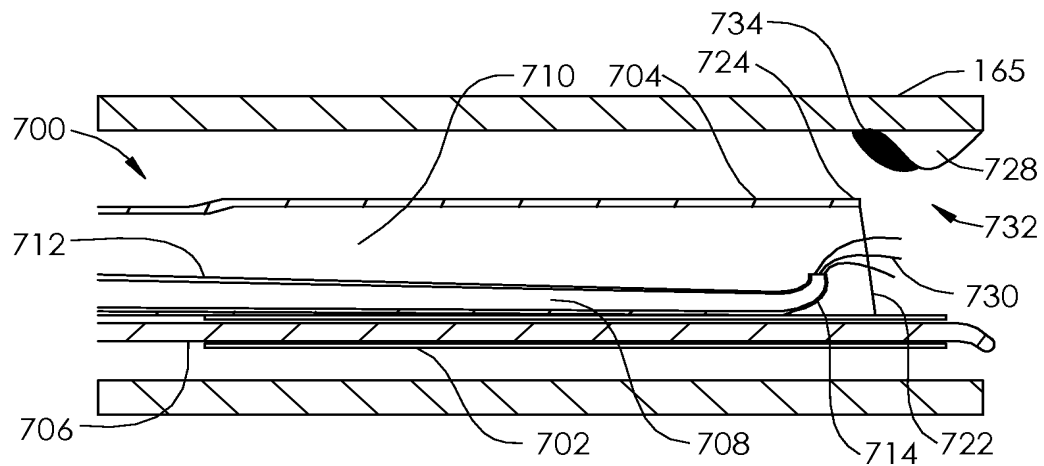


FIG. 27

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 15/31460

A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - A61M 1/00 (2015.01) CPC - A61M 1/0084, A61M 25/003, A61M 1/0023, A61M 2039/082 According to International Patent Classification (IPC) or to both national classification and IPC				
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC(8) - A61M 1/00 (2015.01) CPC - A61M 1/0084, A61M 25/003, A61M 1/0023, A61M 2039/082				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched 604/508, 266-269 (UPC) (Search term limited; see below)				
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PubWest (PGPB, USPT, EPAB, JPAB); Google; PatBase (All); Search Terms: Aspirat*, suction*, vacuum*, drain*, catheter*, conduit, lumen, tube, jet, nozzle, spray, clog*, unclog*, declog*, obstruct*, anticlog*, antiobstr*, rinse, flush*, clean*, clear*, pump*, motor*, driv*, piston*, valve, one way, thromb*, blood				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
Y	WO 1990/05493 A1 (SVEDMAN) 31 May 1990 (31.05.1990) Entire document, especially p3, In 10 - p4, In 27, p5, In 11-30 and FIGS. 1, 4.	1-20		
Y	US 3,429,313 A (ROMANELLI) 25 February 1969 (25.02.1969) Entire document, especially col 3, In 10- col 4, In 5, col 6, In 67- col 7, In 4 and FIG. 1.	1-3, 6-7, 10-20		
Y	US 3,707,967 A (KITRILAKIS et al.) 02 January 1973 (02.01.1973) Entire document, especially Abstract, col 3, In 44- col 4, In 34 and FIGS. 1, 4.	1, 4-5, 8-9		
A	US 2012/0289910 A1 (SHTUL et al.) 15 November 2012 (15.11.2012) Entire document.	1-20		
A	US 5,713,849 A (BOSMA et al.) 03 February 1988 (03.02.1988) Entire document.	1-20		
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☐ Further documents are listed in the continuation of Box C. ☐				
<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> * Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed </td> <td style="width: 50%; vertical-align: top;"> "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family </td> </tr> </table>			* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
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Date of the actual completion of the international search 16 July 2015 (16.07.2015)	Date of mailing of the international search report <div style="font-size: 1.5em; font-weight: bold; text-align: center;">07 AUG 2015</div>			
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer: <div style="text-align: right;">Lee W. Young</div> <div style="font-size: 0.8em;"> PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774 </div>			

Form PCT/ISA/210 (second sheet) (January 2015)



ELECTRONIC PAYMENT RECEIPT

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18/358,837

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07/25/2023 07:11:48 PM ET

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111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 6598

FILED BY J iYoung Anderson

PATENT CENTER # 62503710

AUTHORIZED BY Matthew Williams

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FIRST NAMED
INVENTOR Richard Quick

Payment Information

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CARD / 3369

PAYMENT TRANSACTION ID
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FEE CODE	DESCRIPTION	ITEM PRICE(\$)	QUANTITY	ITEM TOTAL(\$)
1830	PROCESSING FEE, EXCEPT IN PROVISIONAL APPLICATIONS	140.00	1	140.00
1817	REQUEST FOR PRIORITIZED EXAMINATION	4200.00	1	4200.00
1111	UTILITY PATENT APPL. SEARCH FEE	700.00	1	700.00
1011	BASIC FILING FEE - UTILITY (PAPER FILING ALSO REQUIRES NON-ELECTRONIC FILING FEE UNDER 1.16(T))	320.00	1	320.00

1311	PATENT APPL. EXAMINATION FEE	800.00	1	800.00
1202	EACH CLAIM IN EXCESS OF 20	100.00	2	200.00
TOTAL AMOUNT:				\$6,360.00

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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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Richard Quick

Application No.: Not Yet Assigned

Confirmation No.: NA

Filed: Concurrently Herewith

Art Unit: NA

For: SINGLE INSERTION DELIVERY SYSTEM
FOR TREATING EMBOLISM AND
ASSOCIATED SYSTEMS AND METHODS

Examiner: Not Yet Known

**AUTHORIZATION FOR: EXTENSIONS OF TIME UNDER 37 C.F.R. § 1.136(a)(3) AND
PAYMENT OF FEES UNDER 37 C.F.R. § 1.17**

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

Dear Commissioner:

With respect to the above-identified application, the Commissioner is authorized to treat any concurrent or future reply requiring a petition for an extension of time under 37 C.F.R. § 1.136(a)(3) for its timely submission as incorporating a petition therefor for the appropriate length of time.

The Commissioner is also authorized to charge any extension of time fees or other fees that may be required under 37 C.F.R. § 1.17 for any paper filed concurrently herewith or in the future, or credit any overpayment, to Deposit Account No. 50-0665.

Dated: July 25, 2023

Respectfully submitted,

By /Matthew S. Williams/
Matthew S. Williams
Registration No.: 77,516

Application No.: Not Yet Assigned

Docket No.: 111552-8023.US06

Authorization for: Extensions of Time under 37 C.F.R. § 1.136(a)(3) and
Payment of Fees under 37 C.F.R. § 1.17

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SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is a continuation of U.S. Patent Application No. 17/865,307, filed July 14, 2022, and titled "SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS," which is a continuation of U.S. Patent Application No. 17/498,642, filed on October 11, 2021, and titled "SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS," which is a continuation of U.S. Patent Application No. 16/258,344, filed on January 25, 2019, and titled "SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS," which is now issued as U.S. Patent No. 11,154,314, which claims the benefit of U.S. Provisional Patent Application No. 62/622,691, filed on January 26, 2018, and titled "SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS," each of which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The present technology relates generally to devices and methods for the intravascular treatment of emboli and/or thrombi within a blood vessel of a human patient. In particular, some embodiments of the present technology relate to systems for repeatedly deploying an interventional device at or proximate to a pulmonary embolism within a patient.

BACKGROUND

[0003] Thromboembolic events are characterized by an occlusion of a blood vessel. Thromboembolic disorders, such as stroke, pulmonary embolism, heart attack, peripheral thrombosis, atherosclerosis, and the like, affect many people. These disorders are a major cause of morbidity and mortality.

[0004] When an artery is occluded by a clot, tissue ischemia develops. The ischemia will progress to tissue infarction if the occlusion persists. Infarction does not develop or is greatly

limited if the flow of blood is reestablished rapidly. Failure to reestablish blood flow can lead to the loss of limb, angina pectoris, myocardial infarction, stroke, or even death.

[0005] In the venous circulation, occlusive material can also cause serious harm. Blood clots can develop in the large veins of the legs and pelvis, a common condition known as deep venous thrombosis (DVT). DVT arises most commonly when there is a propensity for stagnated blood (e.g., long distance air travel, immobility, etc.) and clotting (e.g., cancer, recent surgery, such as orthopedic surgery, etc.). DVT causes harm by: (1) obstructing drainage of venous blood from the legs leading to swelling, ulcers, pain, and infection, and (2) serving as a reservoir for blood clots to travel to other parts of the body including the heart, lungs, brain (stroke), abdominal organs, and/or extremities.

[0006] In the pulmonary circulation, the undesirable material can cause harm by obstructing pulmonary arteries—a condition known as pulmonary embolism. If the obstruction is upstream, in the main or large branch pulmonary arteries, it can severely compromise total blood flow within the lungs, and therefore the entire body, and result in low blood pressure and shock. If the obstruction is downstream, in large to medium pulmonary artery branches, it can prevent a significant portion of the lung from participating in the exchange of gases to the blood resulting in low blood oxygen and buildup of blood carbon dioxide.

[0007] There are many existing techniques to reestablish blood flow through an occluded vessel. One common surgical technique, an embolectomy, involves incising a blood vessel and introducing a balloon-tipped device (such as the Fogarty catheter) to the location of the occlusion. The balloon is then inflated at a point beyond the clot and used to translate the obstructing material back to the point of incision. The obstructing material is then removed by the surgeon. Although such surgical techniques have been useful, exposing a patient to surgery may be traumatic and best avoided when possible. Additionally, the use of a Fogarty catheter may be problematic due to the possible risk of damaging the interior lining of the vessel as the catheter is being withdrawn.

[0008] Percutaneous methods are also utilized for reestablishing blood flow. A common percutaneous technique is referred to as balloon angioplasty where a balloon-tipped catheter is introduced to a blood vessel (e.g., typically through an introducing catheter). The balloon-tipped catheter is then advanced to the point of the occlusion and inflated to dilate the stenosis. Balloon

angioplasty is appropriate for treating vessel stenosis, but it is generally not effective for treating acute thromboembolisms as none of the occlusive material is removed and the vessel will re-stenosis after dilation. Another percutaneous technique involves placing a catheter near the clot and infusing streptokinase, urokinase, or other thrombolytic agents to dissolve the clot. Unfortunately, thrombolysis typically takes hours to days to be successful. Additionally, thrombolytic agents can cause hemorrhage and in many patients the agents cannot be used at all.

[0009] Various devices exist for performing a thrombectomy or removing other foreign material. However, such devices have been found to have structures which are either highly complex, cause trauma to the treatment vessel, or lack sufficient retaining structure and thus cannot be appropriately fixed against the vessel to perform adequately. Furthermore, many of the devices have highly complex structures that lead to manufacturing and quality control difficulties as well as delivery issues when passing through tortuous or small diameter catheters. Less complex devices may allow the user to pull through the clot, particularly with inexperienced users, and such devices may not completely capture and/or collect all of the clot material.

[0010] Moreover, with many devices, it is difficult or not possible to make repeated attempts at removing clot material (e.g., to make multiple passes with a device). In particular, if a first pass with a device does not completely capture and/or collect all of the clot material, the device and an accompanying catheter system must be removed from the patient, cleaned, and subsequently reinserted into the patient in order to make a second pass and remove additional material. This can be time consuming and traumatic for the patient.

[0011] Thus, there exists a need for an improved embolic extraction device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Many aspects of the present technology can be better understood with reference to the following drawings. The components in the drawings are not necessarily to scale. Instead, emphasis is placed on illustrating clearly the principles of the present disclosure.

[0013] Figures 1A and 1B are perspective views of a retraction and aspiration system shown in a first state and a second state, respectively, in accordance with embodiments of the present technology.

[0014] Figures 2A–2G are schematic illustrations of a distal portion of the retraction and aspiration system during a clot removal procedure in accordance with embodiments of the present technology.

[0015] Figures 3A–3C are a fully-exploded view, an isometric view, and a partially-exploded view of a clot reservoir of the retraction and aspiration system in accordance with embodiments of the present technology.

[0016] Figure 4 is a side view of an attachment member and a fluid control unit of the retraction and aspiration system in accordance with embodiments of the present technology.

[0017] Figure 5 is a side cross-sectional view of the attachment member shown in Figure 4.

[0018] Figure 6 is an isometric view of a first valve insert in accordance with embodiments of the present technology.

[0019] Figures 7A and 7B are a side view and a side cross-sectional view, respectively, of the first valve insert shown in Figure 6 inserted into the attachment member shown in Figure 4 in accordance with embodiments of the present technology.

[0020] Figure 8 is a side view of a second valve insert in accordance with embodiments of the present technology.

[0021] Figure 9 is a side view of the second valve insert shown in Figure 8 inserted into the attachment member shown in Figure 4 in accordance with embodiments of the present technology.

[0022] Figure 10 is a flow diagram of a process or method for operating the retraction and aspiration system in accordance with embodiments of the present technology.

[0023] Figure 11 is a side view of an attachment member and a fluid control unit of the retraction and aspiration system in accordance with embodiments of the present technology.

[0024] Figure 12 is a side view of the fluid control unit shown in Figure 11 in accordance with embodiments of the present technology.

[0025] Figures 13A and 13B are side cross-sectional views of the attachment member shown in Figure 11 in a first configuration and a second configuration, respectively, in accordance with embodiments of the present technology.

[0026] Figure 14 is a flow diagram of a process or method for operating the retraction and aspiration system in accordance with embodiments of the present technology.

DETAILED DESCRIPTION

[0027] The present technology is generally directed to systems and associated devices and methods for engaging and removing clot material from a blood vessel of a human patient. In some embodiments, an interventional device can be advanced through a guide catheter and deployed within clot material in a blood vessel. The interventional device can subsequently be withdrawn from the patient through the guide catheter to remove clot material captured by the interventional device. In some embodiments of the present technology, the interventional device can be repeatedly deployed in/withdrawn from the blood vessel to capture a desired amount of the clot material—without requiring that the guide catheter be fully withdrawn from the patient after each "pass" (e.g., each repeated deployment/withdrawal of the interventional device). That is, the guide catheter may be inserted only a single time during an intravascular procedure including multiple passes to remove clot material from the patient.

[0028] Although many of the embodiments are described below with respect to devices, systems, and methods for treating a pulmonary embolism, other applications and other embodiments in addition to those described herein are within the scope of the technology (e.g., intravascular procedures other than the treatment of emboli, intravascular procedures for treating cerebral embolism, etc.). Additionally, several other embodiments of the technology can have different configurations, states, components, or procedures than those described herein. Moreover, it will be appreciated that specific elements, substructures, advantages, uses, and/or other features of the embodiments described with reference to Figures 1A–14 can be suitably interchanged, substituted or otherwise configured with one another in accordance with additional embodiments of the present technology. Furthermore, suitable elements of the embodiments described with reference to Figures 1A–14 can be used as standalone and/or self-contained devices. A person of ordinary skill in the art, therefore, will accordingly understand that the technology can have other embodiments with additional elements, or the technology can have other embodiments without several of the features shown and described below with reference to Figures 1A–14.

[0029] With regard to the terms "distal" and "proximal" within this description, unless otherwise specified, the terms can reference a relative position of the portions of a retraction and aspiration apparatus and/or an associated catheter system with reference to an operator and/or a location in the vasculature. Also, as used herein, the designations "rearward," "forward," "upward," "downward," etc. are not meant to limit the referenced component to use in a specific orientation. It will be appreciated that such designations refer to the orientation of the referenced component as illustrated in the Figures; the retraction and aspiration system of the present technology can be used in any orientation suitable to the user.

I. Selected Embodiments of Retraction/Aspiration Systems and Methods of Use

[0030] Figures 1A and 1B are perspective views of a proximal portion of a clot retrieval system 1 configured in accordance with embodiments of the present technology, shown in a first state and a second state, respectively. Referring to Figures 1A and 1B together, the clot retrieval system 1 includes a retraction and aspiration device 100 ("RA device 100"), a catheter system 200, and a tubing system 300. In some embodiments, the RA device 100 is coupleable to the catheter system 200 and operable to simultaneously (i) retract a portion of the catheter system 200 and (ii) aspirate through the catheter system 200. In certain embodiments, the RA device 100 and catheter system 200 can both be fluidly coupled to the tubing system 300 to enable material (e.g., blood and clot material) aspirated from the catheter system 200 to flow into the tubing system 300. In particular, the RA device 100, the catheter system 200, and the tubing system 300 can be the same as or similar to one or more of the retraction and aspiration devices, catheter systems, and tubing systems disclosed in U.S. Patent 9,526,864, filed June 9, 2015, and titled "RETRACTION AND ASPIRATION DEVICE FOR TREATING EMBOLISM AND ASSOCIATED METHODS," which is incorporated herein by reference in its entirety.

[0031] Figures 2A–2G are schematic illustrations of a distal portion of the clot retrieval system 1 during a clot removal procedure in accordance with embodiments of the present technology. In particular, Figures 2A–2G illustrate a distal portion of the catheter system 200 that is positioned proximate to an embolism or clot material within a blood vessel (e.g., a pulmonary blood vessel). Accordingly, operation of the catheter system 200 is described with references to Figures 2A–2G.

[0032] Figure 2A is a side view of a distal portion of the catheter system 200 positioned adjacent an embolism or clot material PE within a blood vessel BV (e.g., a pulmonary blood vessel). As shown in Figure 2A, the catheter system 200 can include an outer guide catheter 206 defining a lumen 205, a delivery sheath 204 slidably received within the lumen of the guide catheter 206, and an elongated pull (and/or push) member 202 slidably received within a lumen of the delivery sheath 204. The guide catheter 206 and the delivery sheath 204 individually comprise an elongated shaft having a lumen and, in some embodiments, the push member 202 can also define a lumen (e.g., configured to receive a guidewire therethrough). In a particular embodiment, the catheter system 200 does not include a guide catheter 206 and/or a delivery sheath 204. As shown in Figure 2A, a distal portion of the push member 202 can be integral with or coupled to an interventional device ID, such as a clot removal and/or clot treatment device, that is housed within the delivery sheath 204. Accordingly, axial movement of the pull member 202 causes axial movement of the interventional device ID.

[0033] As further shown in Figure 2A, the delivery sheath 204 and the interventional device ID can be positioned at least partially within the clot material PE. Access to the pulmonary vessels can be achieved through the patient's vasculature, for example, via the femoral vein. The catheter system 200 can include an introducer 210 (Figure 1A and 1B; e.g., a Y-connector with a hemostasis valve) that can be partially inserted into the femoral vein. A guidewire (not shown) can be guided into the femoral vein through the introducer 210 and navigated through the right atrium, the tricuspid valve, the right ventricle, the pulmonary valve and into the main pulmonary artery. Depending on the location of the embolism, the guidewire can be guided to one or more of the branches of the right pulmonary artery and/or the left pulmonary artery. It will be understood, however, that other access locations into the venous circulatory system of a patient are possible and consistent with the present technology. For example, the user can gain access through the jugular vein, the subclavian vein, the brachial vein or any other vein that connects or eventually leads to the superior vena cava. Use of other vessels that are closer to the right atrium of the patient's heart can also be advantageous as it reduces the length of the instruments needed to reach the pulmonary embolism.

