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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/598,482	03/07/2024	Benjamin E. Merritt	111552.8016.US07	3249

25096 7590 10/08/2024

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

EXAMINER
VU, QUYNH-NHU HOANG

ART UNIT	PAPER NUMBER
3783	

NOTIFICATION DATE	DELIVERY MODE
10/08/2024	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

Imperative Care v. Inari Medical
US Patent 12,109,384
Imperative Care Ex. 1002

APPLICATION NO.	ISSUE DATE	PATENT NO.
18/598,482	08-Oct-2024	12109384

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

EGRANT NOTIFICATION

Your electronic patent grant (eGrant) is now available, which can be accessed via Patent Center at https://patentcenter.uspto.gov

The electronic patent grant is the official patent grant under 35 U.S.C. 153. For more information, please visit https://www.uspto.gov/electronicgrants

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/598,482	10/08/2024	12109384	111552.8016.US07	3249

25096 7590 09/18/2024

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):

Benjamin E. Merritt, San Clemente, CA;
John C. Thress, Capistrano Beach, CA;
Paul Lubock, Monarch 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.

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)
2024-09-09	(Date)

APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO	CONFIRMATION NO
18/598,482	Mar 7, 2024	Benjamin E. Merritt	111552.8016.US07	3249

TITLE OF INVENTION: HEMOSTASIS VALVES AND METHODS OF USE

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	2024-10-28

EXAMINER	ART UNIT	CLASS-SUBCLASS
Quynh-Nhu Hoang Vu	3783	604-167030

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.

1. Perkins Coie LLP
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: 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 ☐ Government

4a. Fees Submitted: ☑ Issue Fee ☐ Publication Fee (if required)

4b. Method of Payment (*Please first reapply any previously paid fee shown above*):

☑ Electronic Payment via Patent Center or EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. 50-0665

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

☐ Applicant certifying micro entity status. See 37 CFR 1.29. NOTE: Absent a valid Certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

☐ Applicant asserting small entity status. See 37 CFR 1.27. NOTE: If the application was previously under micro entity status, checking this box will be taken as a notification of loss of entitlement to micro entity status.

☐ Applicant changing to regular undiscounted fee 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 2024-09-09

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
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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/598,482	**09/09/2024 11:35:30 AM Z ET**	**111552.8016.US07**

Title of Invention

HEMOSTASIS VALVES AND METHODS OF USE

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	3249	FILED BY	JiYoung Anderson
PATENT CENTER #	67093710	FILING DATE	03/07/2024
CUSTOMER #	25096	FIRST NAMED INVENTOR	Benjamin E. Merritt
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Matthew Williams

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2024.9.9 Comments - 111552.8016.US07.pdf	2	Miscellaneous Incoming Letter	85 KB
2024.9.9 Issue Fee Transmittal 111552.8016.US07.pdf	2	Issue Fee Payment (PTO-85B)	238 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2024.9.9 Comments - 111552.8016.US07.pdf	AEEE9D94B0B76D74B8A4515F71650C03DF6A1C63D0E682BD 24ED287F69423214F4051DD1687A1BD5450591D6622AD79E09 43AF0C9477F4D8FE61BC0E021DB951

2024.9.9 Issue Fee Transmittal
111552.8016.US07.pdf

5BFD6500ED03E4CC28816ACB373E02ECBBE486F95C606B9F
135CBCCF828BC371CE974A85EE115A9C57A84865D7672A432
B7130A0D0FCB57323806A492A845BBB

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:
Benjamin E. Merritt et al.

Application No.: 18/598,482	Confirmation No.: 3249
Filed: March 7, 2024	Art Unit: 3783
For: HEMOSTASIS VALVES AND METHODS OF USE	Examiner: Quynh-Nhu Hoang Vu

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 July 26, 2024, the Examiner allowed claims 1–30. The Applicant acknowledges the 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 9, 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

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Alexandria, VA 22313 - 1450
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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/598,482	**09/09/2024 11:35:30 AM Z ET**	**111552.8016.US07**

Title of Invention

HEMOSTASIS VALVES AND METHODS OF USE

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	3249	FILED BY	JiYoung Anderson
PATENT CENTER #	67093710	AUTHORIZED BY	Matthew Williams
CUSTOMER #	25096	FILING DATE	03/07/2024
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Benjamin E. Merritt

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 5111	**E202499B36269104**	**JiYoung Anderson**

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

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UNITED STATES PATENT AND TRADEMARK OFFICE

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NOTICE OF ALLOWANCE AND FEE(S) DUE

25096 7590 07/26/2024

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PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

EXAMINER	
VU, QUYNH-NHU HOANG	
ART UNIT	**PAPER NUMBER**
3783	

DATE MAILED: 07/26/2024

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/598,482	03/07/2024	Benjamin E. Merritt	111552.8016.US07	3249

TITLE OF INVENTION: HEMOSTASIS VALVES AND METHODS OF USE

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	10/28/2024

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.**

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25096 7590 07/26/2024
PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

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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.
18/598,482	03/07/2024	Benjamin E. Merritt	111552.8016.US07	3249

TITLE OF INVENTION: HEMOSTASIS VALVES AND METHODS OF USE

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	10/28/2024

EXAMINER	ART UNIT	CLASS-SUBCLASS
VU, QUYNH-NHU HOANG	3783	604-167030

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑ Issue Fee ❑ Publication Fee (if required)

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via 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

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

❑ Applicant asserting small entity status. See 37 CFR 1.27

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

❑ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (11/23) Approved for use through 03/31/2026 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/598,482	03/07/2024	Benjamin E. Merritt	111552.8016.US07	3249

25096 7590 07/26/2024

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

EXAMINER	
VU, QUYNH-NHU HOANG	
ART UNIT	**PAPER NUMBER**
3783	

DATE MAILED: 07/26/2024

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. 18/598,482	Applicant(s) Merritt et al.	
	Examiner QUYNH-NHU H VU	Art Unit 3783	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 07/01/24.
   ☐ 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 _____.

/QUYNH-NHU H. VU/
Primary Examiner, Art Unit 3783

DETAILED ACTION

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.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been amended as follows:

Election/Restrictions

Claims 1-14 are allowable. The restriction requirement Groups I-III, as set forth in the Office action mailed on 05/08/24, has been reconsidered in view of the allowability of claims to the elected invention pursuant to MPEP § 821.04(a). **The restriction requirement is hereby withdrawn as to any claim that requires all the limitations of an allowable claim.** Specifically, the restriction requirement of 05/08/24 is withdrawn. Claims 15-30, directed to Groups II-III no longer withdrawn from consideration because the claim(s) requires all the limitations of an allowable claim.

In view of the above noted withdrawal of the restriction requirement, applicant is advised that if any claim presented in a divisional application is anticipated by, or includes all the limitations of, a claim that is allowable in the present application, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application.

Once a restriction requirement is withdrawn, the provisions of 35 U.S.C. 121 are no longer applicable. See In re Ziegler, 443 F.2d 1211, 1215, 170 USPQ 129, 131-32 (CCPA 1971). See also MPEP § 804.01.

Allowable Subject Matter

Claims 1-30 are allowed.

Reasons for Allowance

The following is an examiner's statement of reasons for allowance:

Regarding claim 1, the claim in this application have been allowed because the prior art of record fails to disclose either single or in combination the claimed a valve assembly including: a pair of actuators movable from a first position to a second position, wherein the first filament includes a first portion operably acted upon by a first one of the actuators and a second portion operably acted upon by a second one of the actuators; the second filament includes a first portion operably acted upon by the first one of the actuators and a second portion operably acted upon by the second one of the actuators; in the first position, the actuators are positioned to tension the first filament and the second filament thereby decreasing a dimension of the first loop and a dimension of the second loop to constrict the lumen of the tubular member; in the second position, the actuators are positioned to loosen the first filament and the second filament thereby permitting the tubular member to expand against the first loop and the second loop to increase the dimension of the first loop and the dimension of the second loop to at least partially open the lumen of the tubular member; and the actuators are biased to the first position.

Regarding claim 15, the claim in this application have been allowed because the prior art of record fails to disclose either single or in combination the claimed a valve assembly including: a first filament configured in a first loop completely around the tubular member and having a first portion extending from the first loop toward the first actuator and a second portion extending from the first loop toward the second actuator; and a second filament configured in a second loop completely around the tubular member and having a first portion extending from the second loop toward the first actuator and a second portion extending from the second loop toward the second actuator; wherein the first actuator and the second actuator are biased away from one another to elastically deform the tubular member to the first position by (a) increasing a tension in the first filament to decrease a dimension of the first loop and (b) increasing a tension in the second filament to decrease a dimension of the second loop; and the first actuator and the second actuator are movable toward one another to permit the tubular member to return to the second position by (a) decreasing the tension in the first filament and (b) decreasing the tension in the second filament.

Regarding claim 23, the claim in this application have been allowed because the prior art of record fails to disclose either single or in combination the claimed a valve assembly including: a first filament extending in a first loop around the tubular member; a second filament extending in a second loop around the tubular member; and a pair of actuators biased to circumferentially constrict the first loop and the second loop to elastically deform the tubular member to a first position in which the lumen is constricted, wherein at least one the actuators is movable to decrease a level of tension in the first filament and a level of tension in the second filament to permit the tubular member to expand against the first loop and the second loop to a second position in which the lumen of the tubular member is at least partially open.

The closet prior art of record is Hartley (US 2003/0116731), Wong et al. (US 2011/0144592), Eller (US 2015/0305859), however these references do not disclose the device as claimed or described above.

Prior art Harley:

Harley discloses a valve assembly comprising: a tubular member 4 defining a lumen; a first filament 20 extending in a first loop around the tubular member, wherein the first filament is flexible; an actuator 12 movable from a first position (Fig. 4) to a second position (Fig. 3); a first filament includes a first portion operably acted upon by a first one actuator 12; wherein the first position, the actuator is positioned to tension the first filament; whereby a dimension of the first loop (in Fig. 4); wherein the second position (the actuator being rotated, see arrows in Fig. 5), the actuator is positioned to loosen the first filament thereby permitting the tubular member to expand against the first loop to increase the dimension of the first loop.

Harley fails to disclose that the actuator is as a pair of actuators; a second filament. Therefore, Harley fails to disclose the limitations as mentioned in the claims 1, 15 & 23 above.

Prior art Wong

Wong discloses a valve assembly comprising: a tubular member 9 defining a lumen, in Fig. 1;

a pair of actuators 17/17d (see Figs. 10-11) movable first a first position (Fig. 11) to a second position (Fig. 10); in the first position, the actuators are positioned to tension, thereby constrict the lumen

of the tubular member, Fig. 11; the second position, the actuators are positioned to loosen, thereby permitting the tubular member to expand, see Fig. 10.

Wong fails to disclose the limitations as discussed in the claims 1, 15 & 23 above.

Prior art Eller

Eller discloses a valve assembly comprising:

A tubular member being attached to a handle 18; a first filament 22 extending in a first loop around the tubular member, see Figs. 9A-9C, wherein the first filament is flexible; a second filament 24 (or 26) extending in a second loop around the tubular member, wherein the second filament is flexible, an actuator 18 movable first a first position (being rotated, see arrow 159, in Figs. 1, 10C) to a second position (Fig. 9A-9B, 10A-10B); a first filament includes a first portion operably acted upon by the actuator; a second filament 24/26 includes a first portion operably acted upon the actuator, in the first position the actuator is positioned to tension the first filament and the second filament thereby decreasing a dimension of the first loop and second loop to constrict the lumen of the tubular member, see Figs. 9C & 10C; in the second position, the actuator is positioned to loosen the first filament and the second filament thereby permitting the tubular member to expand against the first loop and the second loop to increase the dimension of the first loop and the dimension of the second loop to at least partially open the lumen of the tubular member, Figs. 9A-9B; 10A-10B.

Eller fails to disclose that the actuator is as a pair of the actuator. Therefore Eller fails to disclose the claimed limitations as mentioned in the claims 1, 15 & 23 above.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to QUYNH-NHU HOANG VU whose telephone number is (571)272-3228. The examiner can normally be reached on M-F 7:30 am-4:00 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, Michael Tsai can be reached on 571-270-5246. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Quynh-Nhu H. Vu/
Quynh-Nhu H Vu
Primary Examiner, Art Unit 3783

Notice of References Cited	Application/Control No. 18/598,482	Applicant(s)/Patent Under Reexamination Merritt et al.	
	Examiner QUYNH-NHU H VU	Art Unit 3783	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Name	CPC Classification	US Classification
*	A	US-2846179-A	1958-08-05	CATHERINE MONCKTON MARY	F16K7/04	222/507
*	B	US-3197173-A	1965-07-27	TAUBENHEIM ROY A	F16K7/06	24/527
*	C	US-3383131-A	1968-05-14	ROSFELDER ANDRE M	E21B25/06	251/74
*	D	US-3675657-A	1972-07-11	Gauthier; Oscar	A61B17/132	606/203
*	E	US-4551862-A	1985-11-12	Haber; Terry M.	A61F2/0036	600/491
*	F	US-4705518-A	1987-11-10	Baker; Charles D.	A61F2/0036	128/899
*	G	US-5484418-A	1996-01-16	Quiachon; Dinah B.	A61M25/005	604/167.03
*	H	US-20030116731-A1	2003-06-26	Hartley, David Ernest	F16K7/06	251/297
*	I	US-20110144592-A1	2011-06-16	Wong; En Hou Philip	A61M39/06	604/175
*	J	US-8118275-B2	2012-02-21	Mialhe; Claude	A61M39/0613	251/294
*	K	US-20150305859-A1	2015-10-29	Eller; Derek	A61F2/2469	623/1.24
*	L	US-9980813-B2	2018-05-29	Eller; Derek	F16K7/06	1/1
*	M	US-10183159-B2	2019-01-22	Nobles; Anthony	F16K31/445	1/1

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date YYYY-MM-DD	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in YYYY-MM-DD format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/598,482	Merritt et al.
	Examiner	Art Unit
	QUYNH-NHU H VU	3783

CPC - Searched*		
Symbol	Date	Examiner
A61M2039/062 OR A61M2039/0673 OR A61M39/0613	07/10/2024	QNV

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
PE2E, Inventor, IDS, forward/backward searches	07/10/2024	QNV

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	all the above	07/10/2024	QNV

/QUYNH-NHU H. VU/ Primary Examiner, Art Unit 3783	

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/598,482	Merritt et al.
	Examiner	Art Unit
	QUYNH-NHU H VU	3783

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☑ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	05/02/2024	07/10/2024							
	1	÷	=							
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	30	÷	=							

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/598,482	Merritt et al.
	Examiner	**Art Unit**
	QUYNH-NHU H VU	3783

CPC								
Symbol							**Type**	**Version**
A61M	/	39	/	0613			F	2013-01-01
A61B	/	17	/	3207			A	2013-01-01
A61M	/	2039	/	0673			A	2013-01-01
A61M	/	2039	/	062			A	2013-01-01

CPC Combination Sets								
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	30	
/QUYNH-NHU H. VU/ Primary Examiner, Art Unit 3783	10 July 2024	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1, 15 & 23	1

U.S. Patent and Trademark Office — Part of Paper No.: 20240710

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/598,482	Merritt et al.
	Examiner	**Art Unit**
	QUYNH-NHU H VU	3783

INTERNATIONAL CLASSIFICATION				
CLAIMED				
A61M	/	39	/	06
A61B	/	17	/	3207

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

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

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	30	
/QUYNH-NHU H. VU/ Primary Examiner, Art Unit 3783	10 July 2024	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1, 15 & 23	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/598,482	Merritt et al.
	Examiner	**Art Unit**
	QUYNH-NHU H VU	3783

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

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	30	
/QUYNH-NHU H. VU/ Primary Examiner, Art Unit 3783	10 July 2024	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1, 15 & 23	1

Bibliographic Data

Application No: 18/598,482

Foreign Priority claimed: ○ Yes ◉ No

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

Verified and Acknowledged: /QUYNH-NHU H. VU/ Examiner's Signature | Initials

Title: HEMOSTASIS VALVES AND METHODS OF USE

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
03/07/2024	604	3783	111552.8016.US07
RULE			

APPLICANTS

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John C. Thress, Capistrano Beach, CA, UNITED STATES

Paul Lubock, Monarch Beach, CA, UNITED STATES

CONTINUING DATA

This application is a CON of 18515079 11/20/2023

18515079 is a CON of 17226318 04/09/2021 PAT 11844921

17226318 is a CON of 16117519 08/30/2018 PAT 11000682

16117519 has PRO of 62554931 09/06/2017

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

03/18/2024

STATE OR COUNTRY

UNITED STATES

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	18/598,482 - Conf # 3249
	Filing Date	March 7, 2024
	First Named Inventor	Benjamin E. Merritt
	Art Unit	Not Yet Assigned
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552.8016.US07

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	First Named Inventor	Benjamin E. Merritt
	Art Unit	Not Yet Assigned
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552.8016.US07

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	Filing Date	March 7, 2024
	First Named Inventor	Benjamin E. Merritt
	Art Unit	Not Yet Assigned
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552.8016.US07

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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[6]
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EXAMINER SIGNATURE			
Examiner Signature	/QUYNH-NHU H. VU/	Date Considered	07/10/2024

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[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

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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

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 number **17/226,318** and filed on **April 9, 2021**, application number **16/117,519** and filed **August 30, 2018**, and application number **18/515,079** and filed **November 20, 2023** and 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)	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.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /Q.N.V./

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
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	18/598,482 - Conf # 3249
	Filing Date	March 7, 2024
	First Named Inventor	Benjamin E. Merritt
	Art Unit	3738
	Examiner Name	Quynh-Nhu Hoang Vu
	Attorney Docket Number	111552.8016.US07

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.	20240074771	03-07-2024	Quick et al.	
	2.	20240082540	03-14-2024	Brodt et al.	
	3.	11925369	03-12-2024	Hauser	
	4.	11937838	03-26-2024	Cox et al.	
	5.	11937834	03-26-2024	Dinh	
	6.	11865291	01-09-2024	Merritt et al.	
	7.	11963861	04-23-2024	Strauss et al.	
	8.	3863624	02-04-1975	Gram	
	9.	3661144	05-09-1972	Jensen et al.	
	10.	20160128857	05-12-2016	Kao	
	11.	9566179	02-14-2017	Andreas et al.	
	12.	20150366690	12-24-2015	Lumauig	
	13.	20190366049	12-05-2019	Hannon et al.	
	14.	8529596	09-10-2013	Grandfield et al.	
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	16.	8795317	08-05-2014	Grandfield et al.	
	17.	9072537	07-07-2015	Grandfield et al.	
	18.	10426644	10-01-2019	Shrivastava et al.	
	19.	10456151	10-29-2019	Slee et al.	
	20.	11337714	05-24-2022	Ferrera et al.	
	21.	20030004536	01-02-2003	Boylan et al.	
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	23.	20190216476	07-18-2019	Barry et al.	
	24.	20230047682	02-16-2023	Deaton et al.	
	25.	20210154433	05-27-2021	Casey et al.	
	26.	20180235742	08-23-2018	Fields et al.	
	27.	20200078029	03-12-2020	Hansen et al.	
	28.	20030191425	10-09-2003	Rosenblatt et al.	
	29.	20060149219	07-06-2006	Calderon	

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	Attorney Docket Number	111552.8016.US07

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.	20120143123	06-07-2012	Agnew	
	31.	20200324079	10-15-2020	Jalgaonkar et al.	
	32.	20050080398	04-14-2005	Markel et al.	
	33.	11969332	04-30-2024	Merritt et al.	
	34.	11969333	04-30-2024	Merritt et al.	
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	36.	11969178	04-30-2024	Hauser	
	37.	11974910	05-07-2024	Merritt et al.	
	38.	11974909	05-07-2024	Merritt et al.	
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	40.	11986382	05-21-2024	Merritt et al.	
	41.	11266825	03-08-2022	Peter et al.	
	42.	20220296797	09-22-2022	Chawla	
	43.	8187465	05-29-2012	Nierich	
	44.	10994063	05-04-2021	Fisher et al.	
	45.	20230052964	02-16-2023	Singh et al.	
	46.	20230248502	08-10-2023	Buck et al.	
	47.	8439858	05-14-2013	Huang et al.	
	48.	10967111	04-06-2021	Iida	
	49.	11607483	03-21-2023	Iida	
	50.	9827364	11-28-2017	Peticca et al.	
	51.	11998436	06-04-2024	Merritt et al.	
	52.	12016580	06-25-2024	Quick et al.	
	53.	20240157041	05-16-2024	Zikry et al.	
	54.	20240198072	06-20-2024	Merritt et al.	
	55.	20170238951	08-24-2017	Yang et al.	
	56.				
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	Examiner Name	Quynh-Nhu Hoang Vu
	Attorney Docket Number	111552.8016.US07

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.	EP2231256	05-30-2018	Vortex Medical		
	4.	EP2394680	12-14-2011	CARDiONOVA S.R.L.		
	5.	EP2540328	10-02-2013	Eurosets S.R.L.		
	6.	WO2023069874	04-27-2023	IMPERATIVE CARE, INC.		
	7.	WO2024103036	05-16-2024	Shifamed Holdings LLC		
	8.	WO2019064306	04-04-2019	CERETRIVE LTD.		
	9.					
	10.					
	11.					
	12.					

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.	
	3.	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.	
	4.	Extended European Search Report for European Application No. 21818772.2, Applicant: Inari Medical, Inc., Date of Mailing: May 10, 9 pages.	
	5.		
	6.		
	7.		
	8.		

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	Art Unit	3738
	Examiner Name	Quynh-Nhu Hoang Vu
	Attorney Docket Number	111552.8016.US07

EXAMINER SIGNATURE			
Examiner Signature	/QUYNH-NHU H. VU/	Date Considered	07/10/2024

*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.

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

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 number **17/226,318** and filed

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Doc description: Information Disclosure Statement (IDS) Filed

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	Examiner Name	Quynh-Nhu Hoang Vu
	Attorney Docket Number	111552.8016.US07

on **April 9, 2021,** application number **16/117,519** and filed **August 30, 2018,** and application number **18/515,079** and filed **November 20, 2023** and 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)	2024-07-01
Name/Print	Matthew S. Williams	Registration Number	77,516

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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	1	16/117519 and (pliable) and (reinforcement) and (tensioning adj mechanism)	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	ON	ON	2020/06/10 09:36 AM
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L3	2	("4551862").PN.	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/06/10 11:14 AM
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		"7390317" | "7731694").PN. OR ("8137318").URPN.					
L23	255	("0729423" | "3086797" | "3197173" | "3438607" | "3920215" | "3977400" | "4149535" | "4231400" | "4243034" | "4324239" | "4378013" | "4473369" | "4496348" | "4634421" | "4723550" | "4786028" | "4839471" | "4960259" | "4978341" | "5009643").PN. OR ("5127626").URPN.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2020/06/10 05:57 PM
L24	2	("20120138832").PN.	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/06/10 06:00 PM
L25	2	16/117519 and (pressure with different)	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	ON	ON	2020/06/10 06:25 PM
L26	1	16/117519 and (vacuum adj pressure)	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	ON	ON	2020/06/10 06:27 PM
L27	2	16/117519 and (vacuum)	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	ON	ON	2020/06/10 06:27 PM
L28	1	16/117519 and (filament)	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	ON	ON	2020/06/10 07:46 PM
L29	1	("20150305859").PN.	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/06/10 07:57 PM
L30	2	16/117519 and vacuum	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	ON	ON	2020/06/11 10:02 AM
L31	1	("20120310166").PN.	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/06/11 10:54 AM
L32	1	("7172580").PN.	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/06/11 10:59 AM
L33	14	(compliant adj polymer) with (silicon adj rubber)	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	ON	ON	2020/06/11 11:13 AM
L34	57	(compliant adj polymer) with (silicone adj rubber)	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	ON	ON	2020/06/11 11:14 AM
L35	57	L34 not L33	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	ON	ON	2020/06/11 11:14 AM
L36	179	((benjamin near Merritt) or (John near Thress) or (Paul near Lubock)).in. and valve	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	ON	ON	2020/06/11 02:17 PM
L37	2	L36 and (reinforcement) and (filament)	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	ON	ON	2020/06/11 02:18 PM
L38	4	L36 and (reinforcement) and (tension$4)	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	ON	ON	2020/06/11 02:18 PM
L39	1	16/117519 and uniform	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	ON	ON	2020/11/19 01:13 PM
L40	1	("20180193043").PN.	(US-PGPUB; USPAT;	OR	OFF	OFF	2020/11/19

			FPRS; EPO; JPO)				01:16 PM
L41	1114	(hemostatic adj valve) and (filament or thread or string) and (bias or spring)	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	ON	ON	2020/11/19 04:38 PM
L42	943	L41 and (@ad<"20170906")	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	ON	ON	2020/11/19 04:38 PM
L43	1305	((pinch adj valve) or (hemestatic with seal)) and (filament or thread or string) and (bias or spring) and (@ad<"20170906")	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	ON	ON	2020/11/19 04:59 PM
L44	1304	L43 not L42	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	ON	ON	2020/11/19 05:00 PM
L45	4	("3830462" | "7168444").PN. OR ("7775501").URPN.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2020/11/19 05:12 PM
L46	37	("10098651"|"10238406"|"20010051810"|"20020156457"|"20030116731"|"20040039412"|"20040199202"|"20050283186"|"20060247500"|"20080262528"|"20080300466"|"20090281525"|"20110144592"|"20120059356"|"20130092012"|"20140276403"|"20150133990"|"20150305859"|"20170037548"|"20170058623"|"20170233908"|"20180105963"|"20180296240"|"20180344339"|"20180361116"|"20190046219"|"20190070401"|"2846179"|"3892161"|"4034642"|"4287808"|"4523738"|"4551862"|"4978341"|"5360417"|"8715314"|"9844387").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2020/11/19 06:55 PM
L52	2	("20190046219").PN.	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2021/02/05 10:36 AM
L53	3	(("20140371779") or ("20180064454")).PN.	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2021/02/05 10:38 AM
L54	2	("11000682").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/05/22 06:33 PM
L55	333	("2846179" | "3088363" | "3197173" | "3435826"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/05/22 06:34 PM

		| "3892161" | "3923065" | "4030503" | "4034642" | "4287808" | "4393872" | "4523738" | "4551862" | "4650466" | "4873978" | "4883458" | "4890611" | "4960259" | "4978341" | "5011488" | "5059178" | "5102415" | "5127626" | "5129910" | "5192286" | "5192290" | "5360417" | "5370653" | "5476450" | "5490859" | "5591137" | "5746758" | "5749858" | "5766191" | "5782817" | "5827229" | "5827304" | "5868708" | "5873866" | "5873882" | "5876414" | "5882329" | "5911710" | "5972019" | "5974938" | "5989233" | "5993483" | "6066149" | "6221006" | "6228060" | "6238412" | "6254571" | "6258115" | "6306163" | "6350271" | "6364895" | "6368339" | "6383205" | "6413235" | "6423032" | "6440148" | "6454741" | "6454775" | "6458103" | "6458139" | "6511492" | "6514273" | "6530935" | "6530939" | "6544279" | "6551342" | "6589263" | "6596011" | "6602271" | "6605074" | "6605102" | "6623460" | "6635070" | "6645222" | "6660013" | "6663650" | "6685722" | "6692504" | "6699260" | "6755847" | "6767353" | "6800080" | "6824553" | "6939361" | "6960222" | "7004954" | "7036707" | "7041084" | "7052500" | "7056328" | "7069835" | "7094249" | "7179273" | "7220269" | "7232432" | "7244243" | "7285126" | "7306618" | "7320698" | "7323002" | "7331980" | "7534234" | "7578830" | "7621870" | "7674247" | "7691121" | "7695458" | "7763010" | "7766934" | "7775501" | "7905877" | "7905896" | "7938809" | "7938820" | "7967790" | "7976511"				

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L56	3	16/117519 AND	(US-PGPUB; USPAT;	OR	ON	ON	2022/05/22

		(constricting ADJ mechanism)	FPRS; EPO; JPO)				07:06 PM
L57	21	("1100682").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/08/05 04:00 PM
L58	2	("11000682").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/08/05 04:01 PM
L59	0	("201403717779").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/08/05 05:26 PM
L60	1	("20140371779").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/08/05 05:26 PM
L61	333	("2846179" | "3088363" | "3197173" | "3435826" | "3892161" | "3923065" | "4030503" | "4034642" | "4287808" | "4393872" | "4523738" | "4551862" | "4650466" | "4873978" | "4883458" | "4890611" | "4960259" | "4978341" | "5011488" | "5059178" | "5102415" | "5127626" | "5129910" | "5192286" | "5192290" | "5360417" | "5370653" | "5476450" | "5490859" | "5591137" | "5746758" | "5749858" | "5766191" | "5782817" | "5827229" | "5827304" | "5868708" | "5873866" | "5873882" | "5876414" | "5882329" | "5911710" | "5972019" | "5974938" | "5989233" | "5993483" | "6066149" | "6221006" | "6228060" | "6238412" | "6254571" | "6258115" | "6306163" | "6350271" | "6364895" | "6368339" | "6383205" | "6413235" | "6423032" | "6440148"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/08/05 05:28 PM

		| "6454741" | "6454775" | "6458103" | "6458139" | "6511492" | "6514273" | "6530935" | "6530939" | "6544279" | "6551342" | "6589263" | "6596011" | "6602271" | "6605074" | "6605102" | "6623460" | "6635070" | "6645222" | "6660013" | "6663650" | "6685722" | "6692504" | "6699260" | "6755847" | "6767353" | "6800080" | "6824553" | "6939361" | "6960222" | "7004954" | "7036707" | "7041084" | "7052500" | "7056328" | "7069835" | "7094249" | "7179273" | "7220269" | "7232432" | "7244243" | "7285126" | "7306618" | "7320698" | "7323002" | "7331980" | "7534234" | "7578830" | "7621870" | "7674247" | "7691121" | "7695458" | "7763010" | "7766934" | "7775501" | "7905877" | "7905896" | "7938809" | "7938820" | "7967790" | "7976511" | "7993302" | "7993363" | "8043313" | "8052640" | "8066757" | "8070791" | "8075510" | "8088140" | "8100935" | "8109962" | "8118829" | "8197493" | "8246641" | "8261648" | "8267897" | "8298257" | "8317748" | "8337450" | "RE43902" | "8357178" | "8361104" | "8409215" | "8486105" | "8491539" | "8512352" | "8535334" | "8545526" | "8568432" | "8574262" | "8579915" | "8585713" | "8696622" | "8715314" | "8771289" | "8777893" | "8784434" | "8784441" | "8795305" | "8795345" | "8801748" | "8814927" | "8820207" | "8826791" | "8828044" | "8833224" | "8845621" | "8852205" | "8852226" | "8932319" | "8939991" | "8945143" | "8945172" | "8968330" | "8992504" | "9005172" |				

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L62	105	("1170208" | "1741526" | "2217718" | "2269401" | "3675657" | "4118805" | "4256094" | "4399809" | "4401107").pn. OR ("4551862").urpn. AND (PGPB | USPT | USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/08/05 05:29 PM
L63	19	("2003/0116731").urpn. AND (PGPB | USPT | USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/08/05 05:43 PM
L64	1	17/705189	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/08/08 11:02 AM
L65	1	("20110144592").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/08/08 01:12 PM
L66	12	"7775501"	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO);	OR	ON	ON	2022/08/08 01:22 PM