[0034] As shown in Figures 2B and 2C, the delivery sheath 204 can be withdrawn proximally (e.g., as indicated by arrow A1 in Figure 2B) to allow the interventional device ID to expand within the clot material PE, thereby grabbing the clot material PE that is nearby. Although Figure 2B shows the interventional device ID positioned at the treatment site such that a distal terminus of the interventional device ID is distal of a distal terminus of the clot material PE, in some procedures the interventional device ID may be positioned such that the distal terminus of the interventional device ID is proximal of the distal terminus of the clot material PE. As shown in Figure 2D, in some embodiments the guide catheter 206 can optionally be advanced distally (e.g., as indicated by arrow A2) until the guide catheter 206 is positioned proximate to a proximal portion of the clot material PE.

[0035] Referring again to Figures 1A and 1B, the RA device 100 includes (i) a housing 102, (ii) an actuation mechanism that includes a lever 104 coupled to and extending from the housing 102, and (iii) a pressure source (obscured in Figures 1A and 1B; e.g., a syringe) positioned within the housing 102, coupled to the actuation mechanism, and configured to generate negative and/or positive pressure. The lever 104 is shown in a first position and second position in Figures 1A and 1B, respectively. The housing 102 can have a proximal portion 100a, a distal portion 100b, and an opening 114 at the distal portion 100b configured to receive a portion of the catheter system 200 and to mechanically couple the catheter system 200 to the housing 102. For example, a proximal portion of the guide catheter 206 can include an attachment/valve member 208 that is configured to be detachably coupled to the RA device 100 (e.g., via a snap-fit arrangement) to secure the catheter 200 to the RA device 100. As described in greater detail below, the attachment/valve member 208 can fluidly couple an aspiration lumen of the catheter system 200 (e.g., the lumen 205 of the guide catheter 206) to the tubing system 300 of the clot retrieval system 1.

[0036] The housing 102 can further include a channel 116 that extends proximally from the opening 114 along approximately the length of the housing 102, as shown in Figures 1A and 1B. The channel 116 can have a height at least as great as the outer diameter of the delivery sheath 204 of the catheter system 200 (and/or another component of the catheter system 200) such that the delivery sheath 204 can fit sideways through the channel 116. In some embodiments, the pull

member 202 and the interventional device ID (Figures 2A–2G) can be pre-loaded into the delivery sheath 204, and the delivery sheath 204 can be fed distally through the channel 116 (e.g., either via the proximal end of the channel 116 or first pushed sideways through a portion of the channel 116) and into the guide catheter 206. In other embodiments, the interventional device ID and the delivery sheath 204 are fed into the guide catheter 206 and the interventional device ID is deployed prior to coupling the guide catheter 206 to the RA device 100.

[0037] When the RA device 100 is coupled to the catheter system 200 (e.g., when the attachment/valve member 208 of the catheter system 200 is positioned within the opening 114 in the housing 102 of the RA device 100), movement of the lever 104 functions to retract a portion of the catheter system 200 positioned in the channel 116 (e.g., the delivery sheath 204 and/or the push member 202). For example, the RA device 100 can include a locking portion that grips the delivery sheath 204 (and, in some embodiments, indirectly the push member 202) to pull the delivery sheath 204 proximally as the lever 104 is moved from the first to the second position.

[0038] The tubing system 300 of the clot retrieval system 1 fluidly couples the pressure source of the RA device 100 to the aspiration lumen of the catheter system 200. When the RA device 100 is coupled to the catheter system 200, movement of the lever 104 functions to simultaneously generate negative pressure in the pressure source and to retract a portion of the catheter system 200, as described above. The tubing system 300 has a first portion 314 coupled to the pressure source, a second portion 316 coupled to the guide catheter 206, and a drainage portion 318 coupled to a reservoir 320 (e.g., a vinyl bag). The first portion 314, second portion 316, and/or drainage portion 318 can include one or more tubing sections 302 (labeled individually as tubing sections 302a–302f) and/or fluid control unit, such as one or more control valves. In certain embodiments, one or more of the tubing sections 302 can have a relatively large diameter (e.g., greater than about 0.1 inch, greater than about 0.210 inch, etc.) to help inhibit clogging of clot material within the tubing system 300.

[0039] More specifically, the first portion 314 can include the tubing section 302a. The drainage portion 318 can include (i) the tubing section 302b, (ii) a first fluid control unit (e.g., a valve) 304, and (iii) the tubing section 302c. The second portion 316 can include (i) the tubing section 302d, (ii) a clot reservoir 306, (iii) the tubing section 302e, (iv) a second fluid control

unit 310, and (v) the tubing section 302f. In some embodiments, the first fluid control unit 304 can be a one-way valve (e.g., a check valve) that only allows fluid flow from the first portion 314 and/or second portion 316 to the drainage portion 318 (and not vice-versa). In certain embodiments, as described in detail with reference to Figures 3A–3C, the clot reservoir 306 can also include a one-way valve that only allows fluid flow from the second portion 316 to the drainage portion 318 (and not vice-versa). In some embodiments, the second fluid control unit 310 can be a stopcock or a clamp that is externally operated to regulate the flow of liquid through the second portion 316 of the tubing system 300. A Y-connector 308 can fluidly couple the first, second, and drainage portions 314, 316, 318. In other embodiments, the first, second, and/or drainage portions 314, 316, 318 can have more or fewer tubing sections, connectors, and/or fluid control unit and/or other suitable configurations.

[0040] As shown in Figures 1A and 2E, moving the lever 104 from the first position to the second position (indicated by arrow A1 in Figure 1A) simultaneously (1) generates a negative pressure in the lumen 205 of the guide catheter 206 (indicated by arrow F in Figure 1A and F1 in Figure 2E), and (2) retracts the delivery sheath 204 and/or push member 202 proximally, thereby retracting the interventional device ID from the treatment site. During this time, in some embodiments, the guide catheter 206 remains fixed (e.g., by the housing 102) relative to the delivery sheath 204 and pull member 202. In such embodiments, as the lever 104 moves from the first position to the second position, the interventional device ID, delivery sheath 204, pull member 202, and at least a portion of the clot material PE are drawn proximally into the guide catheter 206.

[0041] As shown in Figure 1B, moving the lever 104 from the second position to the first position (indicated by arrow A2 in Figure 1B) creates a positive pressure (e.g., indicated by arrows F in Figure 1B) in the first portion 314 and drainage portion 318 of the tubing system 300. The clot reservoir 306 prevents the positive pressure from affecting the aspiration lumen of the catheter system 200, thereby preventing backflow of fluid into the blood vessel BV at the treatment site. With respect to the catheter system 200, when the lever 104 is actuated from the second position to the first position, the RA device 100 does not engage the delivery sheath 204 or the push member 202 to move these components. Thus, the next time the lever 104 is actuated relative to the

housing 102, the RA device 100 engages a new portion of the delivery sheath 204 and push member 202 such that the delivery sheath 204 and push member 202 are incrementally retracted proximally each time the lever 104 is "pumped" (e.g., moved from the first position toward the second position and then back toward the first position).

[0042] Depending on the age and size of the clot material PE, local anatomical and/or physiological conditions, and position of the interventional device ID relative to the clot material PE, the lever 104 can be pumped several times to fully extract the clot material PE and/or interventional device ID from the treatment site. For example, Figures 2D and 2E show the proximal movement of the delivery sheath 204 and pull member 202 after a first pump of the lever 104. Figures 2E and 2F show the proximal movement of the delivery sheath 204, pull member 202, and interventional device ID after a second pump of the lever 104 (e.g., including a second instance of pressure generation indicated by arrows F1 and F2 in Figures 2E and 2F, respectively). In some embodiments, the interventional device ID and the clot material PE can be fully withdrawn into the guide catheter 206 after a single pump of the lever 104. In other embodiments, such as those procedures where the interventional device ID is initially positioned such that a distal terminus of the interventional device ID is proximal of a distal terminus of the clot material PE (the clot material PE often originates in a vein of the patient's leg, and thus is cast into an elongated, worm-like shape), it can take several pumps of the lever 104 to fully withdraw the clot material PE into the guide catheter 206. Thus, in some embodiments, even when the interventional device ID is positioned within the guide catheter 206 such that a distal terminus of the interventional device ID is proximal of the distal terminus of the guide catheter 206, the lever 104 can be pumped several more times to continue to withdraw the clot material PE into the guide catheter 206 and the tubing system 300 (e.g., into the second portion 316, the clot reservoir 306, and/or the drainage portion 318).

[0043] Once the clot material PE is positioned within the guide catheter 206 such that a distal terminus of the clot material PE is proximal from a distal terminus of the guide catheter 206, the catheter system 200 can be withdrawn proximally (e.g., as indicated by arrow A3 in Figure 2G) from the treatment site, and removed from the patient. However, sometimes, as shown in Figure 2G, retracting the interventional device ID and delivery sheath 204 into the guide

catheter 206 may not remove all of the clot material PE (or a desired amount of the clot material PE) from the blood vessel BV. That is, a single "pass" (e.g., a deployment of the interventional device ID and subsequent retraction of the interventional device ID into the guide catheter 206) may not adequately remove the clot material PE from the blood vessel BV. In such instances, the operator of the clot retrieval system 1 may wish to make another pass with the interventional device ID to remove all or a portion of the remaining clot material PE in the blood vessel BV.

[0044] To redeploy the interventional device ID, many conventional systems require that the entire catheter system, including the guide catheter 206, be fully removed from the patient (e.g., including a guide catheter). That is, if the once-deployed interventional device is reintroduced without fully removing and cleaning the catheter system, there is a significant risk that clot material and/or other contaminants from the catheter system will be reintroduced into the blood vessel of the patient during a second pass. As described in further detail below, the present technology advantageously allows for an interventional device to be redeployed without fully removing a guide catheter, and with a significantly reduced risk of reintroducing clot material and/or other contaminants into the blood vessel of the patient.

II. Selected Embodiments of Clot Reservoirs and Associated Methods of Use

[0045] Figures 3A–3C are a fully-exploded view, an isometric view, and a partially-exploded view of the clot reservoir 306 of the clot retrieval system 1. With reference to Figure 3A, the clot reservoir 306 includes a housing 322 defining a chamber 323, a filter 321 configured to be positioned within the housing 322, and a cap assembly 330 configured to be coupled to the housing 322. The housing 322 can include a port 324 configured to be removably, fluidly coupled to the catheter system 200. In some embodiments, a tubing section 326 is coupled to the port 324 during priming of the clot retrieval system 1 and, as described in further detail below with reference to Figures 10 and 14, during flushing of the tubing system 300. In certain embodiments the tubing section 326 is semi-permanently coupled to the housing 322 and can be used to fluidly couple the housing 322 to the tubing system 300 and/or the catheter system 200.

[0046] In the embodiment illustrated in Figure 3A, the cap assembly 330 includes a fluid connector (e.g., a barbed outlet) 332 for connecting to the tubing system 300 (e.g., to the tubing

section 302d shown in Figures 1A and 1B), a nut 333 for releasably securing the cap assembly 330 to the housing 322 (e.g., via a threaded coupling), a first cap portion 334, and a second cap portion 338. In some embodiments, the fluid connector 332 is secured to the first cap portion 334 via an adhesive 331a, and the first cap portion 334 is secured to the nut 333 via a second adhesive 331b. In some embodiments, the first and second adhesives 331a, 331b are the same. The cap assembly 330 can further include a check valve assembly 335 positioned between the first and second cap portions 334, 338 and comprising a piston 336 and a spring 339 (e.g., a passivated compression spring). The check valve assembly 335 provides for one-way fluid flow through the clot reservoir 306, for example, from the catheter system 200 to the reservoir 320 (Figures 1A and 1B). The clot reservoir 306 can further include one or more O-rings 337 for sealing the various components.

[0047] In operation, blood and clot material flow into the clot reservoir 306 via the port 324 as the lever 104 of the RA device 100 is moved from the first position toward the second position. Clot material is captured within the housing 322 and inhibited from exiting through the cap assembly 330 by the filter 321 while blood is allowed to flow from the port 324 to the fluid connector 332. In particular, the filter 321 inhibits clot material from passing into the check valve assembly 335, which could inhibit function of the check valve assembly 335 and/or macerate the clot material and make it indistinguishable from or difficult to distinguish from other fluids (e.g., blood) aspirated and/or removed from the patient. The check valve assembly 335 subsequently inhibits backflow of fluid through the housing 322 via the fluid connector 332 as the lever 104 of the RA device 100 is moved from the second position toward the first position. With reference to Figures 3B and 3C, the cap assembly 330 can be decoupled from the housing 322 to, for example, permit an operator to remove clot material collected in the housing 322. Moreover, as shown, the housing 322 may be made of a transparent material that permits the operator to visualize material within the housing 322. As described in further detail below, in some embodiments, the operator can at least partially determine whether subsequent passes using the interventional device ID are necessary by visualizing the amount of clot material collected in the housing 322.

[0048] Additional details of the clot reservoir 306, and associated devices and methods, are described in Appendix A to this application.

III. Selected Embodiments of Attachment/Valve Members, and Associated Devices and Methods of Use

[0049] Figure 4 is a side view of an attachment/valve member 408 ("attachment member 408") of the catheter system 200 and a second fluid control unit 410 of the tubing system 300 in accordance with embodiments of the present technology. The attachment member 408 and second fluid control unit 410 can have some features generally similar to the features of the attachment/valve member 208 and second fluid control unit 310, respectively, described above with reference to Figures 1A and 1B. For example, the attachment member 408 can be integral with or coupled to a proximal portion of the guide catheter 206 and configured to be detachably coupled to the RA device 100 (Figures 1A and 1B; e.g., via a snap-fit arrangement) to at least partially secure the catheter system 200 to the RA device 100. When secured to the RA device 100, the attachment member 408 can fluidly couple the lumen 205 (e.g., an aspiration lumen) of the guide catheter 206 to the tubing system 300 of the clot retrieval system 1 via the tubing section 302f. Likewise, the second fluid control unit 410 can be a clamp ("clamp 410") that is externally operable to regulate the flow of liquid through the tubing section 302f. For example, the clamp 410 may be actuated (e.g., compressed or squeezed by the hand of an operator) to partially or fully restrict fluid flow through the tubing section 302f. In some embodiments, the clamp 410 includes features for locking or maintaining the clamp 410 in a position such that it restricts fluid flow through the tubing section 302f. Figure 4 illustrates the clamp 410 in a position that permits fluid flow through the tubing section 302f.

[0050] As further shown in Figure 4, the tubing system 300 can include a connector 417 that, for example, fluidly connects the tubing section 302f to other portions of the tubing system 300 (e.g., those shown in Figures 1A and 1B). In some embodiments, the connector 417 is a quick-release connector that enables rapid coupling/decoupling of the tubing section 302f to the clot reservoir 306 and/or other components of the tubing system 300. In some embodiments, the tubing system 300 can include a flush port adapter that can be removably coupled to the connector 417. The flush port adapter can be configured to, for example, fluidly connect a flushing device (e.g., a syringe) to the catheter system 200 so that the guide catheter 206 can further be flushed with a fluid (e.g., heparinized saline).

[0051] Figure 5 is a side cross-sectional view of the attachment member 408 shown in Figure 4. As shown in the embodiment of Figure 5, the attachment member 408 includes a body or housing 440 having a proximal opening 443a, a distal opening 443b, and a first lumen 441 extending between the proximal and distal openings 443a and 443b. The first lumen 441 further comprises a first portion 441a having a first diameter (e.g., a constant first diameter) and a second portion 441b having a second diameter greater than the first diameter. In some embodiments, the first diameter can be generally the same as the outer diameter of the guide catheter 206. The housing 443 further includes a branch portion 444 configured to be coupled to the tubing section 302f and having a second lumen 442 branching from the first lumen 441. In some embodiments, the second lumen 442 can have a relatively large diameter (e.g., between about 0.098 inch and 0.210 inch, about 0.210 inch, greater than 0.210 inch, etc.) to help inhibit clogging and/or collecting of clot material within the attachment member 408 during, for example, aspiration of the guide catheter 206.

[0052] As illustrated in the embodiment of Figure 5, the attachment member 408 can further include a valve 445 within the second portion 441b of the first lumen 441. The valve 445 can be, for example, a hemostasis valve configured to maintain hemostasis by preventing fluid flow in the proximal direction through the proximal opening 443a of the attachment member 408 as the delivery sheath 204, the pull member 202, the guidewire, the interventional device ID, and/or other components of the catheter system 200 are inserted through the valve 445 for advancement to the treatment site in the blood vessel BV.

[0053] Figure 6 is an isometric view of a first valve insert 650, such as a hub valve insert, in accordance with embodiments of the present technology. The first valve insert 650 is configured to be inserted at least partially into the first lumen 441 of the attachment member 408 (e.g., into the valve 445) through the proximal opening 443a of the attachment member 408. Accordingly, Figures 7A and 7B are a side view and a side cross-sectional view, respectively, of the first valve insert 650 inserted into the attachment member 408 in accordance with embodiments of the present technology.

[0054] Referring to Figure 6, the first valve insert 650 includes a proximal portion 651a, a distal portion 651b extending from the proximal portion 651a, and a lumen 654. As illustrated in

the embodiment of Figure 6, the proximal portion 651a can optionally include one or more first engagement features (e.g., flanges, tabs, etc.) 652 configured to engage with the attachment member 408 of the catheter system 200 to securely position (e.g., lock, mate, flush, etc.) the first valve insert 650 within the attachment member 408. For example, in some embodiments, the first engagement features 652 can be configured to "snap" into (e.g., mate with) corresponding grooves on the attachment member 408. The proximal portion 651a can further include one or more second engagement features 653 (e.g., flanges, tabs, etc.) configured to be gripped by an operator to enable the operator to, for example, easily manipulate and/or position the first valve insert 650 within the attachment member 408.

[0055] Referring to Figures 6–7B together, the distal portion 651b of the first valve insert 650 is configured to be positioned at least partially within the second portion 441b of the first lumen 441 of the attachment member 408. For example, the first valve insert 650 can be advanced distally over the delivery sheath 204 and/or the guidewire of the catheter system 200 to the attachment member 408. Once inserted into the attachment member 408, the first valve insert 650 opens (e.g., exercises) the valve 445. In some embodiments, the lumen 654 of the distal portion 651b of the first valve insert 650 has a generally constant diameter that is generally the same as the first diameter of the first portion 441a of the first lumen 441 of the attachment member 408. In the embodiment illustrated in Figure 7B, when the first valve insert 650 is within the attachment member 408, the distal portion 651b extends substantially or entirely through the second portion 441b of the first lumen 441 such that the lumen 654 of the first valve insert 650 and the second portion 441a of the first lumen 441 of the attachment member 408 together define a generally continuous lumen extending through the attachment member 408 (e.g., between the distal opening 443b of the attachment member 408 and a proximal terminus of the lumen 654).

[0056] In one aspect of the present technology, the continuous lumen formed by inserting the first valve insert 650 into the attachment member 408 can have a generally constant diameter along the length of the lumen configured to accommodate the outer diameter of the guide catheter 206. Accordingly, as described in further detail below, when a clot retaining portion of an interventional device and associated clot material are retracted proximally through the guide catheter 206, the interventional device ID does not greatly change shape (e.g., expand or compress) while passing

through the attachment member 408 and the likelihood of clot material being retained within the attachment member 408 is greatly reduced.

[0057] Figure 8 is a side view of a second valve insert 860 (e.g., an aspiration insert) in accordance with embodiments of the present technology. Similar to the first valve insert 650, the second valve insert 860 is configured to be inserted at least partially into the first lumen 441 of the attachment member 408 (e.g., through the valve 445) through the proximal opening 443a of the attachment member 408. Accordingly, Figure 9 is a side view of the second valve insert 860 inserted into the attachment member 408 in accordance with embodiments of the present technology.