			FPRS; EPO; JPO)				
L67	5183	((A61M2039/062 OR A61M2039/0673 OR A61M39/0613).cpc.) AND (@ad<"20170906")	(US-PGPUB; USPAT; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/08/08 01:55 PM
L68	4288	L67 AND (valve OR seal)	(US-PGPUB; USPAT; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/08/08 01:55 PM
L69	1185	L68 AND (string OR thread OR filament)	(US-PGPUB; USPAT; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/08/08 01:55 PM
L70	474	L69 AND (button OR actuator)	(US-PGPUB; USPAT; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/08/08 01:56 PM
L72	2	10/309485	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/08/08 02:04 PM
L73	1594	((F16K7/02 OR F16K7/08 OR F16K7/04).cpc.) AND (@ad<"20170906")	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/08/08 02:05 PM
L74	362	L73 AND (button OR actuator)	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/08/08 02:05 PM
L75	24	("3383131" | "4094492" | "4540411" | "4570898" | "5112324" | "5211370" | "5582165" | "5814026" | "6270053" | "6450989" | "6475135" | "7914492" | "7981086" | "8079973" | "8132783" | "8900168" | "20040015177" | "20050131344" | "20070118021" |	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/08/08 02:08 PM

		"20070161956" | "20110022063" | "20140012235" | "20140330309").pn. OR ("10183159").urpn. AND (PGPB | USPT | USOC).dbnm.					
L76	250	("20010004699" OR "20010041909" OR "20010051810" OR "20020022858" OR "20020026211" OR "20020032455" OR "20020095161" OR "20020095171" OR "20020111648" OR "20020120277" OR "20020147458" OR "20020156457" OR "20030083693" OR "20030100919" OR "20030114875" OR "20030116731" OR "20030125663" OR "20030135230" OR "20030135258" OR "20030153873" OR "20030153973" OR "20030168068" OR "20030176884" OR "20030191516" OR "20030208224" OR "20040039412" OR "20040068288" OR "20040073243" OR "20040098033" OR "20040133232" OR "20040138692" OR "20040167567" OR "20040199201" OR "20040199202" OR "20050033172" OR "20050038468" OR "20050055047" OR "20050085826" OR "20050085849" OR "20050119668" OR "20050177132" OR "20050187570" OR "20050283165" OR "20050283166" OR "20050283186" OR "20060020286" OR "20060042786" OR "20060047286" OR "20060089533" OR "20060100662" OR	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/08 02:18 PM

		"20060155305" OR "20060173525" OR "20060195137" OR "20060200221" OR "20060224177" OR "20060229645" OR "20060247500" OR "20060253145" OR "20060276874" OR "20060282111" OR "20060293696" OR "20070038225" OR "20070112374" OR "20070118165" OR "20070149996" OR "20070161963" OR "20070179513" OR "20070191866" OR "20070198028" OR "20070208361" OR "20070208367" OR "20070213753" OR "20070213765" OR "20070255252" OR "20070288054" OR "20080015541" OR "20080088055" OR "20080157017" OR "20080167678" OR "20080183136" OR "20080228209" OR "20080234722" OR "20080262528" OR "20080269798" OR "20080300466" OR "20090018566" OR "20090054918" OR "20090062841" OR "20090069828" OR "20090076417" OR "20090160112" OR "20090163846" OR "20090182362" OR "20090281525" OR "20090292307" OR "20090299393" OR "20100030256" OR "20100042136" OR "20100087844" OR "20100087850" OR "20100114113" OR "20100121312" OR "20100137846" OR "20100190156" OR "20100204712" OR "20100249815" OR "20100268264" OR "20100318178" OR					

		"20110034987" OR "20110054405" OR "20110060212" OR "20110118817" OR "20110125181" OR "20110144592" OR "20110152823" OR "20110152993" OR "20110160742" OR "20110160763" OR "20110190806" OR "20110196414" OR "20110213290" OR "20110213403" OR "20110224707" OR "20110245807" OR "20110251629" OR "20110264133" OR "20110265681" OR "20110288529" OR "20110288572" OR "20110319917" OR "20120059309" OR "20120059356" OR "20120083824" OR "20120083868" OR "20120089216" OR "20120101480" OR "20120101510" OR "20120138832" OR "20120143239" OR "20120165919" OR "20120179181" OR "20120197277" OR "20120232655" OR "20120271105" OR "20120271231" OR "20120277788" OR "20120310166" OR "20130030460" OR "20130046332" OR "20130066348" OR "20130092012" OR "20130096571" OR "20130102996" OR "20130116721" OR "20130144326" OR "20130165871" OR "20130184703" OR "20130197567" OR "20130226196" OR "20130289608" OR "20130317589" OR "20130345739" OR "20140005712" OR "20140005713" OR "20140005715" OR "20140005717" OR					

		"20140025048" OR "20140031856" OR "20140046133" OR "20140046243" OR "20140121672" OR "20140155830" OR "20140155908" OR "20140155980" OR "20140180397" OR "20140188143" OR "20140236219" OR "20140243882" OR "20140257253" OR "20140276403" OR "20140318354" OR "20140324091" OR "20140330286" OR "20140336691" OR "20140343593" OR "20140364896" OR "20140371779" OR "20150005781" OR "20150005792" OR "20150018859" OR "20150018860" OR "20150018929" OR "20150025555" OR "20150032144" OR "20150059908" OR "20150088190" OR "20150127035" OR "20150133990" OR "20150150672" OR "20150164523" OR "20150164666" OR "20150190155" OR "20150190156" OR "20150196380" OR "20150196744" OR "20150209058" OR "20150209165" OR "20150238207" OR "20150250578" OR "20150265299" OR "20150305756" OR "20150305859" OR "20150352325" OR "20150360001" OR "20150374391" OR "20160008014" OR "20160022293" OR "20160058540" OR "20160074627" OR "20160106448" OR "20160106449" OR "20160113663" OR "20160113664" OR "20160113665" OR					

		"20160113666" OR "20160143721" OR "20160206344" OR "20160228134" OR "20160262790" OR "20160287276" OR "20160367285" OR "20170014560" OR "20170037548" OR "20170042571" OR "20170058623" OR "20170079672" OR "20170086864" OR "20170100142" OR "20170105743" OR "20170105745" OR "20170112513" OR "20170112514" OR "20170189041" OR "20170233908" OR "20170265878" OR "20170303939" OR "20170303942" OR "20170303947" OR "20170303948" OR "20170325839").pn.					
L77	32	("20170348014" OR "20180042624" OR "20180042626" OR "20180064453" OR "20180064454" OR "20180070968" OR "20180092652" OR "20180105963" OR "20180125512" OR "20180193043" OR "20180236205" OR "20180256178" OR "20180296240" OR "20180344339" OR "20180361116" OR "20190000492" OR "20190046219" OR "20190070401" OR "20190117244" OR "20190133622" OR "20190133623" OR "20190133624" OR "20190133625" OR "20190133626" OR "20190133627" OR "20190150959" OR "20190231373" OR "20190321071" OR "20190336148" OR "20200046368" OR "20210113224" OR	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/08 02:18 PM

		"20210186541").pn.					
L78	1263	((Benjamin NEAR Merritt) OR (John NEAR Thress) OR (Paul NEAR Lubock)).in.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/08/08 02:19 PM
L79	110	L78 AND (valve AND filament)	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/08/08 02:19 PM
L81	5	("10309485").pn.	(US-PGPUB; USPAT; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/08/11 12:16 PM
L82	2	("11000682").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/08/11 12:17 PM
L83	25	("1840967" | "1977504" | "2434835" | "2846179" | "3329396" | "3572627" | "3897039" | "3994472" | "4007904" | "4095805" | "4310139" | "4372026" | "4447037" | "4449719" | "4452421" | "4458876" | "5116017" | "5273108" | "7845648" | "20140174754").pn. OR ("10648268").urpn. AND (PGPB | USPT | USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/08/11 12:48 PM
L84	1	17/705189	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/08/11 01:58 PM
L85	0	17/865266 AND (slide OR slidable OR slidably)	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/08/30 09:42 AM
L86	0	17/865266	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA,	OR	ON	ON	2022/08/30 09:43 AM

			EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)				
L87	2	("11000682").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/08/30 10:02 AM
L88	2	17/705189	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 10:32 AM
L89	6	("2016100252").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 10:49 AM
L90	3	("20160100252").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 10:50 AM
L91	7	"20160100252"	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 10:51 AM
L92	28	"2016100252"	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 10:51 AM
L93	52	(Pattok NEAR Greg).in.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 10:52 AM
L94	92	"2012009675"	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 10:54 AM
L95	1524	("10004531"|"10010335"|"10016266"|"10028759"|"10045790"|"100986	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA,	OR	ON	ON	2022/11/07 10:56 AM

		51"|"10130385"|"10226263"|"10238406"|"10271864"|"10327883"|"10335186"|"10342571"|"10349960"|"10383644"|"10524811"|"10588655"|"10695159"|"10709471"|"10799331"|"10912577"|"11000682"|"11058445"|"11058451"|"11147571"|"11154314"|"20010004699"|"20010041909"|"20010051810"|"20020022858"|"20020022859"|"20020026211"|"20020032455"|"20020049452"|"20020095161"|"20020095171"|"20020116148"|"20020120277"|"20020147458"|"20020151918"|"20020156457"|"20020161392"|"20020169474"|"20020173819"|"20020188276"|"20030083693"|"20030100919"|"20030114875"|"20030116731"|"20030125663"|"20030135230"|"20030135258"|"20030153873"|"20030153973"|"20030168068"|"20030176884"|"20030191516"|"20030208224"|"20030216774"|"20040039412"|"20040068288"|"20040073243"|"20040098033"|"20040122359"|"20040133232"|"20040138525"|"20040138692"|"20040167567"|"20040199201"|"20040199202"|"20040260344"|"20040267272"|"20050033172"|"20050038468"|"20050055047"|"20050085769"|"20050085826"|"20050085846"|"20050085849"|"20050119668"|"20050177132"|"20050187570"|"20050283165"|"20050283166"|"20050283186"|"20060020286"|"20060042786"|"20060047286"|"20060074401"|"20060089533"|"20060100662"|"20060155305"|"20060173525"|"20060195137"|"20060200221"|"20	EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)				

		060224177"|"20060229 645"|"20060247500"|"2 0060253145"|"2006027 6874"|"20060282111"|" 20060293696"|"200700 38225"|"20070093744"| "20070112374"|"20070 118165"|"20070149996 "|"20070161963"|"2007 0179513"|"2007019186 6"|"20070198028"|"200 70208361"|"200702083 67"|"20070213753"|"20 070213765"|"20070255 252"|"20070288054"|"2 0080015541"|"2008008 8055"|"20080157017"|" 20080167678"|"200801 83136"|"20080228209"| "20080234722"|"20080 262528"|"20080269798 "|"20080300466"|"2009 0018566"|"2009005491 8"|"20090062841"|"200 90069828"|"200900764 17"|"20090160112"|"20 090163846"|"20090182 362"|"20090192495"|"2 0090281525"|"2009029 2307"|"20090299393"|" 20100016837"|"201000 30256"|"20100042136"| "20100087844"|"20100 087850"|"20100114113 "|"20100121312"|"2010 0137846"|"2010019015 6"|"20100204712"|"201 00249815"|"201002682 64"|"20100318178"|"20 110034987"|"20110054 405"|"20110060212"|"2 0110118817"|"2011012 5181"|"20110144592"|" 20110152823"|"201101 52993"|"20110160742"| "20110160763"|"20110 190806"|"20110196414 "|"20110213290"|"2011 0213403"|"2011022470 7"|"20110245807"|"201 10251629"|"201102641 33"|"20110265681"|"20 110288529"|"20110288 572"|"20110319917"|"2 0120059309"|"2012005 9356"|"20120083824"|" 20120083868"|"201200 89216"|"20120101480"|					

		"20120101510"|"20120 138832"|"20120143239 "|"20120165919"|"2012 0179181"|"2012019727 7"|"20120232655"|"201 20271105"|"201202712 31"|"20120277788"|"20 120310166"|"20130030 460"|"20130046332"|"2 0130066348"|"2013009 2012"|"20130096571"|" 20130102996"|"201301 16708"|"20130116721"| "20130126559"|"20130 144326"|"20130165871 "|"20130184703"|"2013 0197454"|"2013019756 7"|"20130226196"|"201 30289608"|"201303175 89"|"20130345739"|"20 140005712"|"20140005 713"|"20140005715"|"2 0140005717"|"2014002 5048"|"20140031856"|" 20140046133"|"201400 46243"|"20140121672"| "20140155830"|"20140 155908"|"20140155980 "|"20140180397"|"2014 0188143"|"2014023621 9"|"20140243882"|"201 40257253"|"201402764 03"|"20140303658"|"20 140318354"|"20140324 091"|"20140330286"|"2 0140336691"|"2014034 3593"|"20140364896"|" 20140371779"|"201500 05781"|"20150005792"| "20150018859"|"20150 018860"|"20150018929 "|"20150025555"|"2015 0032144"|"2015005990 8"|"20150088190"|"201 50127035"|"201501339 90"|"20150150672"|"20 150164523"|"20150164 666"|"20150190155"|"2 0150190156"|"2015019 6380"|"20150196744"|" 20150209058"|"201502 09165"|"20150238207"| "20150250578"|"20150 265299"|"20150305756 "|"20150305859"|"2015 0352325"|"2015036000 1"|"20150374391"|"201 60008014"|"201600222					

		93"|"20160058540"|"20 160074627"|"20160106 448"|"20160106449"|"2 0160113663"|"2016011 3664"|"20160113665"|" 20160113666"|"201601 43721"|"20160151605"| "20160206344"|"20160 228134"|"20160262790 "|"20160287276"|"2016 0367285"|"2017001456 0"|"20170037548"|"201 70042571"|"201700499 42"|"20170058623"|"20 170079672"|"20170086 864"|"20170100142"|"2 0170105743"|"2017010 5745"|"20170112513"|" 20170112514"|"201701 89041"|"20170233908"| "20170265878"|"20170 303939"|"20170303942 "|"20170303947"|"2017 0303948"|"2017032583 9"|"20170348014"|"201 80042624"|"201800426 26"|"20180064453"|"20 180064454"|"20180070 968"|"20180092652"|"2 0180105963"|"2018012 5512"|"20180193043"|" 20180236205"|"201802 56178"|"20180296240"| "20180344339"|"20180 361116"|"20190000492 "|"20190046219"|"2019 0070401"|"2019011724 4"|"20190133622"|"201 90133623"|"201901336 24"|"20190133625"|"20 190133626"|"20190133 627"|"20190150959"|"2 0190231373"|"2019032 1071"|"20190336148"|" 20200046368"|"202001 13412"|"20210113224"| "20210186541"|"20210 290925"|"20210330344 "|"20210378694"|"2022 0000505"|"2022000050 6"|"20220000507"|"202 20015798"|"202200228 98"|"20220039815"|"20 220125451"|"20220160 381"|"20220160382"|"2 0220160383"|"2022021 1992"|"20220240959"|" 2846179"|"2955592"|"3					