[0058] Referring to Figure 8, the second valve insert 860 includes a proximal portion 861a, a distal portion 861b extending from the proximal portion 861a, and a lumen 864 extending through the second valve insert 860. As illustrated in the embodiment of Figure 8, the distal portion 861b can optionally include one or more first engagement features (e.g., flanges, tabs, etc.) 862 configured to engage with the attachment member 408 to securely position (e.g., lock) the second valve insert 860 within the attachment member 408. For example, in some embodiments, the first engagement features 862 can be configured to "snap" into (e.g., mate with) corresponding grooves on the attachment member 408. The proximal portion 861a can further include one or more second engagement features 865a (e.g., flanges, tabs, etc.) configured to be gripped by an operator to enable the operator to, for example, easily manipulate and/or position the second valve insert 860 within the attachment member 408.

[0059] The proximal portion 861a can include one or more adjustment features 865 (labeled individually as adjustment features 865a and 865b) for adjusting a diameter of the lumen 864. For example, in some embodiments the second valve insert 860 is a Tuohy Borst Adapter that can be adjusted, via the one or more adjustment features 865, to seal the proximal opening 443a of the attachment member 408 by sealing the lumen 864 against a component of the catheter system 200 inserted therethrough. More particularly, referring to Figures 8 and 9 together, the distal portion 861b of the second valve insert 860 is configured to be positioned at least partially within the attachment member 408 (e.g., within the second portion 441b of the first lumen 441). For example, the second valve insert 860 can be advanced distally over the guidewire of the catheter

system 200 to the attachment member 408. Once inserted into the attachment member 408, the second valve insert 860 opens (e.g., exercises) the valve 445. By tightening at least one of the adjustment features 865, at least a portion of the lumen 864 can be narrowed until a seal is formed between the second valve insert 860 and the guidewire or other component of the catheter system 200 positioned therein.

[0060] As described in further detail below, in some embodiments, the second valve insert 860 may more completely seal against components of the catheter system 200 than the valve 445 of the attachment member 408. Accordingly, use of the second valve insert 860 can improve the efficiency of aspiration of the guide catheter 206 using the RA device 100 (Figures 1A and 1B).

[0061] Figure 10 is a flow diagram of a process or method 1000 for operating the clot retrieval system 1 including the attachment member 408 and the first and second valve inserts 650, 860 to remove clot material from within a blood vessel (e.g., a pulmonary blood vessel) of a human patient in accordance with embodiments of the present technology. Although some features of the method 1000 are described in the context of the embodiments shown in Figures 1A–9 for sake of illustration, one skilled in the art will readily understand that the method 1000 can be carried out using other suitable systems and/or devices.

[0062] The method 1000 includes engaging the interventional device ID of the catheter system 200 with the clot material PE in the blood vessel BV as, for example, described above with reference to Figures 2A–2D (block 1001). In particular, the attachment member 408 (Figures 4 and 5) of the catheter system 200 can be attached to the RA device 100, and the interventional device ID can be deployed within at least a portion of the clot material PE by proximally retracting the delivery sheath 204.

[0063] The method 1000 continues by proximally retracting the interventional device ID and associated clot material PE into the guide catheter 206 of the catheter system 200 until a distal terminus of the clot material PE is proximal from a distal terminus of the guide catheter 206 as, for example, described above with reference to Figures 2E–2G (block 1002). In particular, the RA device 100 can be pumped or cycled one or more times (e.g., one time, three times, five times, etc.) to retract the interventional device ID and/or delivery sheath 204 into the guide catheter 206 while

simultaneously aspirating the lumen 205 of the guide catheter 206 to remove clot material PE and blood, which are drawn through the attachment member 408 and into the tubing system 300 (e.g., through the clot reservoir 306 to the reservoir 320).

[0064] In some embodiments, the interventional device ID can be retracted proximally into the guide catheter 206 without use of the RA device 100. For example, the operator can manually retract the interventional device ID and associated clot material PE into the guide catheter 206.

[0065] After initial deployment of the interventional device ID in blocks 1001 and 1002, the operator can determine whether it is necessary or desirable to redeploy the interventional device ID within the blood vessel BV of the patient in order to remove additional clot material PE that was not removed during a previous pass with the interventional device ID (block 1003). In some embodiments, the operator can visualize the amount of clot material PE collected in the clot reservoir 306 to at least partially determine whether another pass is needed. In other embodiments, the operator can rely on imaging (e.g., fluoroscopic imaging) of the blood vessel BV or other techniques known in the art to determine whether an additional pass is necessary. If another pass is not needed (e.g., the clot material PE was adequately removed), the operator can elect to withdraw the catheter system 200 from the patient (block 1004). If clot material PE remains in the vessel, the operator can prepare to redeploy the interventional device ID.

[0066] To redeploy the interventional device ID, the method 1000 includes positioning the first valve insert 650 (Figure 6) and withdrawing the interventional device ID from the patient (block 1005). In particular, before positioning the first valve insert 650, the catheter system 200 can be decoupled from the RA device by (i) decoupling the attachment member 408 from the distal portion 100b of the RA device 100 and (ii) removing the delivery sheath 204 and/or guidewire from the channel 116. Additionally, in some embodiments, the clamp 410 can be actuated (e.g., closed) to prevent fluid flow from the guide catheter 206 into the tubing system 300 during withdrawal of the interventional device ID.

[0067] The first valve insert 650 can be advanced over the delivery sheath 204 and/or guidewire of the catheter system 200 until it is positioned (e.g., seated) at least partially within the attachment member 408 (Figures 7A and 7B). Once the first valve insert 650 is positioned within the attachment member 408, the interventional device ID and delivery sheath can be fully

withdrawn from the patient. For example, in some embodiments, the operator may grip a portion of the delivery sheath 204 that is exposed proximally from the RA device 100 and pull the delivery sheath 204 and interventional device ID proximally through the guide catheter 206. In some embodiments, the first valve insert 650 is only positioned within the attachment member 408 when the interventional device ID is proximate the attachment member 408. That is, the operator may partially withdraw the delivery sheath 204 and interventional device ID within the guide catheter 206 before advancing the first valve insert 650 into position. In some embodiments, the delivery sheath 204 includes a marking (e.g., a specific color pattern) configured to indicate to the operator that the distal end of the delivery sheath 204 and/or the interventional device ID is near (e.g., proximally approaching) the attachment member 408. In certain embodiments, the guidewire of the catheter system 200 is pinned during withdrawal of the interventional device ID and the delivery sheath 204 such that the guidewire does not move relative to the interventional device ID and the delivery sheath 204. Therefore, in such embodiments, the guidewire does not need to be re-advanced to the treatment site prior to an additional pass.

[0068] In operation, the first valve insert 650 helps create a lumen of constant diameter through the attachment member 408 such that a diameter of the interventional device ID does not substantially change (e.g., expand and/or contract) as the interventional device ID is withdrawn proximally through the attachment member 408. In particular, the first valve insert 650 can effectively shield the interventional device ID from the valve 445 of the attachment member 408. Without the first valve insert 650, as the interventional device ID is withdrawn proximally it can expand within the attachment member 408 (e.g., as the interventional device ID passes through the second portion 441b of the first lumen 441) before being squeezed (e.g., radially collapsed) as it passes through the valve 445. Without the first valve insert 650, the valve 445 may strip (e.g., break off, shear, etc.) clot material PE that held by the interventional device ID. This can cause clot material PE to remain in the attachment member 408 after the interventional device ID is fully withdrawn from the patient, which presents a significant risk that remaining clot material PE will be reintroduced into the blood vessel BV of the patient if a second pass is made with the interventional device ID without fully removing the guide catheter 206 from the patient to enable cleaning of the guide catheter 206 and the attachment member 408. The first valve insert 650 of the present technology inhibits clot material PE engaged with the interventional device ID from being stripped

by the valve 445 within the attachment member 408 and, therefore, enables a second pass with the interventional device ID to be made without removing the guide catheter 206 from the patient.

[0069] The method 1000 includes removing the first valve insert 650 and positioning the second valve insert 860 (Figure 9) (block 1006). For example, the first valve insert 650 can be withdrawn proximally over the guidewire of the catheter system 200 and the second valve insert 860 can then be advanced distally over the guidewire until it is positioned within the attachment member 408. In some embodiments, the first valve insert 650 is removed and the second valve insert 860 is inserted into the attachment member 408 immediately after the delivery sheath 204 and interventional device ID are withdrawn from the patient. Prompt removal of the first valve insert 650 can restore function of the valve 445 and prevent excess blood from leaking through the lumen 654 of the first valve insert 650 once the delivery sheath 204 and interventional device ID are removed.

[0070] Positioning the second valve insert 860 further includes adjusting (tightening) the second valve insert 860 over the guidewire to seal the proximal opening 443a of the attachment member 408. In some embodiments, the method 1000 need not include positioning of the second valve insert 860. Instead, the valve 445 of the attachment member 408 may provide a suitable seal for subsequent aspiration steps. However, in some embodiments, use of the second valve insert 860 can provide a better seal between the guidewire of the catheter system 200 and the attachment member 408, and thus improve the efficiency of aspiration using the RA device 100.

[0071] The method 1000 includes aspirating the guide catheter 206 by, for example, pumping or cycling the lever 104 of the RA device 100 one or more times (block 1007). In embodiments where the clamp 410 was previously closed (e.g., at block 1005), prior to pumping the lever 104, the operator can actuate (e.g., open) the clamp 410 to permit fluid flow from the guide catheter 206 into the tubing system 300. Aspirating the guide catheter 206 removes any residual clot material PE remaining in the guide catheter 206. Accordingly, the residual clot material PE is not reintroduced into the blood vessel BV of the patient when the interventional device ID and delivery sheath 204 are subsequently advanced through the guide catheter 206 during another pass. In certain embodiments, the guide catheter 206 can further be flushed with a fluid (e.g., heparinized saline). For example, the connector 417 can be decoupled from the tubing system 300 and the fluid can be

introduced from a flushing device (e.g., a syringe) through a flush port adapter coupled (e.g., semi-permanently coupled) to the connector 417.

[0072] In some embodiments, the guide catheter 206 can be aspirated without use of the RA device 100. For example, a syringe or other pressure source can be fluidly coupled directly to the connector 417 and used to aspirate the guide catheter 206. In such embodiments, opening of the clamp 410 fluidly connects the syringe to the lumen 205 of the guide catheter 206 and closing of the clamp 410 fluidly disconnects the syringe from the lumen 205 of the guide catheter 206. In some embodiments, the syringe or other pressure source can be pre-charged with a vacuum—such as by drawing a plunger of the syringe with the clamp 410 closed. The clamp 410 can then be opened to instantaneously or nearly instantaneously (e.g., immediately) apply the stored vacuum pressure to the tubing system 300 and to the lumen 205 of the guide catheter 206, thereby generating suction throughout the guide catheter 206. In particular, suction can be generated at a distal portion of the guide catheter 206. In one aspect of the present technology, pre-charging or storing the vacuum before applying the vacuum to the lumen 205 of the guide catheter 206 is expected to generate greater suction forces with a faster ramp time (and correspondingly greater fluid flow velocities) at and/or near a distal portion of the guide catheter 206 as compared to, for example, simply activating the pressure source of the RA device 100 by cycling the lever 104 of the RA device 100. These suction forces generated by application of the stored vacuum can be used to not only aspirate the guide catheter 206, but also to aspirate or otherwise remove some or all of the clot material PE remaining in the blood vessel BV after retraction of the interventional device ID.

[0073] The method 1000 includes flushing the tubing system 300 (block 1008). In some embodiments, flushing the tubing system 300 includes (i) actuating (e.g., closing) the clamp 410 to inhibit fluid flow from the guide catheter 206 into the tubing system 300, (ii) disconnecting the tubing section 326 of the clot reservoir 306 from the tubing section 302e and the connector 417 of the tubing system 300, (iii) placing the tubing section 326 into a container of fluid (e.g., saline), and (iv) pumping the lever 104 of the RA device 100 to draw the fluid through the tubing system 300. In some embodiments, the housing 322 of the clot reservoir 306 can be temporarily disconnected (e.g., unscrewed) from the cap assembly 330 so that the clot material PE in the clot reservoir 306 can be removed. In certain embodiments, the tubing system 300 need not be flushed prior to a

second pass with the interventional device ID or another interventional device. In some embodiments, flushing the tubing system 300 can include attaching a syringe to the fluid connector 332 of the clot reservoir 306 and/or to the tubing section 302a of the tubing system 300 and using the syringe to generate a negative pressure to draw the fluid through the clot reservoir 306.

[0074] After the tubing system 300 has been flushed, the method 1000 can return to block 1001. In particular, the same interventional device ID and delivery sheath 204 can be cleaned and subsequently advanced through the guide catheter 206 and to the remaining clot material PE in the blood vessel BV. In some embodiments, a new interventional device and delivery sheath can be used for each pass to reduce the likelihood of contamination (e.g., reintroduction of clot material PE into the patient). Once the desired amount of clot material PE has been removed from the patient, the catheter system 200 may be fully withdrawn from the patient (block 1004).

[0075] In one aspect of the present technology, the method 1000 provides for multiple passes of an interventional device without requiring that the entire guide catheter be removed after each pass. Accordingly, the present technology allows for only a single insertion of a guide catheter during a procedure including multiple passes to remove clot material—increasing the speed of the procedure and reducing trauma to the patient since the guide catheter does not need to be reintroduced (e.g., advanced through the vasculature and past the heart) before each pass.

[0076] Moreover, in certain embodiments, the present technology can enable the guide catheter 206 to be relocated to an alternate treatment site within the patient without removing the guide catheter 206 from the patient and, therefore, without reintroducing the guide catheter 206 through the heart. For example, the guide catheter 206 can be relocated to another treatment site within the lungs including a treatment site in the opposite lung. More specifically, (i) a dilator can be reintroduced into the guide catheter 206, (ii) the guide catheter 206 can be withdrawn into the main pulmonary artery, (iii) the guidewire can be redirected to the new treatment site, (iv) the guide catheter 206 can be advanced over the guidewire to the new treatment site, and (v) the dilator can be removed.

[0077] Additional details of the systems, devices, and methods described above with reference to Figures 4–9 are provided in Appendix B to this application.

IV. Other Selected Embodiments of Attachment/Valve Members, and Associated Devices and Methods of Use

[0078] Figure 11 is a side view of an attachment/valve member 1108 ("attachment member 1108") of the catheter system 200 and a second fluid control unit 1110 of the tubing system 300 in accordance with embodiments of the present technology. The attachment member 1108 and the second fluid control unit 1110 can have some features generally similar to the features of the attachment members 208, 408 and the second fluid control unit 310, 410, respectively, described above with reference to Figures 1A–10. For example, the attachment member 1108 can be integral with or coupled to a proximal portion of the guide catheter 206 and configured to be detachably coupled to the RA device 100 (Figures 1A and 1B; e.g., via a snap-fit arrangement) to at least partially secure the catheter system 200 to the RA device 100. When secured to the RA Device 100, the attachment member 1108 can fluidly connect the lumen 205 (e.g., an aspiration lumen) of the guide catheter 206 to the tubing system 300 of the clot retrieval system 1 via the tubing section 302f. Likewise, the second fluid control unit 1110 can be a stopcock ("stopcock 1110") that is externally operable to regulate the flow of fluid through the tubing section 302f.

[0079] As further shown in Figure 11, the tubing system 300 can include a connector 1117 for, for example, fluidly connecting the tubing section 302f and the stopcock 1110 to other portions of the tubing system 300 (e.g., those shown in Figures 1A and 1B). In some embodiments, the connector 1117 is a quick-release connector that enables rapid coupling/decoupling of the tubing section 302f and stopcock 1110 to other components of the tubing system 300.

[0080] Figure 12 is a side view of the stopcock 1110 in accordance with embodiments of the present technology. In the embodiment illustrated in Figure 12, the stopcock 1110 includes a grip member (e.g., a handle, a knob, etc.) 1211 that can be actuated (e.g., twisted by the hand of an operator) to partially or fully restrict fluid flow through the tubing section 302f. In some embodiments, the stopcock 1110 also includes an injection port 1212 (e.g., a needleless injection port) configured to receive a syringe or other fluid delivery member therethrough. In some embodiments, the injection port 1212 permits fluid to be introduced into the attachment member 1108 and the guide catheter 206 without requiring that a connector 1117 be decoupled from

the tubing system 300. For example, in some embodiments, an operator can actuate the stopcock 1110 (e.g., twist the grip member 1211) to close the stopcock 1110 and subsequently introduce a syringe at the injection port 1212 to flush the guide catheter 206 with a fluid (e.g., saline) introduced via the syringe.

[0081] Figures 13A and 13B are side cross-sectional views of the attachment member 1108 in a first configuration and a second configuration, respectively, in accordance with embodiments of the present technology. The attachment member 1108 can be, for example, a garrote valve (e.g., a hemostasis valve) as disclosed in provisional U.S. Patent Application No. 62/554,931, filed September 6, 2017, and titled "HEMOSTASIS VALVES AND METHODS OF USE," which is reproduced in Appendix D to this application, and which is incorporated herein by reference in its entirety.

[0082] In particular, referring to Figures 13A and 13B together, the attachment member 1108 can include a housing 1370 having a proximal opening 1373a and a distal opening 1373b, and defining a first lumen (e.g., an interior channel) 1371 extending between the proximal and distal openings 1373a, 1373b. The housing 1370 further includes a branch portion 1380 configured to be coupled to the tubing section 302f and defining a second lumen 1381 branching from the first lumen 1371. In some embodiments, the second lumen 1381 can have a relatively large diameter (e.g., between about 0.098 inch and 0.210 inch, about 0.210 inch, greater than 0.210 inch, etc.) to help inhibit clogging and/or collection of clot material within the attachment member 1108 during, for example, aspiration of the guide catheter 206. In one aspect of the present technology, the first lumen 1371 can have a generally constant diameter along its length.

[0083] As shown, a tubular member (e.g., an elongate member) 1372 can extend at least partially through the first lumen 1371 to define a central lumen 1374 that is generally coaxial with the first lumen 1371. In some embodiments, the tubular member 1372 can comprise a compliant tubular structure (e.g., a silicon tube) that can be, for example, a thin-walled compliant tubular structure. The thin-walled structure of the tubular member 1372 can facilitate the collapse, and specifically the uniform collapse of the tubular member 1372 and sealing of the tubular member 1372. For example, the attachment member 1108 can further include an actuation mechanism 1375 coupled to the tubular member 1372 and configured to collapse and seal the

tubular member 1372 via compression and/or constriction of one or more filaments 1376 coupled to the tubular member 1372.

[0084] More specifically, in some embodiments, the actuation mechanism 1375 can be a manual actuator such as one or more buttons 1378. Depression or release of the buttons can, in some embodiments, facilitate sealing of the tubular member 1372 around tools or instruments of a wide range of sizes and/or diameters that fit through the tubular member 1372. For example, Figure 13A illustrates the attachment member 1108 with the actuation mechanism 1375 in the first configuration in which the tubular member 1372 is in a collapsed and/or sealed state having a minimum diameter (e.g., conformed to a diameter of a portion of a catheter system inserted therethrough). In the embodiment shown in Figure 13A, the actuation mechanism 1375 is biased (e.g., by one or more springs 1377) to maintain the tubular member 1372 in the collapsed state. Specifically, in the first configuration, the actuation mechanism 1375 can tighten the filament 1376 to constrict or compress the tubular member 1372 to seal the central lumen 1374 of the tubular member 1372. Thus, when the buttons 1378 are not depressed, the attachment member 1108 can provide a hemostatic seal.