		088363"|"3197173"|"34 35826"|"3515137"|"389 2161"|"3923065"|"4030 503"|"4034642"|"42223 80"|"4243040"|"428780 8"|"4324262"|"4393872" |"4469100"|"4523738"|" 4551862"|"4604094"|"4 643184"|"4646736"|"46 50466"|"4776337"|"479 0812"|"4863440"|"4870 953"|"4883458"|"48860 62"|"4890611"|"489857 5"|"4946440"|"4960259" |"4978341"|"5059178"|" 5100423"|"5127626"|"5 129910"|"5135484"|"51 54724"|"5192274"|"519 2286"|"5192290"|"5329 923"|"5360417"|"53643 45"|"5376101"|"538388 7"|"5389100"|"5419774" |"5443443"|"5456667"|" 5476450"|"5490859"|"5 496365"|"5527326"|"55 49626"|"5591137"|"566 2703"|"5746758"|"5749 858"|"5769816"|"57828 17"|"5800457"|"582722 9"|"5846251"|"5860938" |"5873866"|"5873882"|" 5876414"|"5895406"|"5 911710"|"5911733"|"59 11754"|"5941869"|"594 7985"|"5954737"|"5971 938"|"5972019"|"59749 38"|"5989233"|"599348 3"|"6030397"|"6066158" |"6068645"|"6126635"|" 6142987"|"6146396"|"6 146403"|"6152946"|"61 56055"|"6159230"|"616 5196"|"6168579"|"6179 859"|"6221006"|"62280 60"|"6238412"|"624507 8"|"6245089"|"6254571" |"6258115"|"6264663"|" 6306163"|"6322572"|"6 350271"|"6361545"|"63 64895"|"6368339"|"638 3205"|"6402771"|"6413 235"|"6423032"|"64321 22"|"6458103"|"647523 6"|"6485502"|"6508782" |"6511492"|"6514273"|" 6530923"|"6530935"|"6 544276"|"6544278"|"65 44279"|"6551342"|"656					

		9181"|"6575995"|"6589 263"|"6596011"|"66022 71"|"6605074"|"660510 2"|"6610077"|"6620148" |"6620179"|"6620182"|" 6623460"|"6635068"|"6 645222"|"6660013"|"66 60014"|"6663650"|"669 2504"|"6699260"|"6702 830"|"6755847"|"67673 53"|"6790204"|"680008 0"|"6824545"|"6824550" |"6824553"|"6830561"|" 6846029"|"6902540"|"6 939361"|"6942682"|"69 45977"|"6960222"|"700 4954"|"7036707"|"7041 084"|"7052500"|"70563 28"|"7063707"|"706983 5"|"7094249"|"7179273" |"7232432"|"7244243"|" 7285126"|"7300458"|"7 306618"|"7320698"|"73 23002"|"7331980"|"753 4234"|"7578830"|"7621 870"|"7674247"|"76911 21"|"7695458"|"776301 0"|"7766934"|"7775501" |"7780696"|"7905877"|" 7905896"|"7938809"|"7 938820"|"7967790"|"79 76511"|"7993302"|"799 3363"|"8043313"|"8052 640"|"8057496"|"80667 57"|"8070769"|"807079 1"|"8075510"|"8088140" |"8092486"|"8100935"|" 8109962"|"8118829"|"8 197493"|"8246641"|"82 61648"|"8267897"|"829 8257"|"8317748"|"8337 450"|"8357178"|"83611 04"|"8409215"|"848610 5"|"8491539"|"8512352" |"8535334"|"8545526"|" 8568432"|"8574262"|"8 579915"|"8585713"|"86 08754"|"8657867"|"869 6622"|"8715314"|"8721 714"|"8771289"|"87778 93"|"8784441"|"878444 2"|"8795305"|"8795345" |"8801748"|"8814927"|" 8820207"|"8826791"|"8 828044"|"8833224"|"88 45621"|"8852226"|"893 9991"|"8945143"|"8945 172"|"8956384"|"89925					

		04"|"9005172"|"9028401"|"9101382"|"9125683"|"9126016"|"9149609"|"9155552"|"9161766"|"9173668"|"9186487"|"9204887"|"9259237"|"9283066"|"9351747"|"9358037"|"9439664"|"9439751"|"9456834"|"9463035"|"9463036"|"9526864"|"9526865"|"9566424"|"9579116"|"9616213"|"9636206"|"9643035"|"9700332"|"9717514"|"9717519"|"9744024"|"9757137"|"9844386"|"9844387"|"9848975"|"9849014"|"9962178"|"9999493"|"RE43902").PN.					
L96	435	L95 AND (valve OR seal)	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 11:10 AM
L97	1	17/865266	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 11:53 AM
L98	5994	((A61M2039/0673 OR A61M39/0613 OR A61M2039/062 OR A61M2039/0626).cpc.) AND (@ad<"20170906")	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 11:55 AM
L99	5031	L98 AND (valve OR seal OR elastic)	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 11:55 AM
L100	596	L99 AND (collapse OR collapsible)	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 11:56 AM
L101	1464	L99 AND (bias OR spring)	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 11:56 AM

L102	295	L100 NOT L101	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 01:48 PM
L103	2	("11000682").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 02:18 PM
L104	4	("5376101").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 02:42 PM
L105	4	"2019246240"	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 02:55 PM
L106	10	"110652645"	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 02:56 PM
L107	9	("5011488," "5800457").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 02:57 PM
L108	28	"2011213403"	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 03:02 PM
L109	4	("2017086864").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 03:07 PM
L110	18	"2017086864"	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 03:08 PM

L111	26	"2017086864," "2013226196"	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 03:11 PM
L112	7	"20170086864," "20130226196"	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 03:11 PM
L113	2	"20140371779"	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 03:16 PM
L114	3958	(hemostasis ADJ valve) AND spring AND (@ad<"20170906")	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 03:32 PM
L115	3684	L114 NOT L101 NOT L100	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/07 03:34 PM
L116	2516	L114 AND (filament OR thread OR string)	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/08 10:09 AM
L117	134	L116 NOT L115	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/08 10:10 AM
L118	250	("20010004699" OR "20010041909" OR "20010051810" OR "20020022858" OR "20020026211" OR "20020032455" OR "20020095161" OR "20020095171" OR "20020111648" OR "20020120277" OR "20020147458" OR "20020156457" OR "20030083693" OR	(US-PGPUB; USPAT)	OR	ON	ON	2022/11/28 11:33 AM

		"20030100919" OR "20030114875" OR "20030116731" OR "20030125663" OR "20030135230" OR "20030135258" OR "20030153873" OR "20030153973" OR "20030168068" OR "20030176884" OR "20030191516" OR "20030208224" OR "20040039412" OR "20040068288" OR "20040073243" OR "20040098033" OR "20040133232" OR "20040138692" OR "20040167567" OR "20040199201" OR "20040199202" OR "20050033172" OR "20050038468" OR "20050055047" OR "20050085826" OR "20050085849" OR "20050119668" OR "20050177132" OR "20050187570" OR "20050283165" OR "20050283166" OR "20050283186" OR "20060020286" OR "20060042786" OR "20060047286" OR "20060089533" OR "20060100662" OR "20060155305" OR "20060173525" OR "20060195137" OR "20060200221" OR "20060224177" OR "20060229645" OR "20060247500" OR "20060253145" OR "20060276874" OR "20060282111" OR "20060293696" OR "20070038225" OR "20070112374" OR "20070118165" OR "20070149996" OR "20070161963" OR "20070179513" OR "20070191866" OR "20070198028" OR "20070208361" OR "20070208367" OR				

		"20070213753" OR "20070213765" OR "20070255252" OR "20070288054" OR "20080015541" OR "20080088055" OR "20080157017" OR "20080167678" OR "20080183136" OR "20080228209" OR "20080234722" OR "20080262528" OR "20080269798" OR "20080300466" OR "20090018566" OR "20090054918" OR "20090062841" OR "20090069828" OR "20090076417" OR "20090160112" OR "20090163846" OR "20090182362" OR "20090281525" OR "20090292307" OR "20090299393" OR "20100030256" OR "20100042136" OR "20100087844" OR "20100087850" OR "20100114113" OR "20100121312" OR "20100137846" OR "20100190156" OR "20100204712" OR "20100249815" OR "20100268264" OR "20100318178" OR "20110034987" OR "20110054405" OR "20110060212" OR "20110118817" OR "20110125181" OR "20110144592" OR "20110152823" OR "20110152993" OR "20110160742" OR "20110160763" OR "20110190806" OR "20110196414" OR "20110213290" OR "20110213403" OR "20110224707" OR "20110245807" OR "20110251629" OR "20110264133" OR "20110265681" OR "20110288529" OR "20110288572" OR					

		"20110319917" OR "20120059309" OR "20120059356" OR "20120083824" OR "20120083868" OR "20120089216" OR "20120101480" OR "20120101510" OR "20120138832" OR "20120143239" OR "20120165919" OR "20120179181" OR "20120197277" OR "20120232655" OR "20120271105" OR "20120271231" OR "20120277788" OR "20120310166" OR "20130030460" OR "20130046332" OR "20130066348" OR "20130092012" OR "20130096571" OR "20130102996" OR "20130116721" OR "20130144326" OR "20130165871" OR "20130184703" OR "20130197567" OR "20130226196" OR "20130289608" OR "20130317589" OR "20130345739" OR "20140005712" OR "20140005713" OR "20140005715" OR "20140005717" OR "20140025048" OR "20140031856" OR "20140046133" OR "20140046243" OR "20140121672" OR "20140155830" OR "20140155908" OR "20140155980" OR "20140180397" OR "20140188143" OR "20140236219" OR "20140243882" OR "20140257253" OR "20140276403" OR "20140318354" OR "20140324091" OR "20140330286" OR "20140336691" OR "20140343593" OR "20140364896" OR "20140371779" OR					

		"20150005781" OR "20150005792" OR "20150018859" OR "20150018860" OR "20150018929" OR "20150025555" OR "20150032144" OR "20150059908" OR "20150088190" OR "20150127035" OR "20150133990" OR "20150150672" OR "20150164523" OR "20150164666" OR "20150190155" OR "20150190156" OR "20150196380" OR "20150196744" OR "20150209058" OR "20150209165" OR "20150238207" OR "20150250578" OR "20150265299" OR "20150305756" OR "20150305859" OR "20150352325" OR "20150360001" OR "20150374391" OR "20160008014" OR "20160022293" OR "20160058540" OR "20160074627" OR "20160106448" OR "20160106449" OR "20160113663" OR "20160113664" OR "20160113665" OR "20160113666" OR "20160143721" OR "20160206344" OR "20160228134" OR "20160262790" OR "20160287276" OR "20160367285" OR "20170014560" OR "20170037548" OR "20170042571" OR "20170058623" OR "20170079672" OR "20170086864" OR "20170100142" OR "20170105743" OR "20170105745" OR "20170112513" OR "20170112514" OR "20170189041" OR "20170233908" OR "20170265878" OR				

		"20170303939" OR "20170303942" OR "20170303947" OR "20170303948" OR "20170325839").pn.					
L119	32	("20170348014" OR "20180042624" OR "20180042626" OR "20180064453" OR "20180064454" OR "20180070968" OR "20180092652" OR "20180105963" OR "20180125512" OR "20180193043" OR "20180236205" OR "20180256178" OR "20180296240" OR "20180344339" OR "20180361116" OR "20190000492" OR "20190046219" OR "20190070401" OR "20190117244" OR "20190133622" OR "20190133623" OR "20190133624" OR "20190133625" OR "20190133626" OR "20190133627" OR "20190150959" OR "20190231373" OR "20190321071" OR "20190336148" OR "20200046368" OR "20210113224" OR "20210186541").pn.	(US-PGPUB; USPAT)	OR	ON	ON	2022/11/28 11:33 AM
L120	250	L118	(US-PGPUB; USPAT)	OR	ON	ON	2022/11/28 11:34 AM
L121	12894	(hemostasis OR twist) ADJ valve	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/28 02:19 PM
L122	1158	L121 AND filament AND (biasing OR spring) AND (@ad<"20170906")	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2022/11/28 02:19 PM
L123	21	("11259821" OR "11439799" OR "11457936" OR "11529158" OR "20060217664" OR	(US-PGPUB; USPAT)	OR	ON	ON	2022/12/16 10:23 AM

		"20080234715" OR "20110034986" OR "20170252057" OR "20170340867" OR "20190239910" OR "20190336142" OR "20210315598" OR "20220346800" OR "20220346801" OR "20220346813" OR "20220346814" OR "20220347455" OR "20220362512" OR "3675657" OR "6451036" OR "9216277" OR "9980813").pn.					
L124	11	("4960259" | "5127906" | "5514109" | "5871474" | "5895376" | "6221057" | "6276661" | "7597688" | "20010021828" | "20040172008" | "20110282301").pn. OR ("9216277").urpn. AND (PGPB | USPT | USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/12/16 10:24 AM
L125	26	("20180184912," "20160262774," "20120172918," "20050054995," "5421824," "20210236148," "5158533," "202300446775," "20140188127," "20140074144," "8535283," "8753322," "8808259").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2023/04/10 09:40 AM
L126	43	("20220142638," "20220151647," "20220152355," "565364," "5908435," "4611594," "9827084," "202101376177," "11013523," "11406801," "11554005," "11559382," "6818006," "9078682," "20140052161," "20180042623").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2023/04/10 09:44 AM
L127	38	("20180184912," "20160262774," "20120172918," "20050054995,"	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP,	OR	ON	ON	2023/04/10 10:00 AM

		"5421824," "20210236148," "5158533," "20230046775," "20140188127," "20140074144," "8535283," "8753322," "8808259," "20230062809," "20010031981," "20040102807," "6059814").pn.	KR, OA, RU, SU, WO); FPRS; EPO; JPO)				
L128	333	("2846179" | "3088363" | "3197173" | "3435826" | "3892161" | "3923065" | "4030503" | "4034642" | "4287808" | "4393872" | "4523738" | "4551862" | "4650466" | "4873978" | "4883458" | "4890611" | "4960259" | "4978341" | "5011488" | "5059178" | "5102415" | "5127626" | "5129910" | "5192286" | "5192290" | "5360417" | "5370653" | "5476450" | "5490859" | "5591137" | "5746758" | "5749858" | "5766191" | "5782817" | "5827229" | "5827304" | "5868708" | "5873866" | "5873882" | "5876414" | "5882329" | "5911710" | "5972019" | "5974938" | "5989233" | "5993483" | "6066149" | "6221006" | "6228060" | "6238412" | "6254571" | "6258115" | "6306163" | "6350271" | "6364895" | "6368339" | "6383205" | "6413235" | "6423032" | "6440148" | "6454741" | "6454775" | "6458103" | "6458139" | "6511492" | "6514273" | "6530935" | "6530939" | "6544279" | "6551342" | "6589263" | "6596011" | "6602271" | "6605074" | "6605102" | "6623460" | "6635070" | "6645222" | "6660013" | "6663650" | "6685722" | "6692504" | "6699260" | "6755847" | "6767353" | "6800080" | "6824553" | "6939361" | "6960222" | "7004954"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2023/05/05 07:52 AM

		| "7036707" | "7041084" | "7052500" | "7056328" | "7069835" | "7094249" | "7179273" | "7220269" | "7232432" | "7244243" | "7285126" | "7306618" | "7320698" | "7323002" | "7331980" | "7534234" | "7578830" | "7621870" | "7674247" | "7691121" | "7695458" | "7763010" | "7766934" | "7775501" | "7905877" | "7905896" | "7938809" | "7938820" | "7967790" | "7976511" | "7993302" | "7993363" | "8043313" | "8052640" | "8066757" | "8070791" | "8075510" | "8088140" | "8100935" | "8109962" | "8118829" | "8197493" | "8246641" | "8261648" | "8267897" | "8298257" | "8317748" | "8337450" | "RE43902" | "8357178" | "8361104" | "8409215" | "8486105" | "8491539" | "8512352" | "8535334" | "8545526" | "8568432" | "8574262" | "8579915" | "8585713" | "8696622" | "8715314" | "8771289" | "8777893" | "8784434" | "8784441" | "8795305" | "8795345" | "8801748" | "8814927" | "8820207" | "8826791" | "8828044" | "8833224" | "8845621" | "8852205" | "8852226" | "8932319" | "8939991" | "8945143" | "8945172" | "8968330" | "8992504" | "9005172" | "9101382" | "9149609" | "9161766" | "9204887" | "9259237" | "9283066" | "9408620" | "9439664" | "9439751" | "9456834" | "9463036" | "9526864" | "9526865" | "9566424" | "9579116" | "9616213" | "9636206" | "9700332" | "9717519" | "9744024" | "9757137" | "9844386" | "9844387" | "9999493" | "10004531" | "10045790" | "10098651" |				