[0085] As shown in the embodiment of Figure 13B, the attachment member 1108 is in an expanded (e.g., open) and/or unsealed state having a maximum diameter (e.g., a diameter generally the same as the first lumen 1371). More particularly, one or more of the buttons 1378 may be depressed to, for example, loosen the filament 1376 and allow expansion of the tubular member 1372 to unseal the central lumen 1374 of the tubular member 1372.

[0086] Accordingly, the actuation mechanism 1375 and tubular member 1372 of the attachment member 1108 provide for sealing of the attachment member 1108 around, for example, various components of the catheter system 200 (e.g., the delivery sheath 204, the pull member 202, the guidewire, the interventional device ID, etc.) that are inserted through the attachment member 1108 for advancement to the treatment site in the blood vessel BV. Moreover, in the second configuration, the central lumen 1374 of the tubular member 1372 and the first lumen 1371 of the housing 1370 can together provide a continuous lumen of generally constant diameter. As described above, such a constant diameter can prevent clot material PE associated with the interventional device ID from getting stuck in (e.g., remaining in) the attachment member 1108 as

the interventional device ID is retracted through the attachment member 1108—thus minimizing the risk of reintroducing clot material to the patient upon a second pass using the interventional device ID (or another interventional device).

[0087] Figure 14 is a flow diagram of a process or method 1400 for operating the clot retrieval system 1 including the attachment member 1108 to remove clot material from within a blood vessel (e.g., a pulmonary blood vessel) of a human patient in accordance with embodiments of the present technology. Although some features of the method 1400 are described in the context of the embodiments shown in Figures 1A, 1B, and 11–13 for sake of illustration, one skilled in the art will readily understand that the method 1400 can be carried out using other suitable systems and/or devices.

[0088] The method 1400 includes engaging the interventional device ID of the catheter system 200 with the clot material PE in the blood vessel BV as, for example, described above with reference to Figures 2A–2D (block 1401). In particular, the attachment member 1108 of the catheter system 200 can be coupled to the RA device 100, and the interventional device ID can be deployed within at least a portion of the clot material PE by proximally retracting the delivery sheath 204 relative to the interventional device ID.

[0089] The method 1400 continues by proximally retracting the interventional device ID and associated clot material PE into the guide catheter 206 of the catheter system 200 until a distal terminus of the clot material PE is proximal from a distal terminus of the guide catheter 206 as, for example, described above with reference to Figures 2E–2G (block 1402). In particular, the RA device 100 can be pumped or cycled one or more times (e.g., one time, three times, five times, etc.) to retract the interventional device ID and/or delivery sheath 204 into the guide catheter 206 while simultaneously aspirating the lumen 205 of the guide catheter 206 to remove clot material PE and blood, which are drawn through the attachment member 1108 of the catheter system 200 and into the tubing system 300 (e.g., through the clot reservoir 306 to the reservoir 320).

[0090] In some embodiments, the interventional device ID can be retracted proximally into the guide catheter 206 without use of the RA device 100. For example, the operator can manually retract the interventional device ID and associated clot material PE into the guide catheter 206.

[0091] After the initial deployment of the interventional device ID in blocks 1401 and 1402, the operator can determine whether it is necessary or desirable to redeploy the interventional device ID within the blood vessel BV of the patient in order to remove additional clot material PE that was not removed during a previous pass with the interventional device ID (block 1403). In some embodiments, the operator can visualize the amount of clot material PE collected in the clot reservoir 306 to at least partially determine whether another pass is needed. In other embodiments, the operator can rely on imaging (e.g., fluoroscopic imaging) of the blood vessel BV or other techniques known in the art to determine whether an additional pass is necessary. If another pass is not needed (e.g., the clot material PE was adequately removed), the operator can elect to withdraw the catheter system 200 from the patient at block 1404. If clot material PE remains in the vessel, the operator can prepare to redeploy the interventional device ID.

[0092] To redeploy the interventional device ID, the method 1400 includes withdrawing the interventional device ID from the patient (block 1405). In particular, before withdrawing the interventional device ID, the catheter system 200 can be decoupled from the RA device by (i) decoupling the attachment member 1108 from the distal portion 100b of the RA device 100 and (ii) removing the delivery sheath 204 and/or guidewire from the channel 116 of the RA device 100. Additionally, in some embodiments, the stopcock 1110 can be actuated (e.g., twisted closed) to prevent fluid flow from the guide catheter 206 into the tubing system 300 during withdrawal of the interventional device ID.

[0093] The delivery sheath 204 and/or another component of the catheter system 200 may then be manually (e.g., by the operator) or automatically pulled proximally to withdraw the interventional device ID from the patient. Before the interventional device ID and associated clot material PE are withdrawn through the attachment member 1108, the actuation mechanism 1375 of the attachment member 1108 can be actuated (e.g., by depressing the buttons 1378) to move the tubular member 1372 to the second configuration (e.g., to open the tubular member 1372) such that the central lumen 1374 of the tubular member 1372 and the first lumen 1371 of the housing 1370 together provide a continuous lumen of generally constant diameter. Accordingly, the interventional device ID can be fully withdrawn (e.g., retracted proximally) through the attachment member 1108 without causing a significant amount of clot material PE associated with the

interventional device ID to remain in the attachment member 1108—thus minimizing the risk of reintroducing clot material to the patient upon an additional pass using the interventional device ID (or another interventional device). Moreover, in certain embodiments, the guidewire of the catheter system 200 is pinned during withdrawal of the interventional device ID and the delivery sheath 204 such that the guidewire does not move relative to the interventional device ID and the delivery sheath 204. Therefore, in such embodiments, the guidewire does not need to be re-advanced to the treatment site prior to an additional pass.

[0094] Once the interventional device ID has been fully removed from the guide catheter 206 and the attachment member 1108, the attachment member 1108 can be returned to the first (e.g., sealed) configuration by, for example, releasing the buttons 1378. Next, the method includes aspirating the guide catheter 206 by, for example, pumping or cycling the lever 104 of the RA device 100 one or more times (block 1406). In embodiments where the stopcock 1110 was previously closed (e.g., at block 1405), prior to pumping the lever 104, the stopcock 1110 can be opened to permit fluid flow from the guide catheter 206 into the tubing system 300. Aspirating the guide catheter 206 removes any residual clot material PE remaining in the guide catheter 206. Accordingly, the residual clot material PE is not reintroduced into the blood vessel BV of the patient when the interventional device ID and delivery sheath 204 (or another interventional device ID) are subsequently advanced through the guide catheter 206 during another pass. In certain embodiments, the guide catheter 206 can further be flushed with a fluid (e.g., heparinized saline). For example, the fluid can be introduced through the injection port 1212 while simultaneously pressing the buttons 1378 of the attachment member 1108. In certain embodiments, the stopcock 1110 can be closed (e.g., at block 1406), and a syringe can be connected to the injection port 1212 and used to generate a negative pressure prior to opening the stopcock 1110 to permit fluid flow from the guide catheter 206 into the syringe.

[0095] In some embodiments, the guide catheter 206 can be aspirated without use of the RA device 100. For example, a syringe or other pressure source can be fluidly coupled directly to the connector 1117 and used to aspirate the guide catheter 206. In such embodiments, opening of the stopcock 1110 fluidly connects the syringe to the lumen 205 of the guide catheter 206 and closing of the stopcock 1110 fluidly disconnects the syringe from the lumen 205 of the guide catheter 206.

In some embodiments, the syringe or other pressure source can be pre-charged with a vacuum—such as by drawing a plunger of the syringe with the stopcock 1110 closed. The stopcock 1110 can then be opened to instantaneously or nearly instantaneously (e.g., immediately) apply the stored vacuum pressure to the tubing system 300 and to the lumen 205 of the guide catheter 206, thereby generating suction throughout the guide catheter 206. In particular, suction can be generated at a distal portion of the guide catheter 206. In one aspect of the present technology, pre-charging or storing the vacuum before applying the vacuum to the lumen 205 of the guide catheter 206 is expected to generate greater suction forces with a faster ramp time (and correspondingly greater fluid flow velocities) at and/or near a distal portion of the guide catheter 206 as compared to, for example, simply activating the pressure source of the RA device 100 by cycling the lever 104 of the RA device 100. These suction forces generated by application of the stored vacuum can be used to not only aspirate the guide catheter 206, but also to aspirate or otherwise remove some or all of the clot material PE remaining in the blood vessel BV after retraction of the interventional device ID.

[0096] The method 1400 includes flushing the tubing system 300 (block 1407). In some embodiments, flushing the tubing system 300 includes (i) closing the stopcock 1110 to inhibit fluid flow from the guide catheter 206 into the tubing system 300, (ii) disconnecting the tubing section 326 of the clot reservoir 306 from the tubing section 300e of the tubing system 300, (iii) placing the tubing section 326 into a container of fluid (e.g., saline), and (iv) pumping the lever 104 of the RA device 100 to draw the fluid through the tubing system 300. In some embodiments, the housing 322 of the clot reservoir 306 can be temporarily decoupled (e.g., unscrewed) from the cap assembly 330 so that the clot material PE in the clot reservoir 306 can be removed. In certain embodiments, the tubing system 300 need not be flushed prior to an additional pass with the interventional device ID. In some embodiments, flushing the tubing system 300 can include attaching a syringe to the fluid connector 332 of the clot reservoir 306 and/or to the tubing section 302a of the tubing system 300 and using the syringe to generate a negative pressure to draw the fluid through the clot reservoir 306.

[0097] After the tubing system 300 has been flushed, the method 1400 can return to block 1401. In particular, the same interventional device ID and delivery sheath 204 can be cleaned and subsequently advanced through the guide catheter 206 and to the remaining clot material PE in

the blood vessel. In some embodiments, a new interventional device ID and delivery sheath 204 can be used for each pass to reduce the likelihood of contamination (e.g., reintroduction of clot material PE). Once the desired amount of clot material PE has been removed from the patient, the catheter system 200 may be fully withdrawn from the patient (block 1404).

[0098] In one aspect of the present technology, the method 1400 provides for multiple passes of an interventional device without requiring that the entire guide catheter be removed after each pass. Accordingly, the present technology allows for only a single insertion of a guide catheter during a procedure including multiple passes to remove clot material—increasing the speed of the procedure and reducing trauma to the patient since the guide catheter does not need to be reintroduced (e.g., advanced through the vasculature and past the heart) before each pass.

[0099] Moreover, in certain embodiments, the present technology can enable the guide catheter 206 to be relocated to an alternate treatment site within the patient without removing the guide catheter 206 from the patient and, therefore, without reintroducing the guide catheter 206 through the heart. For example, the guide catheter 206 can be relocated to another treatment site within the lungs including a treatment site in the opposite lung. More specifically, (i) a dilator can be reintroduced into the guide catheter 206, (ii) the guide catheter 206 can be withdrawn into the main pulmonary artery, (iii) the guidewire can be redirected to the new treatment site, (iv) the guide catheter 206 can be advanced over the guidewire to the new treatment site, and (v) the dilator can be removed.

[0100] Additional details of the systems, devices, and methods described above with reference to Figures 11–14 are provided in Appendix C to this application.

V. Examples

1. A method for the intravascular treatment of clot material from a treatment site within a blood vessel of a human patient, the method comprising:
 - engaging a first interventional device with the clot material at the treatment site in the blood vessel;
 - retracting the first interventional device and a portion of the clot material into a distal portion of an elongated shaft;

inserting a first valve insert into an attachment member coupled to a proximal portion of the elongated shaft;
withdrawing the first interventional device and the portion of the clot material proximally through (a) the elongated shaft, (b) the attachment member, and (c) the first valve insert;
inserting a second valve insert into the attachment member instead of the first valve insert;
aspirating the elongated shaft; and
advancing a second interventional device distally through the elongated shaft to the treatment site.

2. The method of example 1 wherein, after inserting the first valve insert into the attachment member, the first valve insert and the attachment member together define a lumen having a generally constant diameter.

3. The method of example 2 wherein the diameter of the lumen is generally the same as the diameter of the elongated shaft.

4. The method of any one of examples 1–3 wherein inserting the first valve insert into the attachment member includes exercising a valve of the attachment member.

5. The method of any one of examples 1–4, further comprising actuating the second valve insert to seal the attachment member.

6. The method of any one of examples 1–5 wherein the first interventional device and the second interventional device are the same interventional device, and wherein the method further comprises cleaning the interventional device to remove the portion of the clot material.

7. The method of any one of examples 1–6, further comprising engaging the second interventional device with remaining clot material at the treatment site in the blood vessel.

8. The method of any one of examples 1–7 wherein aspirating the elongated shaft includes aspirating, into the elongated shaft, at least a portion of clot material remaining at the treatment site in the blood vessel.

9. The method of example 8 wherein aspirating the elongated shaft includes—
coupling a syringe to the elongated shaft via a fluid control unit, wherein opening of the fluid control unit fluidly connects the syringe to the elongated shaft, and wherein closing of the fluid control device fluidly disconnects the syringe from the elongated shaft;
drawing a plunger of the syringe to generate a vacuum while the fluid control unit is closed;
and
opening the fluid control unit to apply the vacuum to the elongated shaft to thereby aspirate the portion of the remaining clot material into the elongated shaft.

10. The method of example 9 wherein the fluid control unit is a clamp.

11. A method for the intravascular treatment of clot material from a treatment site within a blood vessel of a human patient, the method comprising:

engaging a first interventional device with the clot material at the treatment site in the blood vessel;

retracting the first interventional device and a portion of the clot material into a distal portion of an elongated shaft;

withdrawing the interventional device and the portion of the clot material from the blood vessel through the elongated shaft and an attachment member coupled thereto, including—

before withdrawing the interventional device through the attachment member, actuating the attachment member to move the attachment member from a first configuration in which a lumen of the attachment member is sealed to a second configuration in which the lumen of the attachment member is open;

after withdrawing the interventional device through the attachment member, actuating the attachment member to return the attachment member to the first configuration from the second configuration; aspirating the elongated shaft; and advancing a second interventional device distally through the elongated shaft to the treatment site.

12. The method of example 11 wherein actuating the attachment member includes pressing one or more buttons on the attachment member.

13. The method of example 11 or 12 wherein in the second configuration, the lumen of the attachment member has a generally constant diameter.

14. The method of example 13 wherein the diameter of the lumen is generally the same as a diameter of the elongated shaft.

15. The method of any one of examples 11–14 wherein the first interventional device and the second interventional device are the same interventional device, and wherein the method further comprises cleaning the interventional device to remove the portion of the clot material.

16. The method of any one of examples 11–15, further comprising engaging the second interventional device with remaining clot material in the blood vessel.

17. The method of one of examples 11–16 wherein aspirating the elongated shaft includes—

coupling a syringe to the elongated shaft via a stopcock, wherein opening of the stopcock fluidly connects the syringe to the elongated shaft, and wherein closing of the stopcock fluidly disconnects the syringe from the elongated shaft; drawing a plunger of the syringe to generate a vacuum while the stopcock is closed; and

opening the stopcock to apply the vacuum to the elongated shaft to thereby aspirate, into the elongated shaft, at least a portion of clot material remaining at the treatment site in the blood vessel.

18. A method for the intravascular treatment of clot material from a treatment site within a blood vessel of a human patient, the method comprising:

engaging an interventional device with the clot material at the treatment site in the blood vessel;

retracting the interventional device and a portion of the clot material into a distal portion of a lumen of an elongated shaft;

unsealing an attachment member coupled to a proximal portion of the elongated shaft;

withdrawing the interventional device and the portion of the clot material through the lumen of the elongated shaft and through the attachment member;

sealing the attachment member;

aspirating the elongated shaft; and

advancing the same or a different interventional device distally through the lumen of the elongated shaft to the treatment site.

19. The method of example 18 wherein unsealing the attachment member includes exercising a valve of the attachment member such that a lumen of the attachment member has a diameter that is about equal to a diameter of the lumen of the elongated shaft.

20. The method of example 18 or 19, further comprising:

engaging the same or the different interventional device with clot material remaining in the blood vessel; and

retracting the same or the different interventional device and a portion of the remaining clot material into the distal portion of the lumen of the elongated shaft;

unsealing the attachment member; and

withdrawing the same or the different interventional device and the portion of the remaining clot material through the lumen of the elongated shaft and through the attachment member.

VI. Conclusion

[0101] The above detailed descriptions of embodiments of the technology are not intended to be exhaustive or to limit the technology to the precise form disclosed above. Although specific embodiments of, and examples for, the technology are described above for illustrative purposes, various equivalent modifications are possible within the scope of the technology as those skilled in the relevant art will recognize. For example, although steps are presented in a given order, alternative embodiments may perform steps in a different order. The various embodiments described herein may also be combined to provide further embodiments.

[0102] From the foregoing, it will be appreciated that specific embodiments of the technology have been described herein for purposes of illustration, but well-known structures and functions have not been shown or described in detail to avoid unnecessarily obscuring the description of the embodiments of the technology. Where the context permits, singular or plural terms may also include the plural or singular term, respectively.

[0103] Moreover, unless the word "or" is expressly limited to mean only a single item exclusive from the other items in reference to a list of two or more items, then the use of "or" in such a list is to be interpreted as including (a) any single item in the list, (b) all of the items in the list, or (c) any combination of the items in the list. Additionally, the term "comprising" is used throughout to mean including at least the recited feature(s) such that any greater number of the same feature and/or additional types of other features are not precluded. It will also be appreciated that specific embodiments have been described herein for purposes of illustration, but that various modifications may be made without deviating from the technology. Further, while advantages associated with some embodiments of the technology have been described in the context of those embodiments, other embodiments may also exhibit such advantages, and not all embodiments need necessarily exhibit such advantages to fall within the scope of the technology. Accordingly, the disclosure and associated technology can encompass other embodiments not expressly shown or described herein.

CLAIMS

I/We claim:

1. An aspiration system, comprising:
 - a vacuum source;
 - connection tubing fluidically coupled to the vacuum source;
 - a catheter fluidically coupled to the vacuum source;
 - a filter chamber coupled to the connection tubing at a location apart from the vacuum source, wherein the filter chamber comprises a housing and a filter within the housing, and wherein the housing includes—
 - a port configured to be fluidically coupled to the catheter; and
 - a fluid connector configured to be coupled to the connection tubing; andwherein the filter is in the housing along a first flow path, wherein the filter fluidically couples the port and the fluid connector, and wherein the catheter is fluidically coupled to the vacuum source via the filter chamber along the first flow path;
 - a flow controller fluidically coupling the filter chamber to the catheter, wherein the flow controller is along the first flow path between the filter chamber and the catheter such that flow from the catheter to the filter chamber is controlled proximate to the catheter; and
 - a hemostasis valve fluidically coupled to the catheter along a second flow path at least partially different than the first flow path, wherein the hemostasis valve is configured to maintain hemostasis by preventing proximal fluid flow along the second flow path when an interventional device is inserted through the hemostasis valve and the catheter.
2. The aspiration system of claim 1 wherein the flow controller comprises a flow control unit between the filter chamber and the catheter.

3. The aspiration system of claim 2 wherein the flow control unit comprises a user-actuable valve.
4. The aspiration system of claim 1 wherein the catheter is fluidically connected in serial to the catheter along the first flow path.
5. The aspiration system of claim 1, further comprising the interventional device.
6. The aspiration system of claim 5 wherein the interventional device is configured to be inserted through the hemostasis valve and the catheter past a distal end portion of the catheter.
7. The aspiration system of claim 6 wherein the interventional device comprises:
an elongate shaft having a distal portion; and
a clot engagement member coupled to a distal portion of the elongate shaft, wherein the clot engagement member is shaped and sized to disrupt clot material.
8. The aspiration system of claim 1 wherein the filter is removable from within the housing.
9. The aspiration system of claim 1 wherein the filter chamber is removably coupled to the connection tubing.
10. The aspiration system of claim 1 wherein the filter is coupled around the fluid connector, and wherein the filter includes a plurality of pores sized to inhibit clot material from flowing therethrough and to permit blood to flow therethrough.
11. The aspiration system of claim 1 wherein a distal portion of the first flow path and a distal portion of the second flow path overlap.

12. An aspiration system, comprising:
 - a vacuum source;
 - a catheter fluidically coupled to the vacuum source via a first flow path;
 - a filter chamber along the first flow path and spaced apart from the vacuum source, wherein the filter chamber comprises a housing and a filter within the housing, and wherein the housing includes—
 - a first port configured to be fluidically coupled to the catheter; and
 - a second port configured to be fluidically coupled to the vacuum source; andwherein the filter is in the housing along the first flow path between the first port and the second port;
 - a flow controller fluidically coupling the filter chamber to the catheter, wherein the flow controller is along the first flow path between the filter chamber and the catheter such that flow from the catheter to the filter chamber is controlled proximate to the catheter; and
 - a hemostasis valve fluidically coupled to the catheter along a second flow path at least partially different than the first flow path, wherein the hemostasis valve is configured to maintain hemostasis by preventing proximal fluid flow along the second flow path when an interventional device is inserted through the hemostasis valve and the catheter.
13. The aspiration system of claim 12 wherein the flow controller comprises a flow control unit between the filter chamber and the catheter.
14. The aspiration system of claim 13 wherein the flow control unit comprises a user-actuable valve.
15. The aspiration system of claim 12 wherein the first flow path is fluidically connected in serial to the second flow path.
16. The aspiration system of claim 12, further comprising the interventional device.

17. The aspiration system of claim 16 wherein the interventional device is configured to be inserted through the hemostasis valve and the catheter past a distal end portion of the catheter.

18. The aspiration system of claim 17 wherein the interventional device comprises:
an elongate shaft having a distal portion; and
a clot engagement member coupled to a distal portion of the elongate shaft, wherein the clot engagement member is shaped and sized to disrupt clot material.

19. The aspiration system of claim 12 wherein the filter is removable from within the housing.

20. The aspiration system of claim 12 wherein the filter chamber is removably coupled along the first flow path.

21. The aspiration system of claim 12 wherein the filter is coupled around the second port, and wherein the filter includes a plurality of pores sized to inhibit clot material from flowing therethrough and to permit blood to flow therethrough.

22. The aspiration system of claim 12 wherein a distal portion of the first flow path and a distal portion of the second flow path overlap.

ABSTRACT OF THE DISCLOSURE

Systems and methods for the intravascular treatment of clot material within a blood vessel of a human patient are disclosed herein. A method in accordance with embodiments of the present technology can include, for example, engaging an interventional device of a catheter system with clot material in a blood vessel and withdrawing the interventional device and the portion of the clot material through a guide catheter. In some embodiments, the catheter system can include an attachment/valve member coupled to a proximal portion of the guide catheter, and the method can include unsealing the attachment/valve member to facilitate withdrawing the interventional device through the attachment/valve member without significant retention of clot material within the attachment/valve member. The method can further include resealing and aspirating the guide catheter before advancing another interventional device to the clot material to again engage and remove clot material from the blood vessel.

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	111552.8023.US06
		Application Number	
Title of Invention	SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS		
<p>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.</p> <p>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.</p>			

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Attorney Docket Number	111552.8023.US06	Small Entity Status Claimed	☐
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	111552.8023.US06
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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

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Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	17/865307	2022-07-14

Application Data Sheet 37 CFR 1.76		Attorney Docket Number		111552.8023.US06	
		Application Number			
Title of Invention		SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS			

Prior Application Status		Pending		Remove	
Application Number		Continuity Type		Filing or 371(c) Date (YYYY-MM-DD)	
17/865307		Continuation of		2021-10-11	
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
17/498642	Continuation of	16/258344	2019-01-25	11154314	2021-10-26
Prior Application Status		Expired		Remove	
Application Number		Continuity Type		Filing or 371(c) Date (YYYY-MM-DD)	
16/258344		Claims benefit of provisional		2018-01-26	
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button. Add					

Foreign Priority Information:

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).

			Remove
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button. Add			

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	111552.8023.US06
		Application Number	
Title of Invention	SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS		

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.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

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)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ 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	111552.8023.US06
		Application Number	
Title of Invention	SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS		

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		
<p>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.</p> <p style="text-align: right;">Clear</p>			
☒ Assignee	☐ Legal Representative under 35 U.S.C. 117		
☐ Person to whom the inventor is obligated to assign.	☐ Person who shows sufficient proprietary interest		
<p>If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:</p> <p></p>			
<p>Name of the Deceased or Legally Incapacitated Inventor: <input type="text"/></p>			
<p>If the Applicant is an Organization check here. ☒</p>			
Organization Name	Inari Medical, Inc.		
Mailing Address Information For Applicant:			
Address 1	6001 Oak Canyon, Suite #100		
Address 2			
City	Irvine	State/Province	CA
Country	US	Postal Code	92618
Phone Number		Fax Number	
Email Address			
<p>Additional Applicant Data may be generated within this form by selecting the Add button. Add</p>			

Assignee Information including Non-Applicant Assignee 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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	111552.8023.US06
		Application Number	
Title of Invention	SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS		

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. ☐

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		State/Province	
Country ⁱ		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the **INITIAL** filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

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

Signature	/Matthew S. Williams/		Date (YYYY-MM-DD)	2023-07-25
First Name	Matthew S.	Last Name	Williams	Registration Number
			77,516	

Additional Signature may be generated within this form by selecting the Add button.

Add

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	111552.8023.US06
		Application Number	
Title of Invention	SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS		

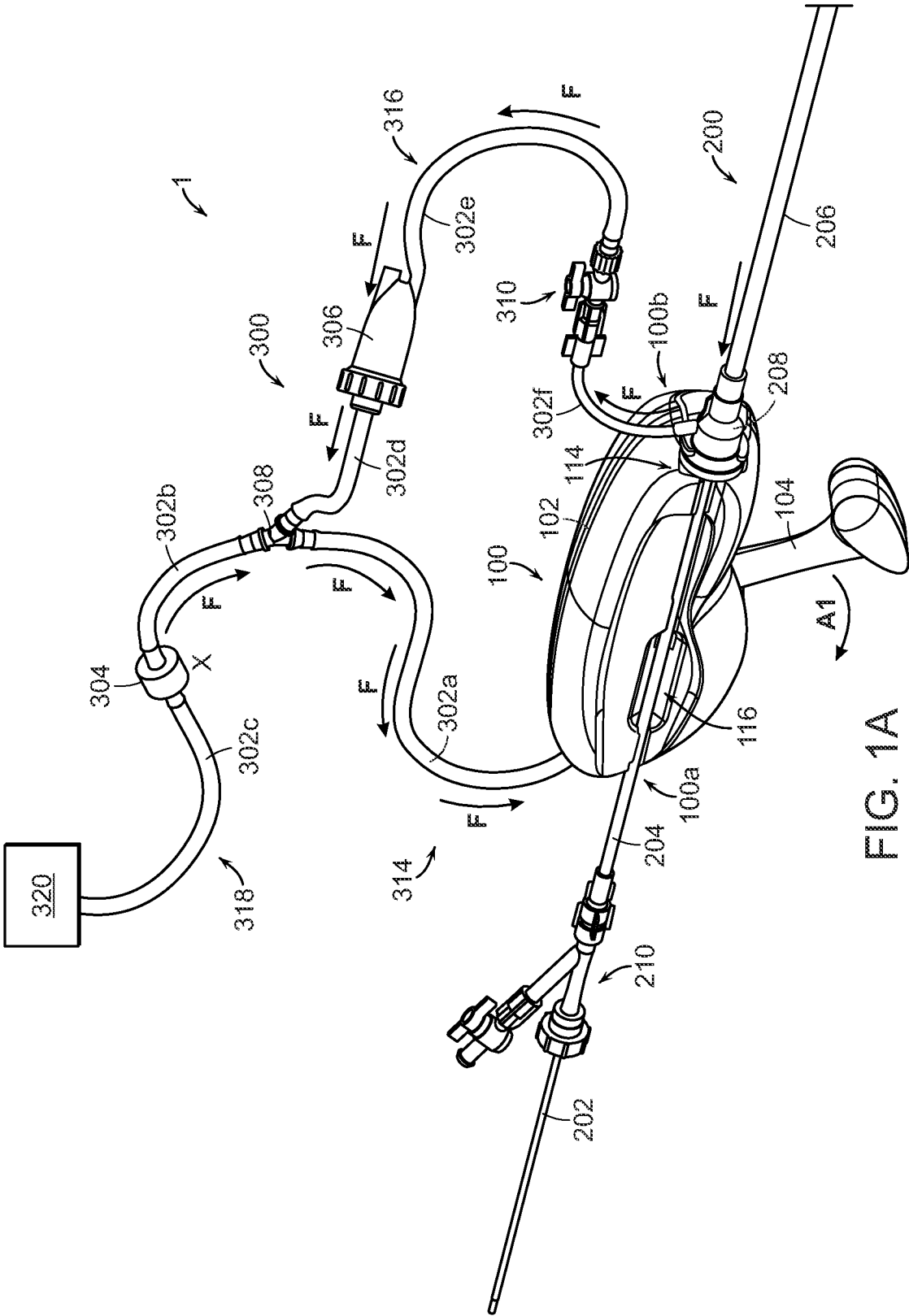
This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes 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.**

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 the Freedom of Information Act requires disclosure of these records.
- 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 inspections 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.