		"10238406" | "10335186" | "10342571" | "10349960" | "20010004699" | "20010041909" | "20010051810" | "20020111648" | "20020120277" | "20020147458" | "20020156457" | "20030114875" | "20030116731" | "20030125663" | "20030135230" | "20030153973" | "20040039412" | "20040073243" | "20040199202" | "20050038468" | "20050119668" | "20050283186" | "20060047286" | "20060100662" | "20060247500" | "20060253145" | "20060282111" | "20070038225" | "20070112374" | "20070118165" | "20070161963" | "20070179513" | "20070191866" | "20070198028" | "20070208361" | "20070208367" | "20070213753" | "20070255252" | "20080015541" | "20080088055" | "20080157017" | "20080167678" | "20080228209" | "20080234722" | "20080262528" | "20080269798" | "20080300466" | "20090018566" | "20090054918" | "20090062841" | "20090160112" | "20090163846" | "20090182362" | "20090281525" | "20090292307" | "20100087850" | "20100114113" | "20100121312" |				

		"20100204712" | "20100249815" | "20100318178" | "20110054405" | "20110060212" | "20110144592" | "20110152993" | "20110190806" | "20110213290" | "20110213403" | "20110224707" | "20110245807" | "20110251629" | "20110264133" | "20110319917" | "20120059356" | "20120089216" | "20120101480" | "20120101510" | "20120138832" | "20120143239" | "20120165919" | "20120179181" | "20120232655" | "20120271231" | "20120310166" | "20130092012" | "20130184703" | "20140005713" | "20140025048" | "20140276403" | "20140371779" | "20150018860" | "20150133990" | "20150196744" | "20150238207" | "20150265299" | "20150305756" | "20150305859" | "20150352325" | "20150360001" | "20150374391" | "20160113666" | "20160143721" | "20160262790" | "20160277276" | "20170037548" | "20170058623" | "20170105745" | "20170112513" | "20170112514" | "20170189041" | "20170233908" | "20170265878" | "20170325839" | "20180064454" | "20180092652" | "20180105963" |				

		"20180125512" | "20180193043" | "20180256178" | "20180296240" | "20180344339" | "20180361116" | "20190000492" | "20190046219" | "20190070401" | "20190150959" | "20190231373").pn. AND (PGPB | USPT | USOC).dbnm.					
L129	28	((benjamin NEAR Merritt) OR (John NEAR Thress) OR (Paul NEAR Lubock)).in. AND (hemostasis ADJ valve)	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2023/05/05 08:09 AM
L130	250	("11406801" OR "11554005" OR "11559382" OR "20010031981" OR "20040102807" OR "20050054995" OR "20120172918" OR "20140052161" OR "20140074144" OR "20140188127" OR "20160262774" OR "20180042623" OR "20180184912" OR "20210236148" OR "20230046775" OR "20230062809" OR "20230070120" OR "5158533" OR "5421824" OR "6059814" OR "6818006" OR "8535283" OR "8753322" OR "8808259" OR "9078682" OR "10478535" OR "11013523" OR "11259821" OR "11433218" OR "11439799" OR "11457936" OR "11529158" OR "20010049486" OR "20040127936" OR "20050085769" OR "20060217664" OR "20070010787" OR "20080234715" OR	(US-PGPUB; USPAT)	OR	ON	ON	2023/05/05 08:16 AM

		"20100217276" OR "20110034986" OR "20110196309" OR "20130035628" OR "20130281788" OR "20140257363" OR "20140296868" OR "20140303658" OR "20150173782" OR "20160220741" OR "20170049942" OR "20170056032" OR "20170196576" OR "20170252057" OR "20170319221" OR "20170340867" OR "20180104404" OR "20180256177" OR "20190239910" OR "20190336142" OR "20210022843" OR "20210137667" OR "20210315598" OR "20220125451" OR "20220142638" OR "20220151647" OR "20220152355" OR "20220160381" OR "20220160382" OR "20220160383" OR "20220211400" OR "20220211992" OR "20220240959" OR "20220346800" OR "20220346801" OR "20220346813" OR "20220346814" OR "20220347455" OR "20220362512" OR "3675657" OR "4611594" OR "5158564" OR "5197485" OR "5653684" OR "5908435" OR "6451036" OR "6564828" OR "6719717" OR "6960189" OR "7004931" OR "7223253" OR "8057497" OR "9216277" OR "9827084" OR "9980813" OR "20010004699" OR "20010041909" OR "20010051810" OR					

		"20020022858" OR "20020026211" OR "20020032455" OR "20020095161" OR "20020095171" OR "20020111648" OR "20020120277" OR "20020147458" OR "20020156457" OR "20030083693" OR "20030100919" OR "20030114875" OR "20030116731" OR "20030125663" OR "20030135230" OR "20030135258" OR "20030153873" OR "20030153973" OR "20030168068" OR "20030176884" OR "20030191516" OR "20030208224" OR "20040039412" OR "20040068288" OR "20040073243" OR "20040098033" OR "20040133232" OR "20040138692" OR "20040167567" OR "20040199201" OR "20040199202" OR "20050033172" OR "20050038468" OR "20050055047" OR "20050085826" OR "20050085849" OR "20050119668" OR "20050177132" OR "20050187570" OR "20050283165" OR "20050283166" OR "20050283186" OR "20060020286" OR "20060042786" OR "20060047286" OR "20060089533" OR "20060100662" OR "20060155305" OR "20060173525" OR "20060195137" OR "20060200221" OR "20060224177" OR "20060229645" OR "20060247500" OR "20060253145" OR "20060276874" OR "20060282111" OR "20060293696" OR				

		"20070038225" OR "20070112374" OR "20070118165" OR "20070149996" OR "20070161963" OR "20070179513" OR "20070191866" OR "20070198028" OR "20070208361" OR "20070208367" OR "20070213753" OR "20070213765" OR "20070255252" OR "20070288054" OR "20080015541" OR "20080088055" OR "20080157017" OR "20080167678" OR "20080183136" OR "20080228209" OR "20080234722" OR "20080262528" OR "20080269798" OR "20080300466" OR "20090018566" OR "20090054918" OR "20090062841" OR "20090069828" OR "20090076417" OR "20090160112" OR "20090163846" OR "20090182362" OR "20090281525" OR "20090292307" OR "20090299393" OR "20100030256" OR "20100042136" OR "20100087844" OR "20100087850" OR "20100114113" OR "20100121312" OR "20100137846" OR "20100190156" OR "20100204712" OR "20100249815" OR "20100268264" OR "20100318178" OR "20110034987" OR "20110054405" OR "20110060212" OR "20110118817" OR "20110125181" OR "20110144592" OR "20110152823" OR "20110152993" OR "20110160742" OR "20110160763" OR "20110190806" OR					

		"20110196414" OR "20110213290" OR "20110213403" OR "20110224707" OR "20110245807" OR "20110251629" OR "20110264133" OR "20110265681" OR "20110288529" OR "20110288572" OR "20110319917" OR "20120059309" OR "20120059356" OR "20120083824" OR "20120083868" OR "20120089216" OR "20120101480" OR "20120101510" OR "20120138832" OR "20120143239" OR "20120165919" OR "20120179181" OR "20120197277" OR "20120232655" OR "20120271105" OR "20120271231" OR "20120277788" OR "20120310166" OR "20130030460" OR "20130046332" OR "20130066348" OR "20130092012" OR "20130096571" OR "20130102996" OR "20130116721" OR "20130144326" OR "20130165871" OR "20130184703").pn.					
L131	125	("20130197567" OR "20130226196" OR "20130289608" OR "20130317589" OR "20130345739" OR "20140005712" OR "20140005713" OR "20140005715" OR "20140005717" OR "20140025048" OR "20140031856" OR "20140046133" OR "20140046243" OR "20140121672" OR "20140155830" OR "20140155908" OR "20140155980" OR "20140180397" OR "20140188143" OR	(US-PGPUB; USPAT)	OR	ON	ON	2023/05/05 08:16 AM

		"20140236219" OR "20140243882" OR "20140257253" OR "20140276403" OR "20140318354" OR "20140324091" OR "20140330286" OR "20140336691" OR "20140343593" OR "20140364896" OR "20140371779" OR "20150005781" OR "20150005792" OR "20150018859" OR "20150018860" OR "20150018929" OR "20150025555" OR "20150032144" OR "20150059908" OR "20150088190" OR "20150127035" OR "20150133990" OR "20150150672" OR "20150164523" OR "20150164666" OR "20150190155" OR "20150190156" OR "20150196380" OR "20150196744" OR "20150209058" OR "20150209165" OR "20150238207" OR "20150250578" OR "20150265299" OR "20150305756" OR "20150305859" OR "20150352325" OR "20150360001" OR "20150374391" OR "20160008014" OR "20160022293" OR "20160058540" OR "20160074627" OR "20160106448" OR "20160106449" OR "20160113663" OR "20160113664" OR "20160113665" OR "20160113666" OR "20160143721" OR "20160206344" OR "20160228134" OR "20160262790" OR "20160287276" OR "20160367285" OR "20170014560" OR "20170037548" OR "20170042571" OR					

		"20170058623" OR "20170079672" OR "20170086864" OR "20170100142" OR "20170105743" OR "20170105745" OR "20170112513" OR "20170112514" OR "20170189041" OR "20170233908" OR "20170265878" OR "20170303939" OR "20170303942" OR "20170303947" OR "20170303948" OR "20170325839" OR "20170348014" OR "20180042624" OR "20180042626" OR "20180064453" OR "20180064454" OR "20180070968" OR "20180092652" OR "20180105963" OR "20180125512" OR "20180193043" OR "20180236205" OR "20180256178" OR "20180296240" OR "20180344339" OR "20180361116" OR "20190000492" OR "20190046219" OR "20190070401" OR "20190117244" OR "20190133622" OR "20190133623" OR "20190133624" OR "20190133625" OR "20190133626" OR "20190133627" OR "20190150959" OR "20190231373" OR "20190321071" OR "20190336148" OR "20200046368" OR "20210113224" OR "20210186541").pn.					
L132	5	"17226318"	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2023/05/05 08:56 AM
L133	4	"20030116731"	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA,	OR	ON	ON	2023/05/05 08:57 AM

			EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)				
L134	3198	((F16K7/06 OR F16K7/04 OR F16K7/08 OR F16K7/02).cpc.) AND (@ad<"20170906")	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2023/05/05 08:59 AM
L135	886	L134 AND (valve OR seal OR constrict$4) AND (spring OR bias OR biasing)	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2023/05/05 09:00 AM
L136	24	("3383131" | "4094492" | "4540411" | "4570898" | "5112324" | "5211370" | "5582165" | "5814026" | "6270053" | "6450989" | "6475135" | "7914492" | "7981086" | "8079973" | "8132783" | "8900168" | "20040015177" | "20050131344" | "20070118021" | "20070161956" | "20110022063" | "20140012235" | "20140330309").pn. AND (PGPB | USPT | USOC).dbnm.	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2023/05/05 09:06 AM
L137	2	10/309485	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2023/05/05 09:31 AM
L138	2	("20090254041," "8057436").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2023/05/05 11:16 AM
L139	1	("20080312600").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2023/05/05 11:18 AM
L141	27	("2846179," "3675657," "8267897").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO);	OR	ON	ON	2023/05/05 06:24 PM

			FPRS; EPO; JPO)				
L143	2	("10183159").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2023/07/31 09:11 AM
L145	2	("20030116731," "20110144592").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2023/07/31 10:22 AM
L146	0	18/142518	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2023/07/31 10:52 AM
L147	7	"17226318"	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2023/07/31 10:52 AM
L148	11422	((A61M2039/062 OR A61M39/06 OR A61M2039/0626 OR A61M2039/0673 OR A61M39/0613).cpc.)	(US-PGPUB; USPAT; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2023/07/31 10:55 AM
L149	250	("10531883" OR "10772636" OR "10960114" OR "11166703" OR "11642209" OR "11648028" OR "11697011" OR "11697012" OR "20050004534" OR "20050203605" OR "20060264905" OR "20100094201" OR "20100106081" OR "20130030460" OR "20130144326" OR "20130204297" OR "20140005715" OR "20140180397" OR "20140222070" OR "20140324091" OR "20150018859" OR "20150150672" OR "20150196744" OR "20160030708" OR	(US-PGPUB; USPAT)	OR	ON	ON	2023/07/31 11:08 AM

		"20160038267" OR "20160106353" OR "20160135829" OR "20160192912" OR "20160367285" OR "20170021130" OR "20190365395" OR "20210038385" OR "20210393278" OR "20230200970" OR "20230218310" OR "20230218313" OR "20230218383" OR "5030201" OR "5234403" OR "5244619" OR "6152144" OR "6540722" OR "7128073" OR "7152605" OR "7678131" OR "7713282" OR "7722641" OR "8080032" OR "8480708" OR "8523897" OR "8535343" OR "8647367" OR "8784469" OR "8834519" OR "9011551" OR "9168043" OR "9301769" OR "9566073" OR "9581942" OR "9717488" OR "10004531" OR "10010335" OR "10016266" OR "10028759" OR "10045790" OR "10098651" OR "10130385" OR "10226263" OR "10238406" OR "10271864" OR "10327883" OR "10335186" OR "10342571" OR "10349960" OR "10383644" OR "10478535" OR "10524811" OR "10588655" OR "10695159" OR "10709471" OR "10799331" OR "10912577" OR					

		"11000682" OR "11013523" OR "11058445" OR "11058451" OR "11147571" OR "11154314" OR "11259821" OR "11433218" OR "11439799" OR "11457936" OR "11529158" OR "11554005" OR "11559382" OR "20010004699" OR "20010031981" OR "20010041909" OR "20010049486" OR "20010051810" OR "20020022858" OR "20020022859" OR "20020026211" OR "20020032455" OR "20020049452" OR "20020095161" OR "20020095171" OR "20020111648" OR "20020120277" OR "20020147458" OR "20020151918" OR "20020156457" OR "20020161392" OR "20020169474" OR "20020173819" OR "20020188276" OR "20030083693" OR "20030100919" OR "20030114875" OR "20030116731" OR "20030125663" OR "20030135230" OR "20030135258" OR "20030153873" OR "20030153973" OR "20030168068" OR "20030176884" OR "20030191516" OR "20030208224" OR "20030216774" OR "20040039412" OR "20040068288" OR "20040073243" OR "20040098033" OR "20040102807" OR "20040122359" OR "20040127936" OR "20040133232" OR "20040138525" OR "20040138692" OR					

		"20040167567" OR "20040199201" OR "20040199202" OR "20040260344" OR "20040267272" OR "20050033172" OR "20050038468" OR "20050054995" OR "20050055047" OR "20050085769" OR "20050085826" OR "20050085846" OR "20050085849" OR "20050119668" OR "20050177132" OR "20050187570" OR "20050283165" OR "20050283166" OR "20050283186" OR "20060020286" OR "20060042786" OR "20060047286" OR "20060074401" OR "20060089533" OR "20060100662" OR "20060155305" OR "20060173525" OR "20060195137" OR "20060200221" OR "20060217664" OR "20060224177" OR "20060229645" OR "20060247500" OR "20060253145" OR "20060276874" OR "20060282111" OR "20060293696" OR "20070010787" OR "20070038225" OR "20070093744" OR "20070112374" OR "20070118165" OR "20070149996" OR "20070161963" OR "20070179513" OR "20070191866" OR "20070198028" OR "20070208361" OR "20070208367" OR "20070213753" OR "20070213765" OR "20070255252" OR "20070288054" OR "20080015541" OR "20080088055" OR "20080157017" OR "20080167678" OR "20080183136" OR					