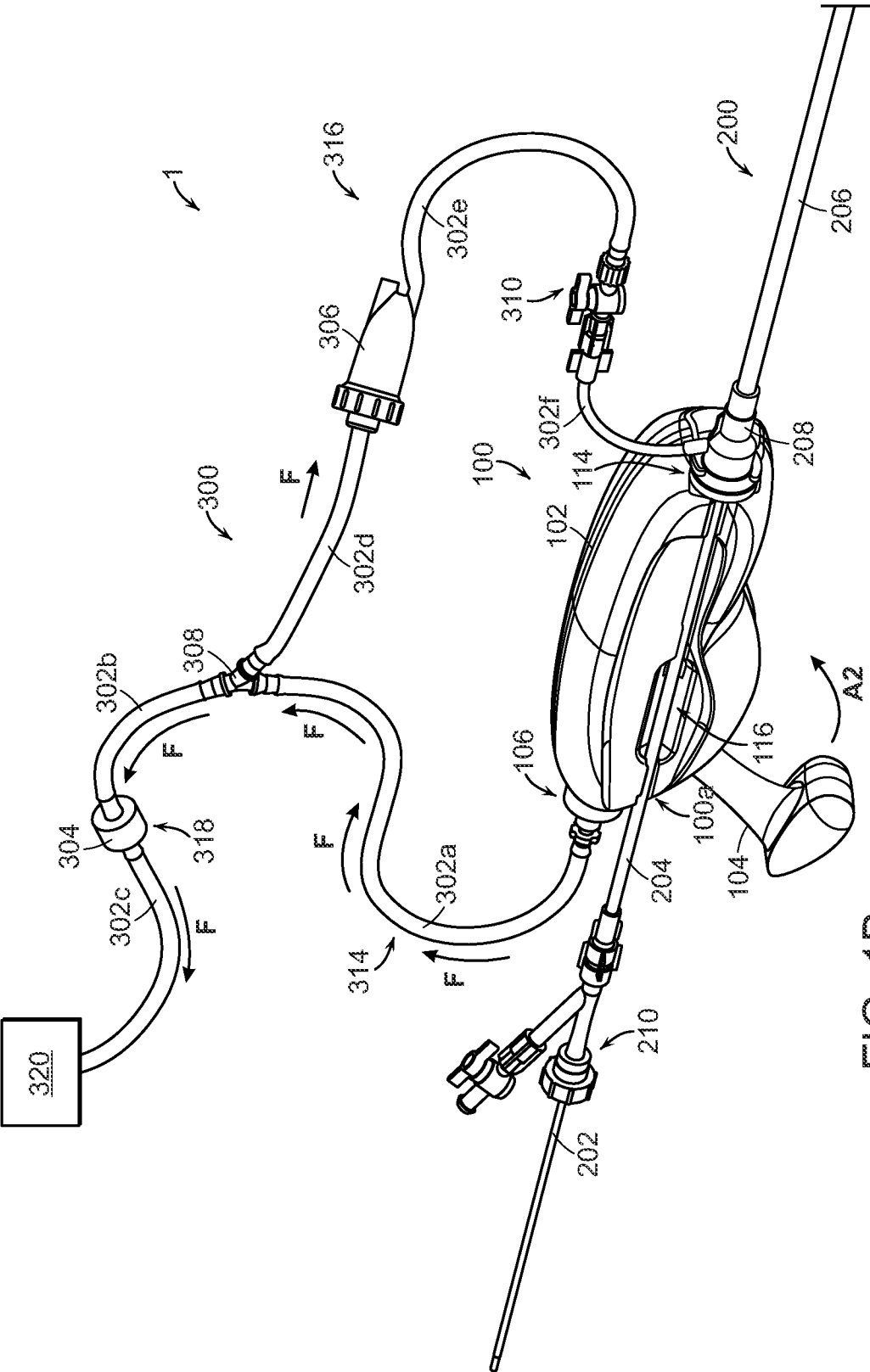


FIG. 1B

3/20

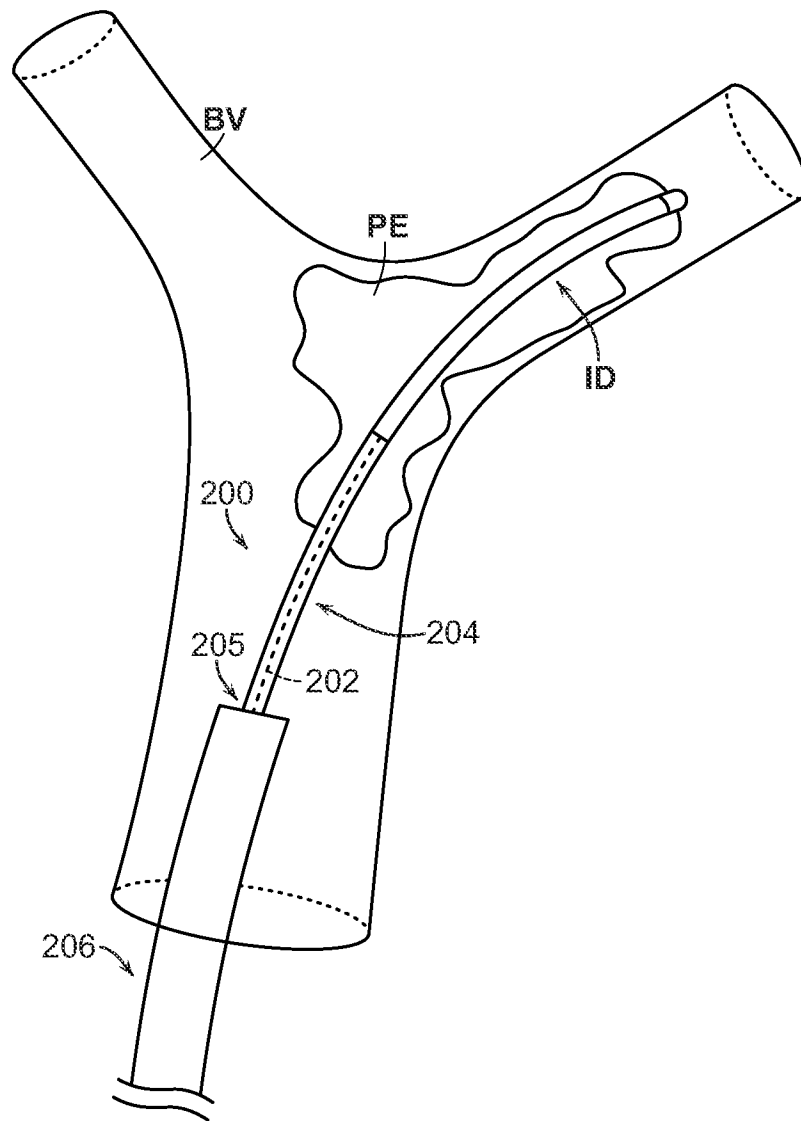


FIG. 2A

4/20

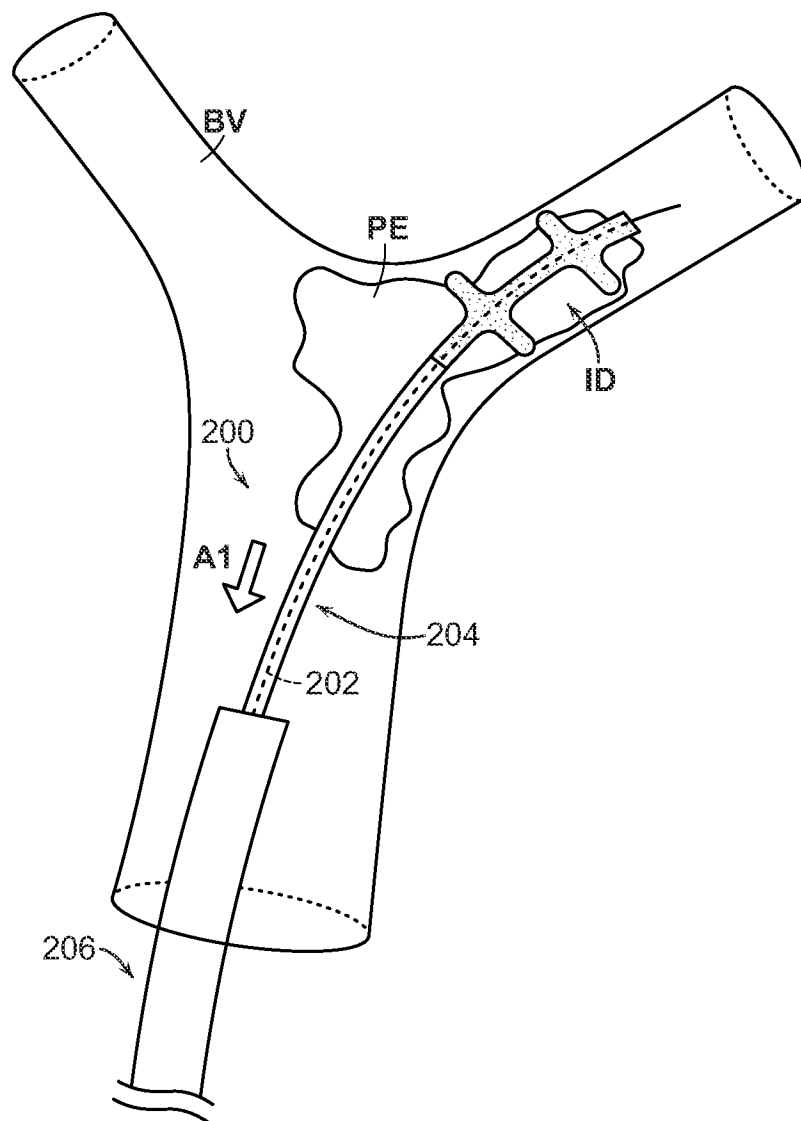


FIG. 2B

5/20

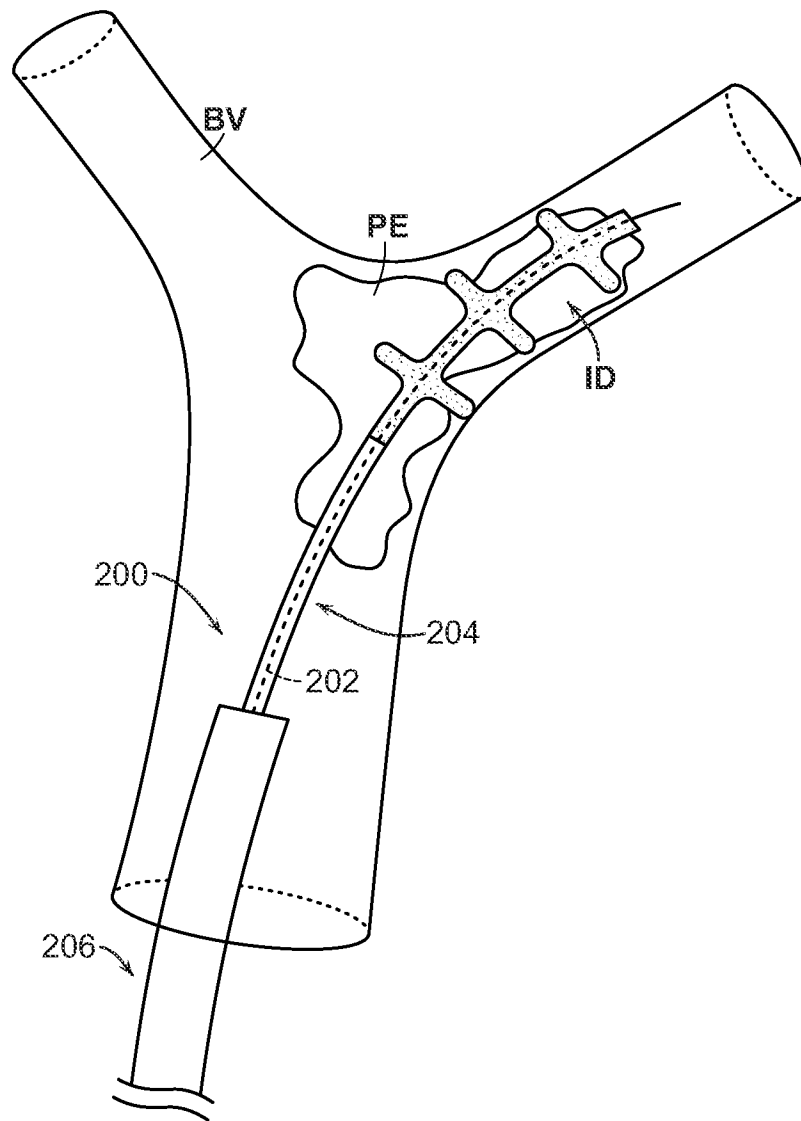


FIG. 2C

6/20

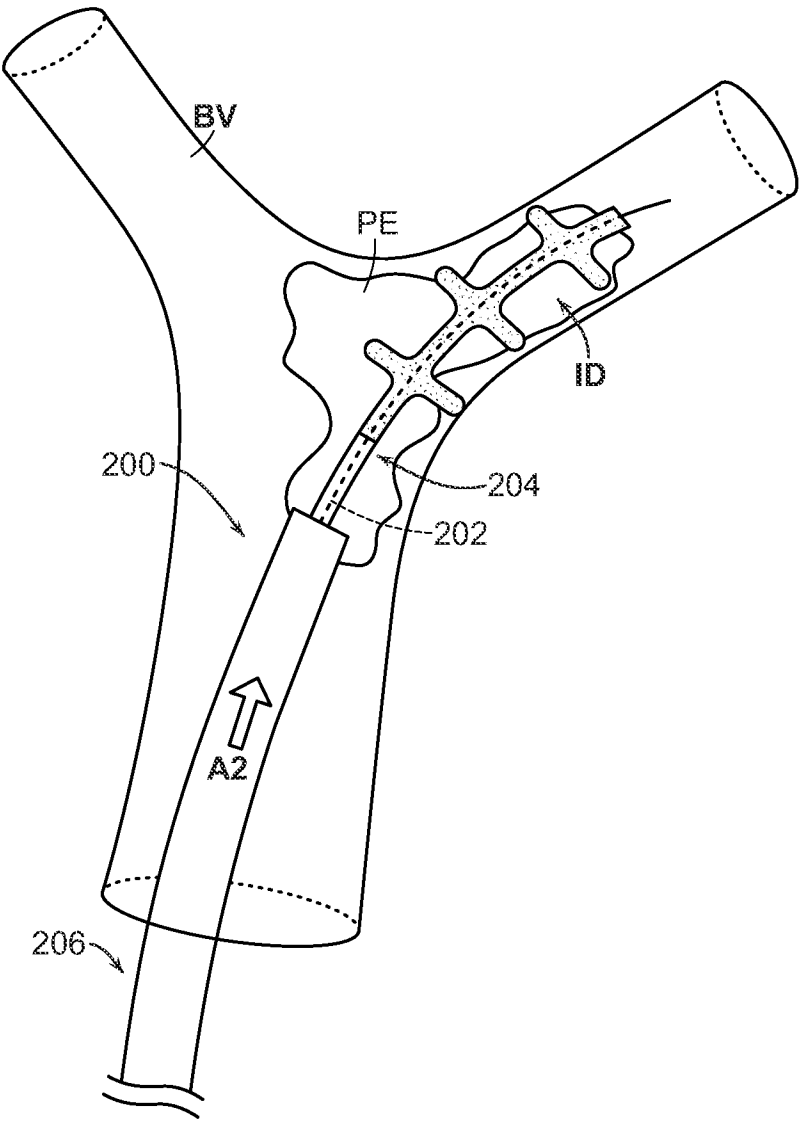


FIG. 2D

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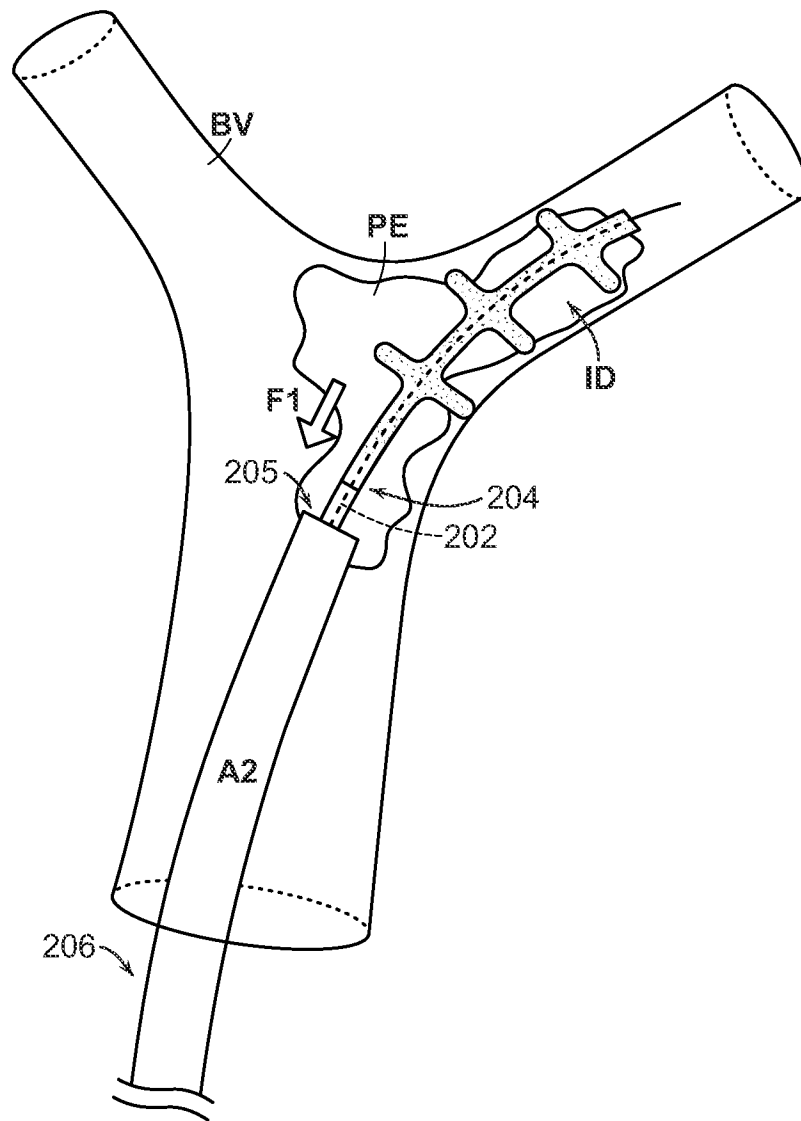


FIG. 2E

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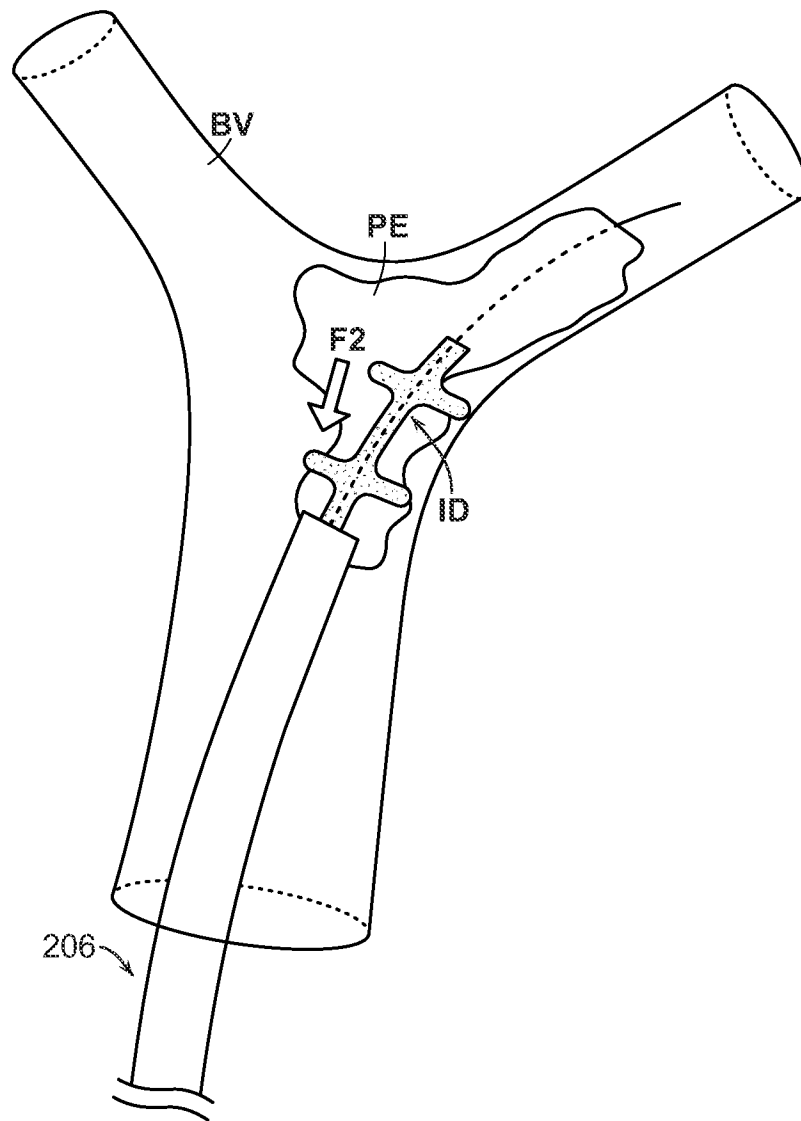


FIG. 2F

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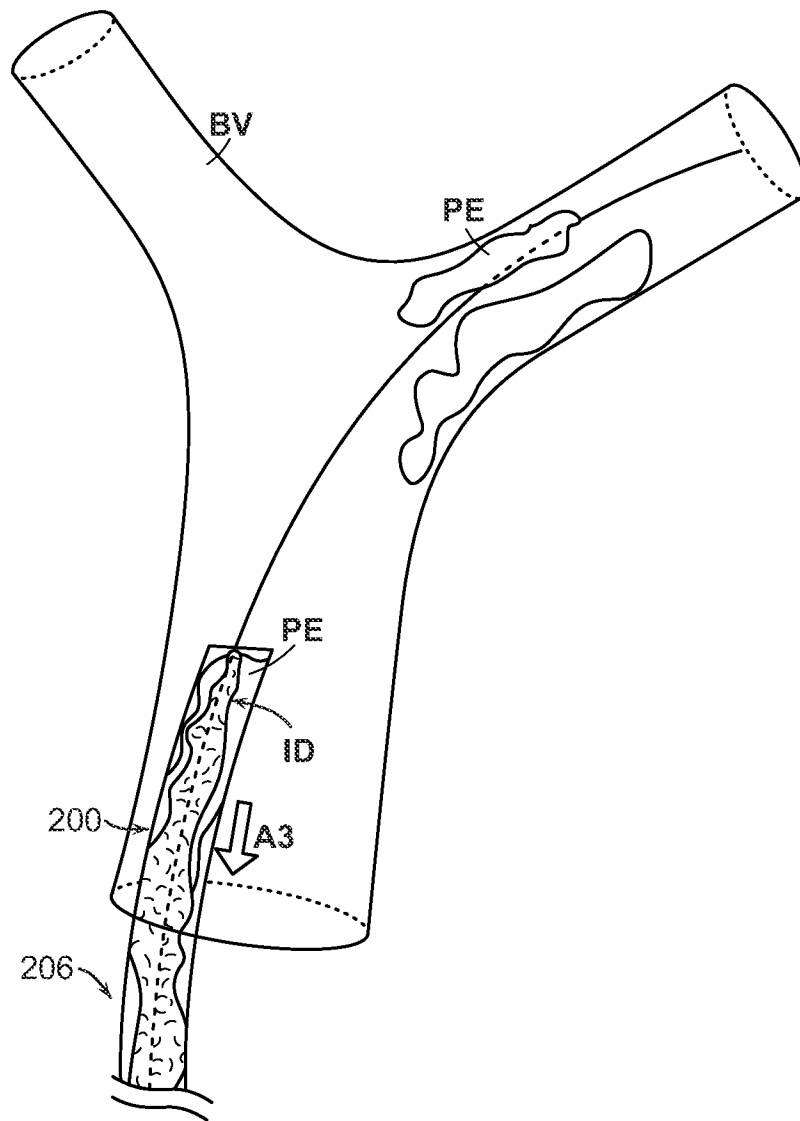


FIG. 2G

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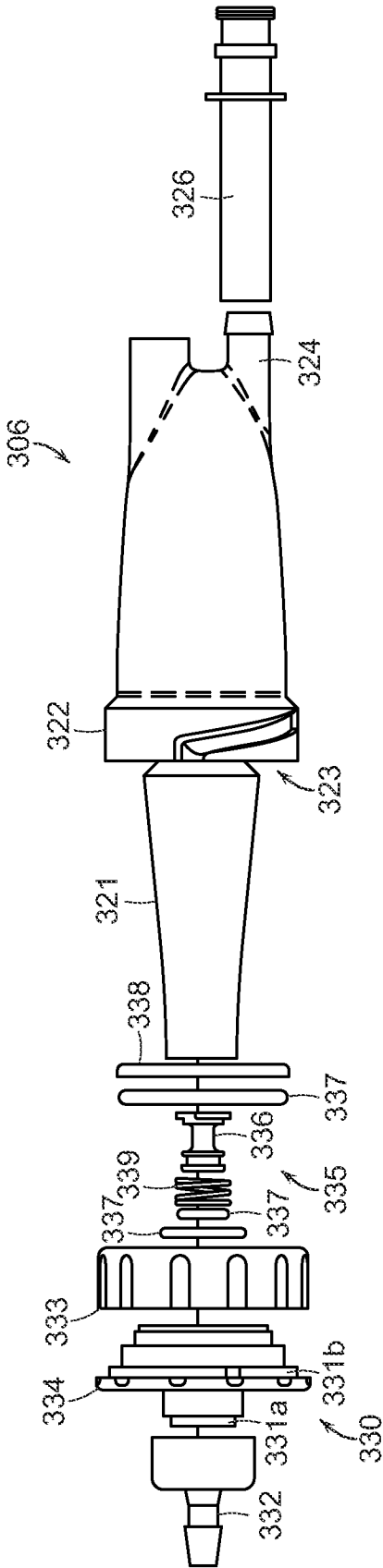


FIG. 3A

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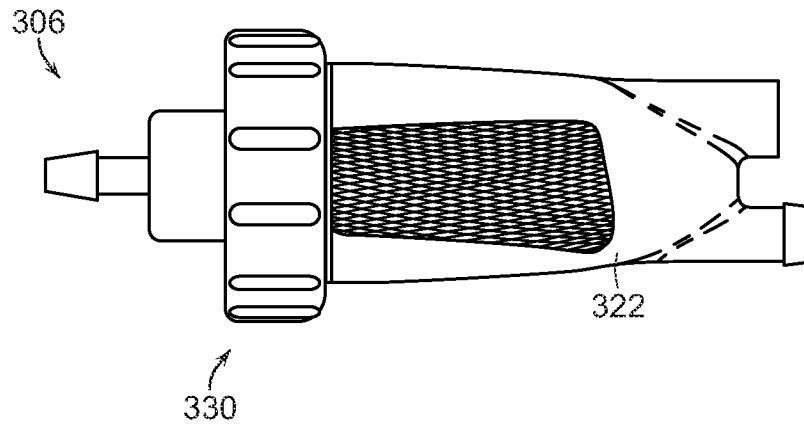


FIG. 3B

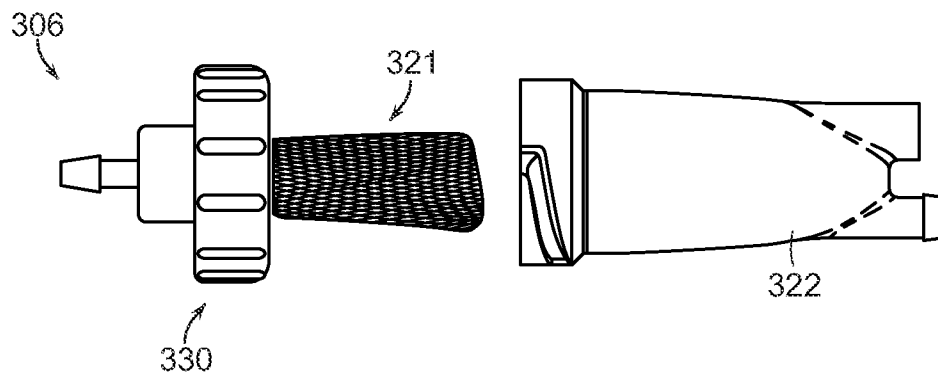


FIG. 3C

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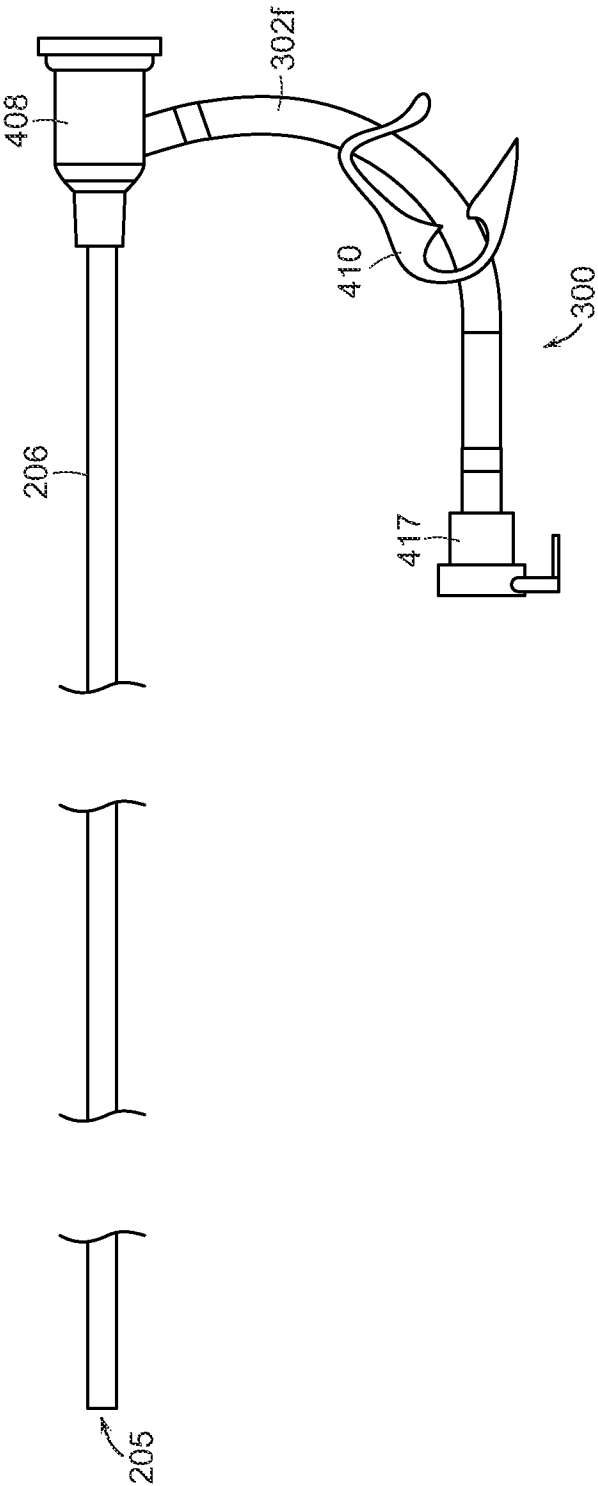


FIG. 4

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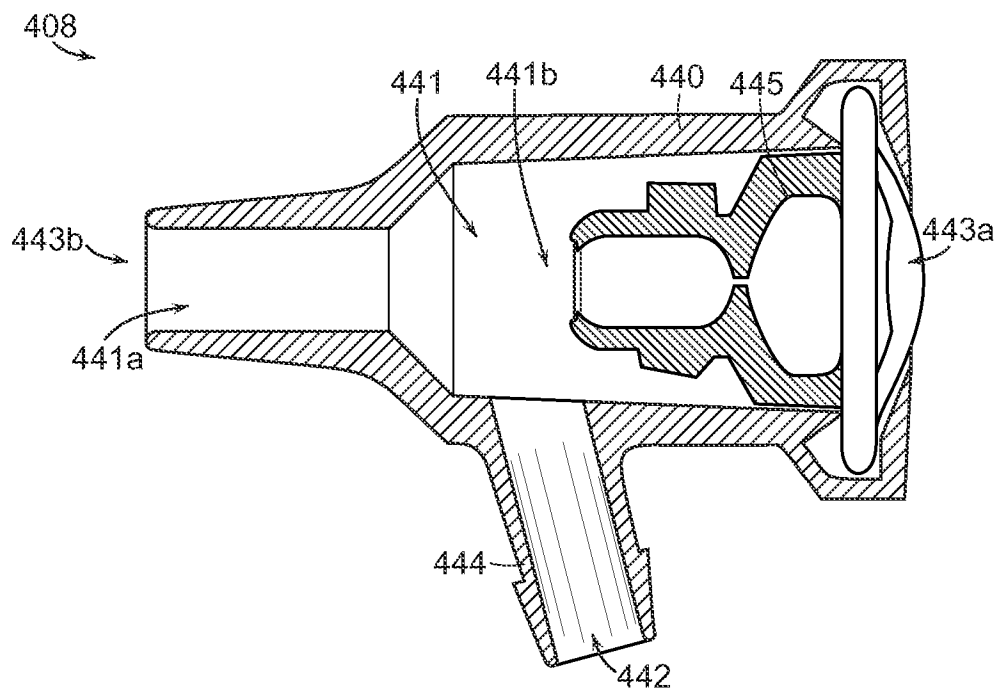


FIG. 5

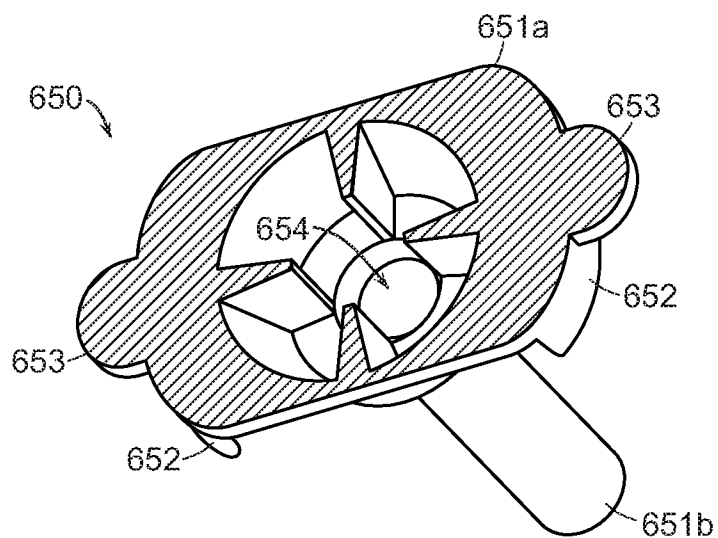


FIG. 6

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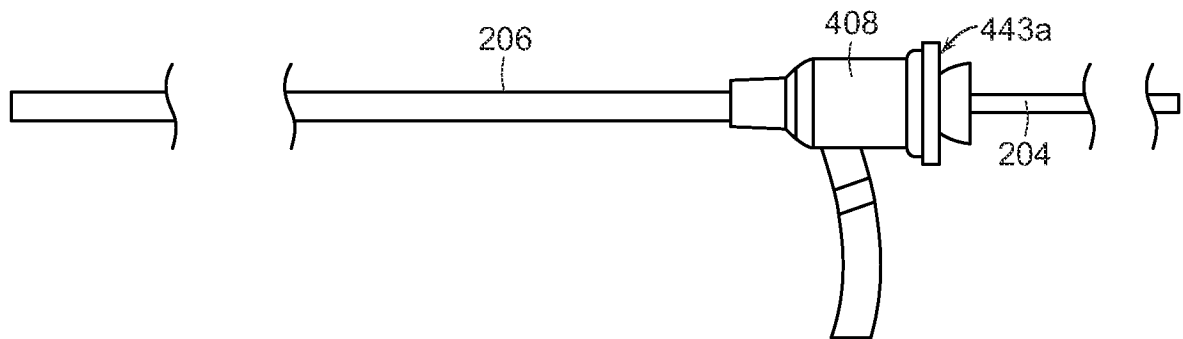


FIG. 7A

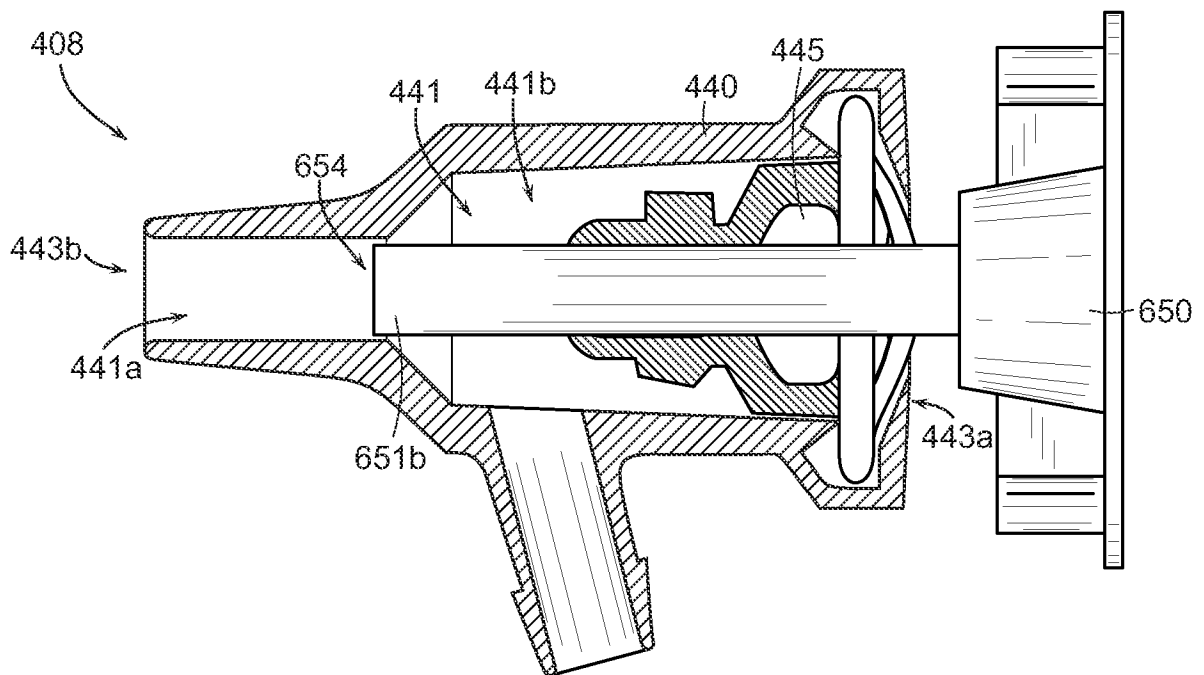


FIG. 7B

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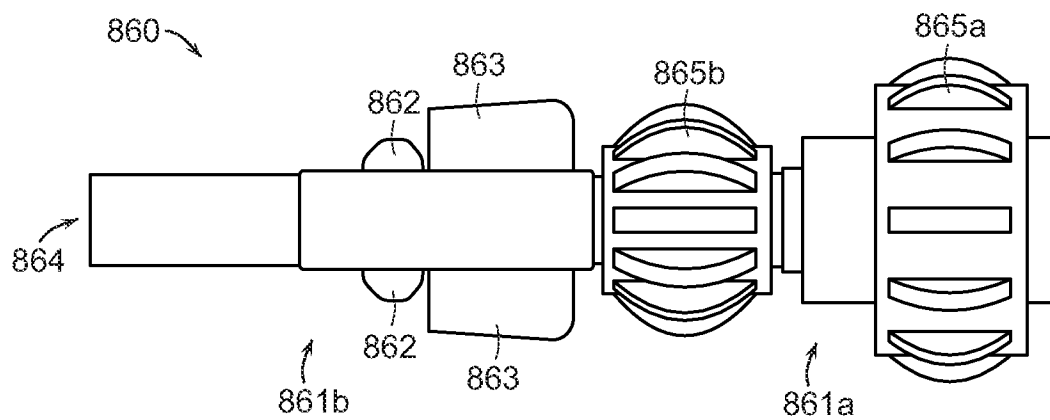


FIG. 8

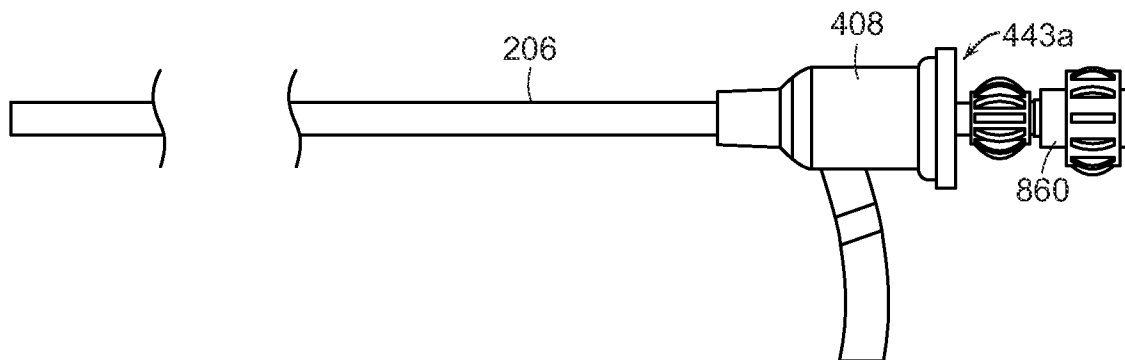


FIG. 9

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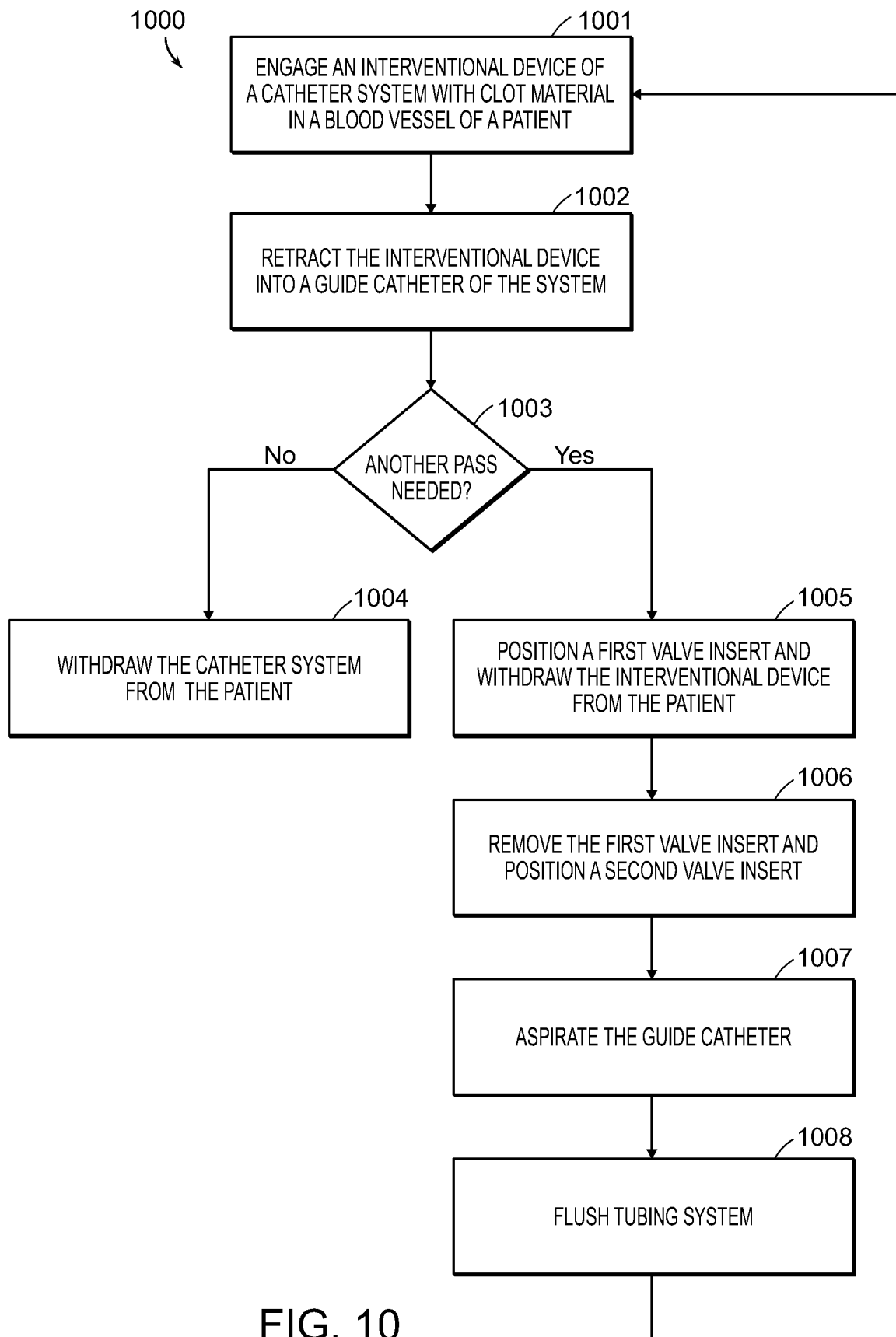


FIG. 10

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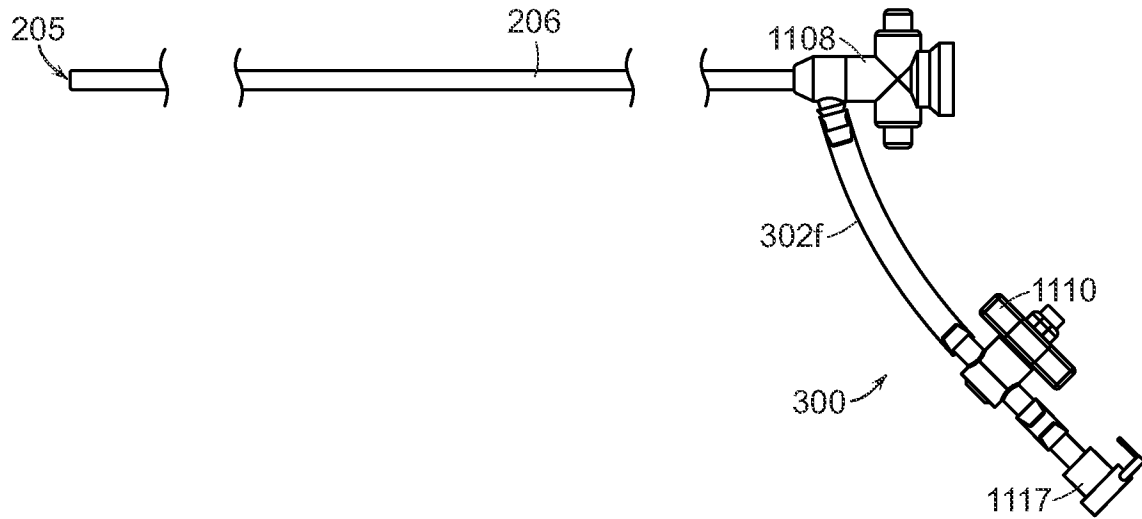