		"20080228209" OR "20080234715" OR "20080234722" OR "20080262528" OR "20080269798" OR "20080300466" OR "20090018566" OR "20090054918" OR "20090062841" OR "20090069828" OR "20090076417" OR "20090160112" OR "20090163846" OR "20090182362" OR "20090192495" OR "20090281525" OR "20090292307" OR "20090299393" OR "20100016837" OR "20100030256" OR "20100042136" OR "20100087844" OR "20100087850" OR "20100114113" OR "20100121312" OR "20100137846" OR "20100190156" OR "20100204712" OR "20100217276" OR "20100249815" OR "20100268264" OR "20100318178" OR "20110034986" OR "20110034987" OR "20110054405" OR "20110060212" OR "20110118817" OR "20110125181" OR "20110144592" OR "20110152823" OR "20110152993" OR "20110160742" OR "20110160763" OR "20110190806" OR "20110196309" OR "20110196414" OR "20110213290" OR "20110213403" OR "20110224707" OR "20110245807" OR "20110251629" OR "20110264133").pn.					
L152	19	("9566424" OR "9579116" OR "9616213" OR "9636206" OR "9643035" OR	(US-PGPUB; USPAT)	OR	ON	ON	2023/07/31 11:08 AM

		"9700332" OR "9717514" OR "9717519" OR "9744024" OR "9757137" OR "9827084" OR "9844386" OR "9844387" OR "9848975" OR "9849014" OR "9962178" OR "9980813" OR "9999493" OR "RE43902").pn.					
L153	218	L148 AND (hemostasis ADJ valve) AND (filament OR reinforcement) AND (biasaing OR spring)	(US-PGPUB; USPAT; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2023/07/31 11:12 AM
L154	137	L153 AND (@ad<"20170906")	(US-PGPUB; USPAT; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2023/07/31 11:12 AM
L155	0	((F16K7/02 OR F16K7/08 OR F16K7/04).cpc.) AND (@ad<"20170906") AND (hemostasis ADJ valve) AND (filament OR reinforcement) AND (biasaing OR spring)	(US-PGPUB; USPAT; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2023/07/31 11:17 AM
L156	27	((F16K7/02 OR F16K7/08 OR F16K7/04).cpc.) AND (@ad<"20170906") AND (valve) AND (filament OR reinforcement) AND (biasaing OR spring)	(US-PGPUB; USPAT; FIT (AP, AT, AU, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2023/07/31 11:17 AM
L157	250	("10058339" OR "10183159" OR "10384034" OR "10456555" OR "10485952" OR "10648268" OR "10926060" OR "10953195" OR "1101890" OR "11065019" OR "11185664" OR "11224450" OR "11224721" OR "11305094" OR	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/14 09:07 AM

		"11383064" OR "11395903" OR "11576691" OR "11596768" OR "11744691" OR "11806033" OR "20030023263" OR "20030135151" OR "20040019310" OR "20040039351" OR "20070233043" OR "20080087853" OR "20080312681" OR "20100114017" OR "20110071503" OR "20110152889" OR "20120109109" OR "20130150793" OR "20140180055" OR "20170143359" OR "20170143938" OR "20170281204" OR "20180055999" OR "20180250498" OR "20190015298" OR "20190366036" OR "20200022711" OR "20200046940" OR "20200121334" OR "20210138194" OR "20210205577" OR "20210404464" OR "20220033888" OR "20220370761" OR "20230059721" OR "20230122587" OR "20230233311" OR "20230240705" OR "20230240706" OR "20230241302" OR "20230248380" OR "20230310137" OR "20230310138" OR "20230310751" OR "20230320834" OR "20230329734" OR "20230338130" OR "20230338131" OR "2784717" OR "3416531" OR "3438607" OR "3860006" OR "4401107" OR "4634421" OR "4981478" OR "5242461" OR "5391152" OR "5484418" OR				

		"5639276" OR "5971958" OR "6017335" OR "7122034" OR "7481805" OR "7815608" OR "8021351" OR "8070694" OR "8343167" OR "8568465" OR "9241669" OR "9265512" OR "9532792" OR "9662129" OR "9884387" OR "10531883" OR "10772636" OR "10960114" OR "11166703" OR "11642209" OR "11648028" OR "11697011" OR "11697012" OR "20050004534" OR "20050203605" OR "20060264905" OR "20100094201" OR "20100106081" OR "20130030460" OR "20130144326" OR "20130204297" OR "20140005715" OR "20140180397" OR "20140222070" OR "20140324091" OR "20150018859" OR "20150150672" OR "20150196744" OR "20160030708" OR "20160038267" OR "20160106353" OR "20160135829" OR "20160192912" OR "20160367285" OR "20170021130" OR "20190365395" OR "20210038385" OR "20210393278" OR "20230200970" OR "20230218310" OR "20230218313" OR "20230218383" OR "5030201" OR "5234403" OR "5244619" OR "6152144" OR "6540722" OR "7128073" OR					

		"7152605" OR "7678131" OR "7713282" OR "7722641" OR "8080032" OR "8480708" OR "8523897" OR "8535343" OR "8647367" OR "8784469" OR "8834519" OR "9011551" OR "9168043" OR "9301769" OR "9566073" OR "9581942" OR "9717488" OR "10004531" OR "10010335" OR "10016266" OR "10028759" OR "10045790" OR "10098651" OR "10130385" OR "10226263" OR "10238406" OR "10271864" OR "10327883" OR "10335186" OR "10342571" OR "10349960" OR "10383644" OR "10478535" OR "10524811" OR "10588655" OR "10695159" OR "10709471" OR "10799331" OR "10912577" OR "11000682" OR "11013523" OR "11058445" OR "11058451" OR "11147571" OR "11154314" OR "11259821" OR "11433218" OR "11439799" OR "11457936" OR "11529158" OR "11554005" OR "11559382" OR "20010004699" OR "20010031981" OR "20010041909" OR "20010049486" OR "20010051810" OR "20020022858" OR					

		"20020022859" OR "20020026211" OR "20020032455" OR "20020049452" OR "20020095161" OR "20020095171" OR "20020111648" OR "20020120277" OR "20020147458" OR "20020151918" OR "20020156457" OR "20020161392" OR "20020169474" OR "20020173819" OR "20020188276" OR "20030083693" OR "20030100919" OR "20030114875" OR "20030116731" OR "20030125663" OR "20030135230" OR "20030135258" OR "20030153873" OR "20030153973" OR "20030168068" OR "20030176884" OR "20030191516" OR "20030208224" OR "20030216774" OR "20040039412" OR "20040068288" OR "20040073243" OR "20040098033" OR "20040102807" OR "20040122359" OR "20040127936" OR "20040133232" OR "20040138525" OR "20040138692" OR "20040167567" OR "20040199201" OR "20040199202" OR "20040260344" OR "20040267272" OR "20050033172" OR "20050038468" OR "20050054995" OR "20050055047" OR "20050085769" OR "20050085826" OR "20050085846" OR "20050085849" OR "20050119668" OR "20050177132" OR "20050187570" OR "20050283165" OR "20050283166" OR "20050283186" OR					

		"20060020286" OR "20060042786" OR "20060047286" OR "20060074401").pn.					
L158	250	("20060089533" OR "20060100662" OR "20060155305" OR "20060173525" OR "20060195137" OR "20060200221" OR "20060217664" OR "20060224177" OR "20060229645" OR "20060247500" OR "20060253145" OR "20060276874" OR "20060282111" OR "20060293696" OR "20070010787" OR "20070038225" OR "20070093744" OR "20070112374" OR "20070118165" OR "20070149996" OR "20070161963" OR "20070179513" OR "20070191866" OR "20070198028" OR "20070208361" OR "20070208367" OR "20070213753" OR "20070213765" OR "20070255252" OR "20070288054" OR "20080015541" OR "20080088055" OR "20080157017" OR "20080167678" OR "20080183136" OR "20080228209" OR "20080234715" OR "20080234722" OR "20080262528" OR "20080269798" OR "20080300466" OR "20090018566" OR "20090054918" OR "20090062841" OR "20090069828" OR "20090076417" OR "20090160112" OR "20090163846" OR "20090182362" OR "20090192495" OR "20090281525" OR "20090292307" OR "20090299393" OR	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/14 09:07 AM

		"20100016837" OR "20100030256" OR "20100042136" OR "20100087844" OR "20100087850" OR "20100114113" OR "20100121312" OR "20100137846" OR "20100190156" OR "20100204712" OR "20100217276" OR "20100249815" OR "20100268264" OR "20100318178" OR "20110034986" OR "20110034987" OR "20110054405" OR "20110060212" OR "20110118817" OR "20110125181" OR "20110144592" OR "20110152823" OR "20110152993" OR "20110160742" OR "20110160763" OR "20110190806" OR "20110196309" OR "20110196414" OR "20110213290" OR "20110213403" OR "20110224707" OR "20110245807" OR "20110251629" OR "20110264133" OR "20110265681" OR "20110288529" OR "20110288572" OR "20110319917" OR "20120059309" OR "20120059356" OR "20120083824" OR "20120083868" OR "20120089216" OR "20120101480" OR "20120101510" OR "20120138832" OR "20120143239" OR "20120165919" OR "20120172918" OR "20120179181" OR "20120197277" OR "20120232655" OR "20120271105" OR "20120271231" OR "20120277788" OR "20120310166" OR "20130035628" OR "20130046332" OR					

		"20130066348" OR "20130092012" OR "20130096571" OR "20130102996" OR "20130116708" OR "20130116721" OR "20130126559" OR "20130165871" OR "20130184703" OR "20130197454" OR "20130197567" OR "20130226196" OR "20130281788" OR "20130289608" OR "20130317589" OR "20130345739" OR "20140005712" OR "20140005713" OR "20140005717" OR "20140025048" OR "20140031856" OR "20140046133" OR "20140046243" OR "20140052161" OR "20140074144" OR "20140121672" OR "20140155830" OR "20140155908" OR "20140155980" OR "20140188127" OR "20140188143" OR "20140236219" OR "20140243882" OR "20140257253" OR "20140257363" OR "20140276403" OR "20140296868" OR "20140303658" OR "20140318354" OR "20140330286" OR "20140336691" OR "20140343593" OR "20140364896" OR "20140371779" OR "20150005781" OR "20150005792" OR "20150018860" OR "20150018929" OR "20150025555" OR "20150032144" OR "20150059908" OR "20150088190" OR "20150127035" OR "20150133990" OR "20150164523" OR "20150164666" OR "20150173782" OR "20150190155" OR					

		"20150190156" OR "20150196380" OR "20150209058" OR "20150209165" OR "20150238207" OR "20150250578" OR "20150265299" OR "20150305756" OR "20150305859" OR "20150352325" OR "20150360001" OR "20150374391" OR "20160008014" OR "20160022293" OR "20160058540" OR "20160074627" OR "20160106448" OR "20160106449" OR "20160113663" OR "20160113664" OR "20160113665" OR "20160113666" OR "20160143721" OR "20160151605" OR "20160206344" OR "20160220741" OR "20160228134" OR "20160262774" OR "20160262790" OR "20160287276" OR "20170014560" OR "20170037548" OR "20170042571" OR "20170049942" OR "20170056032" OR "20170058623" OR "20170079672" OR "20170086864" OR "20170100142" OR "20170105743" OR "20170105745" OR "20170112513" OR "20170112514" OR "20170189041" OR "20170196576" OR "20170233908" OR "20170252057" OR "20170265878" OR "20170303939" OR "20170303942" OR "20170303947" OR "20170303948" OR "20170319221" OR "20170325839" OR "20170340867" OR "20170348014" OR "20180042623" OR "20180042624" OR					

		"20180042626" OR "20180064453" OR "20180064454" OR "20180070968" OR "20180092652" OR "20180104404" OR "20180105963" OR "20180125512" OR "20180184912" OR "20180193043" OR "20180236205" OR "20180256177" OR "20180256178" OR "20180296240" OR "20180344339" OR "20180361116" OR "20190000492" OR "20190046219" OR "20190070401" OR "20190117244" OR "20190133622" OR "20190133623" OR "20190133624").pn.					
L159	250	("20190133625" OR "20190133626" OR "20190133627" OR "20190150959" OR "20190231373" OR "20190239910" OR "20190321071" OR "20190336142" OR "20190336148" OR "20200046368" OR "20200113412" OR "20210022843" OR "20210113224" OR "20210137667" OR "20210186541" OR "20210236148" OR "20210290925" OR "20210315598" OR "20210330344" OR "20210378694" OR "20220000505" OR "20220000506" OR "20220000507" OR "20220015798" OR "20220022898" OR "20220039815" OR "20220125451" OR "20220142638" OR "20220151647" OR "20220160381" OR "20220160382" OR "20220160383" OR "20220211400" OR "20220211992" OR	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/14 09:07 AM

		"20220240959" OR "20220346800" OR "20220346801" OR "20220346813" OR "20220346814" OR "20220347455" OR "20220362512" OR "20230046775" OR "20230062809" OR "20230070120" OR "2846179" OR "2955592" OR "3088363" OR "3197173" OR "3435826" OR "3515137" OR "3675657" OR "3892161" OR "3923065" OR "4030503" OR "4034642" OR "4222380" OR "4243040" OR "4287808" OR "4324262" OR "4393872" OR "4469100" OR "4523738" OR "4551862" OR "4604094" OR "4611594" OR "4643184" OR "4646736" OR "4650466" OR "4776337" OR "4790812" OR "4863440" OR "4870953" OR "4883458" OR "4886062" OR "4890611" OR "4898575" OR "4946440" OR "4960259" OR "4978341" OR "5059178" OR "5100423" OR "5127626" OR "5129910" OR "5135484" OR "5154724" OR "5158533" OR "5158564" OR "5192274" OR "5192286" OR "5192290" OR "5197485" OR "5329923" OR					

		"5360417" OR "5364345" OR "5376101" OR "5383887" OR "5389100" OR "5419774" OR "5421824" OR "5443443" OR "5456667" OR "5476450" OR "5490859" OR "5496365" OR "5527326" OR "5549626" OR "5591137" OR "5653684" OR "5662703" OR "5746758" OR "5749858" OR "5769816" OR "5782817" OR "5800457" OR "5827229" OR "5846251" OR "5860938" OR "5873866" OR "5873882" OR "5876414" OR "5895406" OR "5908435" OR "5911710" OR "5911733" OR "5911754" OR "5941869" OR "5947985" OR "5954737" OR "5971938" OR "5972019" OR "5974938" OR "5989233" OR "5993483" OR "6030397" OR "6059814" OR "6066158" OR "6068645" OR "6126635" OR "6142987" OR "6146396" OR "6146403" OR "6152946" OR "6156055" OR "6159230" OR "6165196" OR "6168579" OR "6179859" OR "6221006" OR "6228060" OR "6238412" OR					

		"6245078" OR "6245089" OR "6254571" OR "6258115" OR "6264663" OR "6306163" OR "6322572" OR "6350271" OR "6361545" OR "6364895" OR "6368339" OR "6383205" OR "6402771" OR "6413235" OR "6423032" OR "6432122" OR "6451036" OR "6458103" OR "6475236" OR "6485502" OR "6508782" OR "6511492" OR "6514273" OR "6530923" OR "6530935" OR "6544276" OR "6544278" OR "6544279" OR "6551342" OR "6564828" OR "6569181" OR "6575995" OR "6589263" OR "6596011" OR "6602271" OR "6605074" OR "6605102" OR "6610077" OR "6620148" OR "6620179" OR "6620182" OR "6623460" OR "6635068" OR "6645222" OR "6660013" OR "6660014" OR "6663650" OR "6692504" OR "6699260" OR "6702830" OR "6719717" OR "6755847" OR "6767353" OR "6790204" OR "6800080" OR "6818006" OR "6824545" OR "6824550" OR					

		"6824553" OR "6830561" OR "6846029" OR "6902540" OR "6939361" OR "6942682" OR "6945977" OR "6960189" OR "6960222" OR "7004931" OR "7004954" OR "7036707" OR "7041084" OR "7052500" OR "7056328" OR "7063707" OR "7069835" OR "7094249" OR "7179273" OR "7223253" OR "7232432" OR "7244243" OR "7285126" OR "7300458" OR "7306618" OR "7320698" OR "7323002" OR "7331980" OR "7534234" OR "7578830" OR "7621870" OR "7674247" OR "7691121" OR "7695458" OR "7763010" OR "7766934" OR "7775501" OR "7780696" OR "7905877" OR "7905896" OR "7938809" OR "7938820").pn.					
L160	106	("7967790" OR "7976511" OR "7993302" OR "7993363" OR "8043313" OR "8052640" OR "8057496" OR "8057497" OR "8066757" OR "8070769" OR "8070791" OR "8075510" OR "8088140" OR "8092486" OR "8100935" OR	(US-PGPUB; USPAT)	OR	ON	ON	2023/11/14 09:07 AM

		"8109962" OR "8118829" OR "8197493" OR "8246641" OR "8261648" OR "8267897" OR "8298257" OR "8317748" OR "8337450" OR "8357178" OR "8361104" OR "8409215" OR "8486105" OR "8491539" OR "8512352" OR "8535283" OR "8535334" OR "8545526" OR "8568432" OR "8574262" OR "8579915" OR "8585713" OR "8608754" OR "8657867" OR "8696622" OR "8715314" OR "8721714" OR "8753322" OR "8771289" OR "8777893" OR "8784441" OR "8784442" OR "8795305" OR "8795345" OR "8801748" OR "8808259" OR "8814927" OR "8820207" OR "8826791" OR "8828044" OR "8833224" OR "8845621" OR "8852226" OR "8939991" OR "8945143" OR "8945172" OR "8956384" OR "8992504" OR "9005172" OR "9028401" OR "9078682" OR "9101382" OR "9125683" OR "9126016" OR "9149609" OR "9155552" OR "9161766" OR "9173668" OR					

		"9186487" OR "9204887" OR "9216277" OR "9259237" OR "9283066" OR "9351747" OR "9358037" OR "9439664" OR "9439751" OR "9456834" OR "9463035" OR "9463036" OR "9526864" OR "9526865" OR "9566424" OR "9579116" OR "9616213" OR "9636206" OR "9643035" OR "9700332" OR "9717514" OR "9717519" OR "9744024" OR "9757137" OR "9827084" OR "9844386" OR "9844387" OR "9848975" OR "9849014" OR "9962178" OR "9980813" OR "9999493" OR "RE43902").pn.					
L162	65	16/117519	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2024/05/02 05:23 PM
L163	333	("2846179" | "3088363" | "3197173" | "3435826" | "3892161" | "3923065" | "4030503" | "4034642" | "4287808" | "4393872" | "4523738" | "4551862" | "4650466" | "4873978" | "4883458" | "4890611" | "4960259" | "4978341" | "5011488" | "5059178" | "5102415" | "5127626" | "5129910" | "5192286" | "5192290" | "5360417" | "5370653" | "5476450" | "5490859" | "5591137" | "5746758" | "5749858" | "5766191" | "5782817" | "5827229" | "5827304"	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2024/07/10 09:35 AM

		| "5868708" | "5873866" | "5873882" | "5876414" | "5882329" | "5911710" | "5972019" | "5974938" | "5989233" | "5993483" | "6066149" | "6221006" | "6228060" | "6238412" | "6254571" | "6258115" | "6306163" | "6350271" | "6364895" | "6368339" | "6383205" | "6413235" | "6423032" | "6440148" | "6454741" | "6454775" | "6458103" | "6458139" | "6511492" | "6514273" | "6530935" | "6530939" | "6544279" | "6551342" | "6589263" | "6596011" | "6602271" | "6605074" | "6605102" | "6623460" | "6635070" | "6645222" | "6660013" | "6663650" | "6685722" | "6692504" | "6699260" | "6755847" | "6767353" | "6800080" | "6824553" | "6939361" | "6960222" | "7004954" | "7036707" | "7041084" | "7052500" | "7056328" | "7069835" | "7094249" | "7179273" | "7220269" | "7232432" | "7244243" | "7285126" | "7306618" | "7320698" | "7323002" | "7331980" | "7534234" | "7578830" | "7621870" | "7674247" | "7691121" | "7695458" | "7763010" | "7766934" | "7775501" | "7905877" | "7905896" | "7938809" | "7938820" | "7967790" | "7976511" | "7993302" | "7993363" | "8043313" | "8052640" | "8066757" | "8070791" | "8075510" | "8088140" | "8100935" | "8109962" | "8118829" | "8197493" | "8246641" | "8261648" | "8267897" | "8298257" | "8317748" | "8337450" | "RE43902" | "8357178" | "8361104" | "8409215" | "8486105" | "8491539" | "8512352" | "8535334" | "8545526" | "8568432" | "8574262" | "8579915" | "8585713" |				

		"8696622" | "8715314" | "8771289" | "8777893" | "8784434" | "8784441" | "8795305" | "8795345" | "8801748" | "8814927" | "8820207" | "8826791" | "8828044" | "8833224" | "8845621" | "8852205" | "8852226" | "8932319" | "8939991" | "8945143" | "8945172" | "8968330" | "8992504" | "9005172" | "9101382" | "9149609" | "9161766" | "9204887" | "9259237" | "9283066" | "9408620" | "9439664" | "9439751" | "9456834" | "9463036" | "9526864" | "9526865" | "9566424" | "9579116" | "9616213" | "9636206" | "9700332" | "9717519" | "9744024" | "9757137" | "9844386" | "9844387" | "9999493" | "10004531" | "10045790" | "10098651" | "10238406" | "10335186" | "10342571" | "10349960" | "20010004699" | "20010041909" | "20010051810" | "20020111648" | "20020120277" | "20020147458" | "20020156457" | "20030114875" | "20030116731" | "20030125663" | "20030135230" | "20030153973" | "20040039412" | "20040073243" | "20040199202" | "20050038468" | "20050119668" | "20050283186" | "20060047286" | "20060100662" | "20060247500" | "20060253145" | "20060282111" | "20070038225" | "20070112374" | "20070118165" | "20070161963" |				

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		"20140371779" | "20150018860" | "20150133990" | "20150196744" | "20150238207" | "20150265299" | "20150305756" | "20150305859" | "20150352325" | "20150360001" | "20150374391" | "20160113666" | "20160143721" | "20160262790" | "20160277276" | "20170037548" | "20170058623" | "20170105745" | "20170112513" | "20170112514" | "20170189041" | "20170233908" | "20170265878" | "20170325839" | "20180064454" | "20180092652" | "20180105963" | "20180125512" | "20180193043" | "20180256178" | "20180296240" | "20180344339" | "20180361116" | "20190000492" | "20190046219" | "20190070401" | "20190150959" | "20190231373").pn. AND (PGPB | USPT | USOC).dbnm.					
L164	2	("20030191425," "20120143123").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2024/07/10 10:23 AM
L165	250	("10004531" OR "10010335" OR "10016266" OR "10028759" OR "10045790" OR "10058339" OR "10098651" OR "10130385" OR "10226263" OR "10238406" OR "10271864" OR	(US-PGPUB; USPAT)	OR	ON	ON	2024/07/10 10:25 AM

		"10327883" OR "10335186" OR "10342571" OR "10349960" OR "10383644" OR "10384034" OR "10456555" OR "10478535" OR "10485952" OR "10524811" OR "10531883" OR "10588655" OR "10648268" OR "10695159" OR "10709471" OR "10772636" OR "10799331" OR "10912577" OR "10926060" OR "10953195" OR "10960114" OR "11000682" OR "11013523" OR "1101890" OR "11058445" OR "11058451" OR "11065019" OR "11147571" OR "11154314" OR "11166703" OR "11185664" OR "11213356" OR "11224450" OR "11224721" OR "11259821" OR "11305094" OR "11383064" OR "11395903" OR "11406801" OR "11433218" OR "11439799" OR "11457936" OR "11529158" OR "11554005" OR "11559382" OR "11576691" OR "11596768" OR "11642209" OR "11648028" OR "11697011" OR "11697012" OR "11744691" OR "11806033" OR "11832837" OR "11832838" OR "11833023" OR "11839393" OR "11844921" OR					

		"11849963" OR "11890180" OR "11918243" OR "11918244" OR "20010004699" OR "20010031981" OR "20010041881" OR "20010041909" OR "20010049486" OR "20010051810" OR "20020022858" OR "20020022859" OR "20020026211" OR "20020032455" OR "20020049452" OR "20020095161" OR "20020095171" OR "20020111648" OR "20020120277" OR "20020147458" OR "20020151918" OR "20020156457" OR "20020161392" OR "20020169474" OR "20020173819" OR "20020188276" OR "20030023263" OR "20030083693" OR "20030100919" OR "20030114875" OR "20030116731" OR "20030125663" OR "20030135151" OR "20030135230" OR "20030135258" OR "20030153873" OR "20030153973" OR "20030168068" OR "20030176884" OR "20030191516" OR "20030208224" OR "20030216774" OR "20030225379" OR "20040019310" OR "20040039351" OR "20040039412" OR "20040068288" OR "20040073243" OR "20040098033" OR "20040102807" OR "20040122359" OR "20040127936" OR "20040133232" OR "20040138525" OR "20040138692" OR "20040167567" OR "20040199201" OR "20040199202" OR					

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		"20080157017" OR "20080167678" OR "20080183136" OR "20080228209" OR "20080234715" OR "20080234722" OR "20080262528" OR "20080269798" OR "20080294096" OR "20080300466" OR "20080312681" OR "20090018566" OR "20090054918" OR "20090062841" OR "20090069828" OR "20090076417" OR "20090160112" OR "20090163846" OR "20090182362" OR "20090192495" OR "20090281525" OR "20090292307" OR "20090299393" OR "20090312786" OR "20100016837" OR "20100030256" OR "20100042136" OR "20100087844" OR "20100087850" OR "20100094201" OR "20100106081" OR "20100114017" OR "20100114113" OR "20100121312" OR "20100137846" OR "20100190156" OR "20100204712" OR "20100217276" OR "20100249815" OR "20100268264" OR "20100318178" OR "20110034986" OR "20110034987" OR "20110054405" OR "20110060212" OR "20110118817" OR "20110125181" OR "20110144592" OR "20110152823" OR "20110152889" OR "20110152993" OR "20110160742" OR "20110160763" OR "20110190806" OR "20110196309" OR "20110196414" OR "20110213290" OR "20110213403" OR					

		"20110224707" OR "20110245807" OR "20110251629" OR "20110264132" OR "20110264133" OR "20110265681" OR "20110288529").pn.					
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		"20140005715" OR "20140005717" OR "20140025048" OR "20140031856" OR "20140046133" OR "20140046243" OR "20140052161" OR "20140074144" OR "20140121672" OR "20140155830" OR "20140155908" OR "20140155980" OR "20140163615" OR "20140180055" OR "20140180397" OR "20140188127" OR "20140188143" OR "20140222070" OR "20140236219" OR "20140243882" OR "20140257253" OR "20140257363" OR "20140276403" OR "20140296868" OR "20140303658" OR "20140318354" OR "20140324091" OR "20140330286" OR "20140336691" OR "20140343593" OR "20140364896" OR "20140371779" OR "20150005781" OR "20150005792" OR "20150018859" OR "20150018860" OR "20150018929" OR "20150025555" OR "20150032144" OR "20150059908" OR "20150088190" OR "20150127035" OR "20150133990" OR "20150150672" OR "20150164523" OR "20150164666" OR "20150173782" OR "20150190155" OR "20150190156" OR "20150196380" OR "20150196744" OR "20150209058" OR "20150209165" OR "20150238207" OR "20150250578" OR "20150265299" OR "20150305756" OR "20150305859" OR					

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L168	152	("7306618" OR "7320698" OR "7323002" OR "7331980" OR "7481805" OR "7534234" OR "7578830" OR "7621870" OR "7674247" OR "7678131" OR "7691121" OR "7695458" OR	(US-PGPUB; USPAT)	OR	ON	ON	2024/07/10 10:25 AM

		"7713282" OR "7722641" OR "7763010" OR "7766934" OR "7775501" OR "7780696" OR "7815608" OR "7905877" OR "7905896" OR "7938809" OR "7938820" OR "7967790" OR "7976511" OR "7993302" OR "7993363" OR "8021351" OR "8043313" OR "8052640" OR "8057496" OR "8057497" OR "8066757" OR "8070694" OR "8070769" OR "8070791" OR "8075510" OR "8080032" OR "8088140" OR "8092486" OR "8100935" OR "8109962" OR "8118829" OR "8197493" OR "8246641" OR "8261648" OR "8267897" OR "8298257" OR "8317748" OR "8337450" OR "8343167" OR "8357178" OR "8361104" OR "8409215" OR "8480708" OR "8486105" OR "8491539" OR "8512352" OR "8523897" OR "8535283" OR "8535334" OR "8535343" OR "8545526" OR "8568432" OR "8568465" OR "8574262" OR "8579915" OR "8585713" OR "8608754" OR "8647367" OR					

		"8657867" OR "8696622" OR "8715314" OR "8721714" OR "8753322" OR "8771289" OR "8777893" OR "8784441" OR "8784442" OR "8784469" OR "8795305" OR "8795345" OR "8801748" OR "8808259" OR "8814927" OR "8820207" OR "8826791" OR "8828044" OR "8833224" OR "8834519" OR "8845621" OR "8852205" OR "8852226" OR "8939991" OR "8945143" OR "8945172" OR "8956384" OR "8992504" OR "9005172" OR "9011551" OR "9028401" OR "9078682" OR "9101382" OR "9125683" OR "9126016" OR "9149609" OR "9155552" OR "9161766" OR "9168043" OR "9173668" OR "9186487" OR "9204887" OR "9216277" OR "9241669" OR "9259237" OR "9265512" OR "9283066" OR "9301769" OR "9351747" OR "9358037" OR "9439664" OR "9439751" OR "9456834" OR "9463035" OR "9463036" OR "9526864" OR "9526865" OR "9532792" OR					

		"9566073" OR "9566424" OR "9579116" OR "9581942" OR "9616213" OR "9636206" OR "9643035" OR "9662129" OR "9700332" OR "9717488" OR "9717514" OR "9717519" OR "9744024" OR "9757137" OR "9827084" OR "9844386" OR "9844387" OR "9848975" OR "9849014" OR "9884387" OR "9962178" OR "9980813" OR "9999493" OR "RE43902").pn.					
L169	210	(hemostasis ADJ valve adj2 method)	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2024/07/10 10:34 AM
L170	67	(hemostasis ADJ valve adj2 method) AND filament	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2024/07/10 10:34 AM
L171	14	(hemostasis ADJ valve adj2 method) AND filament AND (valve ADJ assembly)	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2024/07/10 10:35 AM
L172	87	(hemostasis ADJ valve adj2 method) .ti.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2024/07/10 10:36 AM
L173	5	(hemostasis ADJ valve adj2 method) .ti. AND (Quynh-Nhu NEAR Vu)	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2024/07/10 10:37 AM
L174	5	(hemostasis ADJ valve	(US-PGPUB; USPAT;	OR	ON	ON	2024/07/10

		adj2 method) .ti. AND (Quynh-Nhu NEAR Vu) AND (filament).clm.	FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)				10:37 AM
L175	1	18/598482	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2024/07/10 10:50 AM
L176	7352	((A61M2039/062 OR A61M2039/0673 OR A61M39/0613).cpc.)	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2024/07/10 10:53 AM
L177	3	("20030116731," "20110144592," "20150305859").pn.	(US-PGPUB; USPAT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO)	OR	ON	ON	2024/07/10 11:17 AM