FIG. 11

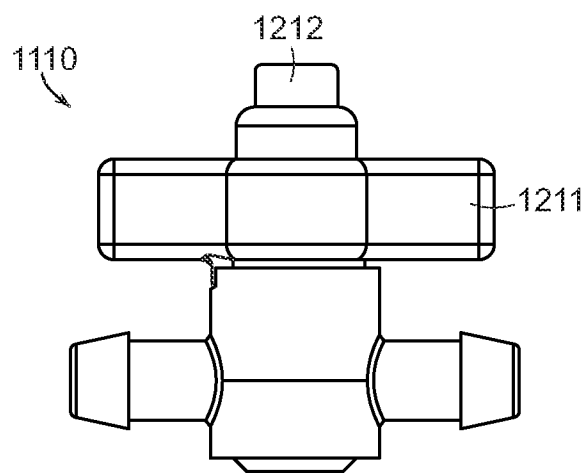


FIG. 12

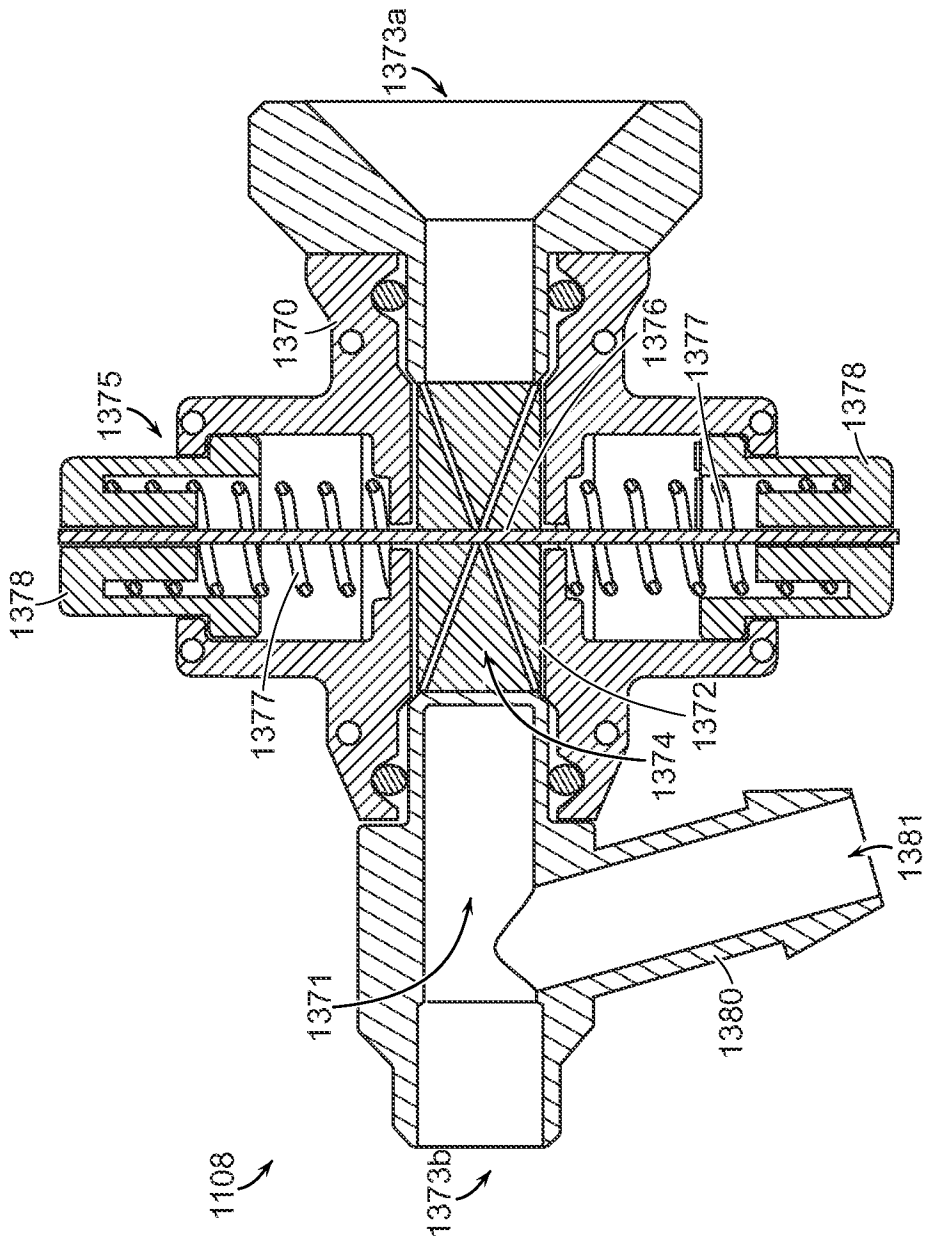


FIG. 13A

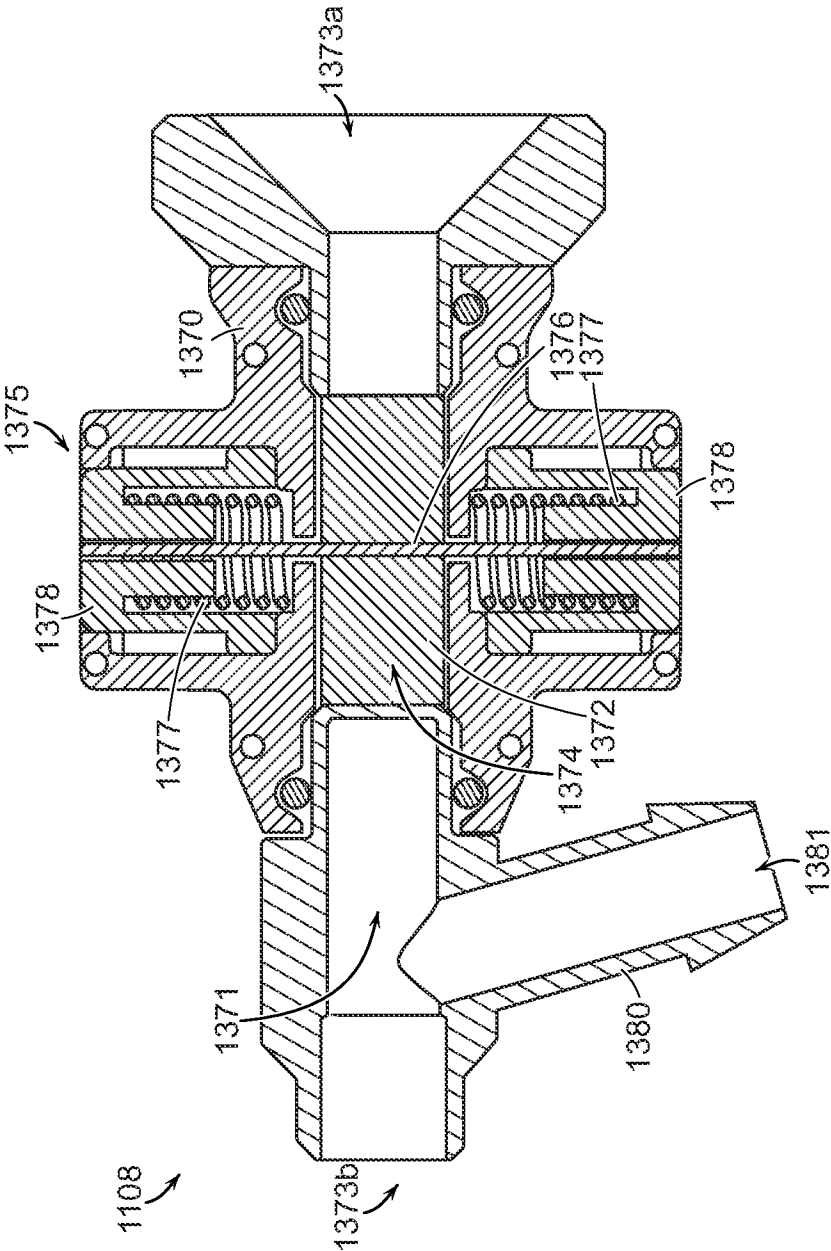


FIG. 13B

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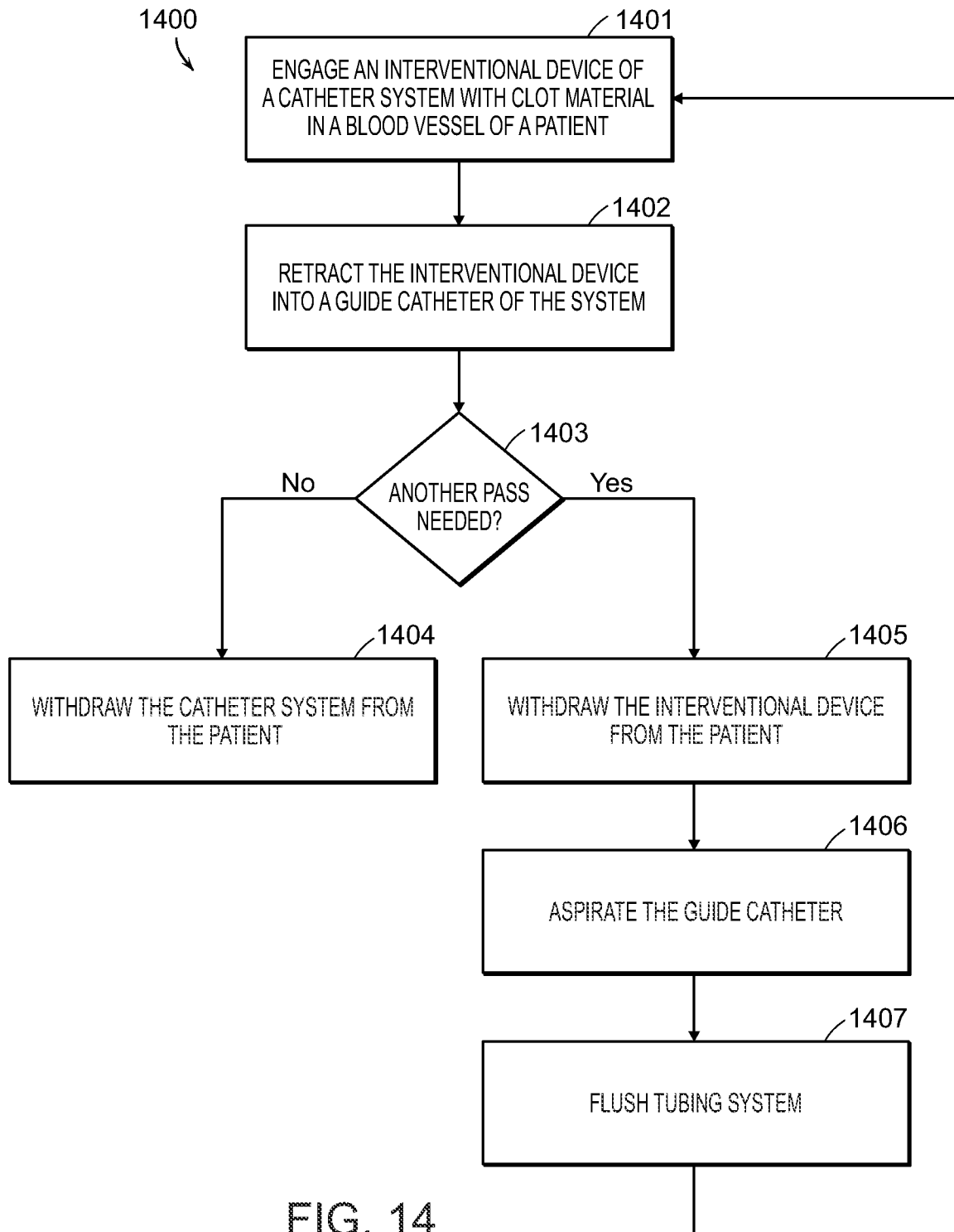


FIG. 14

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number

Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)



I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above:

25096

OR



I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:



The address associated with the above-mentioned Customer Number

OR



The address associated with Customer Number:

OR



Firm or Individual Name

Address

City

State

Zip

Country

Telephone

Email

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Inari Medical, Inc.



Inventor or Joint Inventor (title not required below)



Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)



Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)



Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature

Date (Optional)

10 Dec 2021

Name

Brian Strauss

Title

Vice President, Inari Medical, Inc.

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.



Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. 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 3 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.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS
--------------------	---

As the below named inventor, I hereby declare that:

This declaration ☐ The attached application, or
is directed to:

☒ United States application or PCT international application number 16/258,344
filed on January 25, 2019

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.

I hereby state that I have reviewed and understand the contents of the above identified application, including the claims, as amended by any amendment.

I acknowledge the duty to disclose information material to patentability as defined in 37 C.F.R. 1.56 including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

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: Richard Quick

Date: 10/21/19

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.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	Not Yet Assigned
Filing Date	Concurrently Herewith
First Named Inventor	Richard Quick
Title	SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS
Art Unit	Not Yet Assigned
Examiner Name	Not Yet Assigned
Attorney Docket Number	111552.8023.US06

SIGNATURE of Applicant or Patent Practitioner

Signature	/Matthew S. Williams/	Date (Optional)	2023-07-25
Name	Matthew S. Williams	Registration Number	77,516
Title (if Applicant is a juristic entity)	Attorney for Applicant		
Applicant Name (if Applicant is a juristic entity)	Inari Medical, Inc.		

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.



*Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. 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 3 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.**



ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
18/358,837

RECEIPT DATE / TIME
07/25/2023 07:11:48 PM ET

ATTORNEY DOCKET #
111552.8023.US06

Title of Invention

SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYSTEMS AND METHODS

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 6598

FILED BY J iYoung Anderson

PATENT CENTER # 62503710

FILING DATE -

CUSTOMER # 25096

FIRST NAMED INVENTOR Richard Quick

CORRESPONDENCE ADDRESS -

AUTHORIZED BY Matthew Williams

Documents

TOTAL DOCUMENTS: 9

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2023-7-25 General Fee Autho - 111552.8023US6.PDF	2	Authorization for Extension of Time all replies	94 KB
US_POA-signed_2021- Inari.PDF	1	Power of Attorney	106 KB
Declaration-parent-111552- 8023US6.PDF	1	Oath or Declaration filed	286 KB
POA_Transmittal-111552- 8023US6.PDF	1	Power of Attorney	631 KB
Track-One-Request-111552- 8023US06.PDF	2	Track One Request	857 KB

ADS - 111552-8023US6.PDF	8	Application Data Sheet	1781 KB
Track One CON Application - 111552-8023US6-APP.TEXT.DOCX	41	Application body structured text document	72 KB

Warning: Bookmarks were found and have been removed.

Track One CON Application - 111552-8023US6 - pto.PDF	41	Auxiliary PDF of Application	183 KB
Drawings-111552-8023US6-uspto.PDF	20	Drawings-only black and white line drawings	1931 KB

Digest

DOCUMENT

MESSAGE DIGEST(SHA-512)

2023-7-25 General Fee Autho - 111552.8023US6.PDF	DA8E179DB32A8DB3C17FE58E854E6645C90163FE8778EFF9C E8C1DD2226BF66C196A2957F10E61FC60713342E591E6C5108 670ED0EF2116B02F4378AE9869DBB
US_POA-signed_2021-Inari.PDF	3E41A25D6AE5AA5C420DCDF61DEC6623BF09B001635962F9B 62CA905552C41A768DA4A95A80BB1F15975CBDC9350C70526 105B775C762F739AFD7BF8EADB57E5
Declaration-parent-111552-8023US6.PDF	A35A9687D05795DBDABD0898F85B4F76A3138618A1D113A9C 61F4C720D7C5D78FB6048C80C1D5A2A28486B8BCFB4CDFE0 450597BFCAC35AA73DB071AA7841493
POA_Transmittal-111552-8023US6.PDF	3D114C1E0A4331C1EEBF6141930BBD0AFC253CBFD36206042 A77D44F45BC46AE878CE79F3EA6F93045421215D07A4C7CE2 6E8748CCD2973059C121EF2701A9F4
Track-One-Request-111552-8023US06.PDF	8B4DF28EE4F70FB7BA7F9BAB3A44B0816979F08438483AC65 A71633959626BD0A06DCDDD345BAF4ED3BC810E2CCD5E8D B30F4B29EEF71D3E4C795170627A6420

ADS - 111552-8023US6.PDF	99A23FBB5ED1CB32E81D04DBAF5770D3E2E19D9B3F84A913 C0C3AB8CE509188FE488D7D055256E76C75789BF736C53E7F 180F1C3C26E86A1CB6DF310815BA731
Track One CON Application - 111552-8023US6- APP.TEXT.DOCX	7B7FE3051AB7F15DE3A02F5D4E76DFE6E7067DCA11ADB35F 1D1001B048499237C16DCDA24C207B174412A5205515B26FC C2F8C7730514DF7D0EB2B7550276A3C
Track One CON Application - 111552-8023US6 - pto.PDF	54E0B6C27F33E4EB5FD46F92B4873909F89D47F5E3FA9A9935 2258B702303B88115124B1FB3CD13D956F8C7FA791922B529A 1B2FE9299F497204315B1BFE0B54
Drawings-111552-8023US6- uspto.PDF	090A4198DF6C6F771F54B7413667EF6B5DD817E83594305A69 1EC6C99ED792E61495CA77679542AB9D0D3D2F009996A92E3 F70F7EE3078DDE4303B1F6E5390BC

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 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.

**CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION
UNDER 37 CFR 1.102(e) (Page 1 of 1)**

First Named Inventor:	Richard Quick	Nonprovisional Application Number (if known):	Not Yet Assigned
Title of Invention:	SINGLE INSERTION DELIVERY SYSTEM FOR TREATING EMBOLISM AND ASSOCIATED SYS		

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS PRIORITIZED EXAMINATION FOR THE ABOVE-IDENTIFIED APPLICATION.

1. The processing fee set forth in 37 CFR 1.17(i)(1) and the prioritized examination fee set forth in 37 CFR 1.17(c) have been filed with the request. The publication fee requirement is met because that fee, set forth in 37 CFR 1.18(d), is currently \$0. The basic filing fee, search fee, and examination fee are filed with the request or have been already been paid. I understand that any required excess claims fees or application size fee must be paid for the application.
2. I understand that the application may not contain, or be amended to contain, more than four independent claims, more than thirty total claims, or any multiple dependent claims, and that any request for an extension of time will cause an outstanding Track I request to be dismissed.
3. The applicable box is checked below:

I. ☒ Original Application (Track One) - Prioritized Examination under § 1.102(e)(1)

- i. (a) The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a). This certification and request is being filed with the utility application via EFS-Web.
---OR---
(b) The application is an original nonprovisional plant application filed under 35 U.S.C. 111(a). This certification and request is being filed with the plant application in paper.
- ii. An executed inventor's oath or declaration under 37 CFR 1.63 or 37 CFR 1.64 for each inventor, or the application data sheet meeting the conditions specified in 37 CFR 1.53(f)(3)(i) is filed with the application.

II. ☐ Request for Continued Examination - Prioritized Examination under § 1.102(e)(2)

- i. A request for continued examination has been filed with, or prior to, this form.
- ii. If the application is a utility application, this certification and request is being filed via EFS-Web.
- iii. The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a), or is a national stage entry under 35 U.S.C. 371.
- iv. This certification and request is being filed prior to the mailing of a first Office action responsive to the request for continued examination.
- v. No prior request for continued examination has been granted prioritized examination status under 37 CFR 1.102(e)(2).

Signature /Matthew S. Williams/	Date 2023-07-25
Name Matthew S. Williams (Print/Typed)	Practitioner 77,516 Registration Number

Note: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required.*

☒ *Total of 1 forms are submitted.

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.