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N47	1423	(A61B17/3207).CPC.	(US-PGPUB; USPAT)	OR	ON	ON	2020/11/24 03:05 PM
N48	1681	(A61M39/06 OR A61M2039/062 OR A61M2039/0673 OR A61M39/0613).CPC.	(US-PGPUB; USPAT)	OR	ON	ON	2020/11/24 03:05 PM
N49	0	("I1" or N47) and ((hemostatic adj valve) and reinforcement and filament and biasing).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2020/11/24 03:06 PM
N50	2	(N47 or N48) and ((hemostatic adj valve) and reinforcement and filament and biasing).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2020/11/24 03:06 PM
N51	2	((hemostatic adj valve) and reinforcement and filament and biasing).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2020/11/24 03:06 PM
N52	2	(A61M39/06 OR A61M2039/062 OR A61M2039/0673 OR A61M39/0613).CPC. AND ((constricting ADJ mechanism) AND	(US-PGPUB; USPAT)	OR	ON	ON	2022/11/08 10:25 AM

		filament AND spring).clm.					
N53	3	((hemostasis ADJ valve) AND (constricting ADJ mechanism) AND filament AND spring).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2022/11/08 10:26 AM
N54	3	((valve) AND (constricting ADJ mechanism) AND (filament) AND (biasing OR spring)).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2022/11/28 03:12 PM
N55	5	N48 AND (active ADJ tensioning ADJ mechanism)	(US-PGPUB; USPAT)	OR	ON	ON	2023/05/05 10:13 PM
N56	91	(filament AND actuator AND biasing).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2023/05/05 10:14 PM
N57	15	(filament AND actuator AND biasing AND valve).clm.	(US-PGPUB; USPAT)	OR	ON	ON	2023/05/05 10:14 PM

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
18/598,482	03/07/2024	Benjamin E. Merritt	111552.8016.US07

CONFIRMATION NO. 3249

25096
PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

PUBLICATION NOTICE

OC000000075153982

Date Mailed: 07/12/2024

Title:HEMOSTASIS VALVES AND METHODS OF USE

Publication No.US-2024-0207593-A1
Publication Date:06/27/2024

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 viewed using the USPTO's publicly available Searchable Databases via the Patent Public Search tool at www.uspto.gov. The direct link to access the Patent Public Search tool is currently https://ppubs.uspto.gov/pubwebapp/static/pages/ppubsbasic.html.

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 Patent Center, the USPTO's electronic patent application filing and management system. The direct link to access this status information is currently https://patentcenter.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of Patent Center.

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

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

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/598,482	03/07/2024	Benjamin E. Merritt	111552.8016.US07	3249

25096 7590 07/09/2024

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

EXAMINER
VU, QUYNH-NHU HOANG

ART UNIT	PAPER NUMBER
3783	

NOTIFICATION DATE	DELIVERY MODE
07/09/2024	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

Applicant-Initiated Interview Summary	**Application No.** 18/598,482	**Applicant(s)** Merritt et al.		
	Examiner QUYNH-NHU H VU	**Art Unit** 3783	**AIA (First Inventor to File) Status** Yes	**Page** 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	**Title**	**Type**
QUYNH-NHU H VU	Primary Examiner	Telephonic
Matthew Williams	Attorney of Record	

Date of Interview: 01 July 2024

Issues Discussed:

Election/Restriction

During the interview, attorney Williams and examiner Vu discussed about a sub-species in between Figs . 6-9.
Both of the attorney Williams and examiner Vu agreed that the sub-species (filament) in either one of the Figs. 6-9 should be examined or combined into the delivery device system in Figs. 1-4.
For example: if the sub-species - filament 150 in Fig. 6 elected, then, the filament 150 in Fig. 6 are combined in the delivery device system 100 in Figs. 1-4.
Or if the sub-species - filament 150 in Fig. 7 elected, in that case, the filament 150 in Fig. 7 are combined in the delivery device system 100 in Figs. 1-4.
Or if the sub-species - filament 800 in Fig. 8 elected, in that case, the filament 800 in Fig. 8 are combined in the delivery device system 100 in Figs. 1-4.
Or if the sub-species - filament 800 in Fig. 9 elected, in that case, the filament 800 in Fig. 9 are combined in the delivery device system 100 in Figs. 1-4.

/QUYNH-NHU H. VU/ Primary Examiner, Art Unit 3783	

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

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

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

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

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

RECEIVED
PATENT DOCKETING

JUN 03 2024

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 111552.8043WO00	Date of mailing (day/month/year) MAY 29 2024 **FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/US 23/79428	International filing date (day/month/year) 10 November 2023 (10.11.2023)
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 90*bis*.1 and 90*bis*.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 45*bis*.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 Kari Rodriquez Telephone No. PCT Helpdesk: 571-272-4300

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	FOR FURTHER ACTION
111552.8043WO00	see Form PCT/ISA/220 as well as, where applicable, item 5 below.

International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US 23/79428	10 November 2023 (10.11.2023)	11 November 2022 (11.11.2022)

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 43.6*bis*(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 23/79428

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

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

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

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

This International Searching Authority found multiple inventions in this international application, as follows:
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 1-19 and 28-29 directed to a system for aspirating and irrigating a body cavity.

Group II: Claims 20-27 directed to a method of treating material within a body cavity of a patient.

-*-Continued in 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.:
1-19, 28-29

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 23/79428

A. CLASSIFICATION OF SUBJECT MATTER

IPC - INV. A61M 25/14 (2024.01)
ADD.

CPC - INV. A61M 25/0026

ADD. A61M 2025/0004, A61M 2025/0039, A61M 2025/0031

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 -- Y -- A	US 2003/0191425 A1 (ROSENBLATT et al.); 9 October 2003 (09.10.2003); entire document, especially Abstract; Figs. 1-3, para. [0014], [0029]-[0031], [0039]-[0040].	1-2, 4 --- 3, 19, 28 --- 5-18, 29
Y -- A	US 2006/0149219 A1 (CALDERON); 6 July 2006 (06.07.2006); entire document, especially Abstract, Fig. 3, para. [0040]-[0041].	3, 26 --- 29
Y -- A	US 2012/0143123 A1 (AGNEW); 7 June 2012 (07.06.2012); entire document, especially Abstract, Fig. 9, para. [0055], [0059]-[0060].	19 --- 5-18
A	US 2020/0324079 A1 (COVIDIEN LP); 15 October 2020 (15.10.2020); entire document.	1-19, 28-29
A	US 2005/0080398 A1 (MARKEL et al.); 14 April 2005 (14.04.2005); entire document.	1-19, 28-29

☐ 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	Date of mailing of the international search report
28 February 2024 (28.02.2024)	MAY 29 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	Authorized officer Kari Rodriquez Telephone No. PCT Helpdesk: 571-272-4300

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

The Inventions listed as Groups I-II 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 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}, not required in Group II.

The invention of Group II includes the special technical feature of 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}, not required in Group I.

COMMON TECHNICAL FEATURES

The inventions of Groups I-II share the technical features of a system for aspirating and irrigating a body cavity, comprising: a catheter assembly comprising an inner lumen; and an outer lumen extending at least partially through the inner lumen, and an outer aperture; the system configured to aspirate the inner lumen and to flow an irrigation fluid through the outer lumen and out of the aperture. The common technical features are known in prior art as shown in US 2003/0191425 A1 to Rosenblatt et al. (hereinafter 'Rosenblatt'). Therefore, Groups I and II lack unity since the shared technical features do not represent a contribution over:

Rosenblatt teaches a system for aspirating and irrigating a body cavity (hemodialysis catheter for aspirating and infusing fluid, Abstract), comprising:
a catheter assembly (Fig. 1, para. [0029]) comprising an outer lumen (infusion lumen of tube 24, Fig. 2, para. [0032]) and an inner lumen extending at least partially through the outer lumen (tube 20 extending through tube 24, Fig. 2, para. [0030]), and an outer aperture (infusion ports 26, Fig. 2-3, para. [0031]);
the system configured to aspirate the inner lumen (fluid is taken into aspirating port 34 of aspirating tube 20 to be processed and filtered, para. [0040]) and to flow an irrigation fluid through the outer lumen and out of the aperture (fluid is returned as a jet from the infusion lumen, para. [0040]; jet of fluid exits from ports 25, para. [0039]).

As the common features were known in the art at the time of the invention, they cannot be considered special technical features that would otherwise unify the groups.

Therefore, Groups I-II 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

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

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WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	MAY 29 2024
Applicant's or agent's file reference 111552.8043WO00	FOR FURTHER ACTION See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US 23/79428	10 November 2023 (10.11.2023)	11 November 2022 (11.11.2022)

International Patent Classification (IPC) or both national classification and IPC
IPC - INV. A61M 25/14 (2024.01)
ADD.
CPC - INV. A61M 25/0026
ADD. A61M 2025/0004, A61M 2025/0039, A61M 2025/0031

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 43*bis*.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 66.1*bis*(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	Date of completion of this opinion	Authorized officer
Mail Stop PCT, Attn: ISA/US Commissioner for Patents' P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	28 February 2024 (28.02.2024)	Kari Rodriquez PCT Help Desk Telephone No. 571-272-4300

Form PCT/ISA/237 (cover sheet) (revised July 2022)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 23/79428

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(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
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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 1-19 and 28-29 directed to a system for aspirating and irrigating a body cavity.
Group II: Claims 20-27 directed to a method of treating material within a body cavity of a patient.

The inventions listed as Groups I-II 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 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], not required in Group II.

The invention of Group II includes the special technical feature of 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], not required in Group I.

COMMON TECHNICAL FEATURES
The inventions of Groups I-II share the technical features of a system for aspirating and irrigating a body cavity, comprising: a catheter assembly comprising an inner lumen; and an outer lumen extending at least partially through the inner lumen, and an outer aperture; the system configured to aspirate the inner lumen and to flow an irrigation fluid through the outer lumen and out of the aperture. The common technical features are known in prior art as shown in US 2003/0191425 A1 to Rosenblatt et al. (hereinafter 'Rosenblatt'). Therefore, Groups I and II lack unity since the shared technical features do not represent a contribution over:

Rosenblatt teaches a system for aspirating and irrigating a body cavity (hemodialysis catheter for aspirating and infusing fluid, Abstract), comprising:
a catheter assembly (Fig. 1, para. [0029]) comprising an outer lumen (infusion lumen of tube 24, Fig. 2, para. [0032]) and an inner lumen extending at least partially through the outer lumen (tube 20 extending through tube 24, Fig. 2, para. [0030]), and an outer aperture (infusion ports 26, Fig. 2-3, para. [0031]);
the system configured to aspirate the inner lumen (fluid is taken into aspirating port 34 of aspirating tube 20 to be processed and filtered, para. [0040]) and to flow an irrigation fluid through the outer lumen and out of the aperture (fluid is returned as a jet from the infusion lumen, para. [0040]; jet of fluid exits from ports 25, para. [0039]).

As the common features were known in the art at the time of the invention, they cannot be considered special technical features that would otherwise unify the groups.

Therefore, Groups I-II lack unity under PCT Rule 13 because they do not share a same or corresponding special technical feature.

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. 1-19, 28-29 -180-

WRITTEN OPINION OF THE
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International application No.
PCT/US 23/79428

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

1. Statement

Novelty (N)	Claims	3, 5-18, 28-29	YES
	Claims	1-2, 4	NO
Inventive step (IS)	Claims	5-18, 29	YES
	Claims	1-4, 19, 28	NO
Industrial applicability (IA)	Claims	1-19, 28-29	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1-2 and 4 lack novelty under PCT Article 33(2) as being anticipated by US 2003/0191425 A1 to Rosenblatt et al. (hereinafter 'Rosenblatt').

Regarding claim 1, Rosenblatt teaches a system for aspirating and irrigating a body cavity (hemodialysis catheter for aspirating and infusing fluid, Abstract), comprising:
a catheter assembly (Fig. 1, para. [0029]) comprising
an outer elongate member (tube 24, Fig. 2, para. [0030]) defining an outer lumen (infusion lumen of tube 24, Fig. 2, para. [0032]); and
an inner elongate member extending at least partially through the outer elongate member (tube 20, Fig. 2, para. [0030]) and defining an inner lumen (Fig. 3) having a distal opening (aspirating port 34 at distal end of aspirating tube 20, para. [0014]),
wherein a distal portion of the outer elongate member is fluidly sealed to the inner elongate member (Fig. 3-4, para. [0032]), and wherein the outer elongate member includes an aperture positioned proximal of the distal portion (infusion ports 26, Fig. 2-3, para. [0031]);
an aspiration source fluidly coupled to the inner lumen and configured to aspirate the inner lumen (fluid is taken into aspirating port 34 of aspirating tube 20 to be processed and filtered, para. [0040]; implicitly, the system utilizes an aspiration source coupled to tube 20 for aspirating the fluid); 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 (fluid is returned as a jet from the infusion lumen, para. [0040]; jet of fluid exits from ports 25, para. [0039]; implicitly, the system utilizes an irrigation source coupled to the tube 24 for fluid return).

Regarding claim 2, Rosenblatt teaches the system of claim 1 wherein the inner elongate member is coaxial with the outer elongate member (Fig. 2-3).

Regarding claim 4, Rosenblatt teaches the system of claim 1 wherein the aperture is one of a plurality of apertures positioned circumferentially about the outer elongate member (infusion ports 26a, Fig. 3, para. [0031]).

Claims 3 and 28 lack an inventive step under PCT Article 33(3) as being obvious over Rosenblatt in view of US 2006/0149219 A1 to Calderon (hereinafter 'Calderon').

Regarding claim 3, Rosenblatt teaches the system of claim 1, but fails to teach wherein the aspiration source is a first syringe, and wherein the irrigation source is a second syringe.
Calderon teaches a system for retrograde perfusion (Abstract) wherein an aspiration source fluidly coupled to an aspiration catheter is a first syringe (withdrawal syringe 70 coupled to catheter 40, Fig. 3, para. [0040]) and wherein an irrigation source coupled to an irrigation catheter is a second syringe (push syringe coupled to infusion catheter 60 for infusing fluids into patient, para. [0041]). It would have been obvious to one of ordinary skill in the art that the system of Rosenblatt could have been modified as claimed in view of Calderon for controlled aspiration and irrigation.

-*-Continued in Supplemental Box-*-

WRITTEN OPINION OF THE
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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 claim 14, the element "the aspiration flow control assembly" lacks proper antecedent basis. For purposes of this opinion, claim 14 has been interpreted to teach "the irrigation flow control assembly".

Regarding claim 16, the element "the aspiration flow control assembly" is unclear and confusing. For purposes of this opinion, claim 16 has been interpreted to teach "the irrigation flow control assembly".

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:
-*-Box No. V.2 - Citations and explanations-*-

Regarding claim 28, Rosenblatt teaches a system for aspirating and irrigating a body cavity (hemodialysis catheter for aspirating and infusing fluid, Abstract), comprising:
a catheter assembly (Fig. 1, para. [0029]) comprising
an outer elongate member (tube 24, Fig. 2, para. [0030]) defining an outer lumen (infusion lumen of tube 24, Fig. 2, para. [0032]); and
an inner elongate member extending at least partially through the outer elongate member (tube 20, Fig. 2, para. [0030]) and defining an inner lumen (Fig. 3) having a distal opening (aspirating port 34 at distal end of aspirating tube 20, para. [0014]),
wherein a distal portion of the outer elongate member is fluidly sealed to the inner elongate member (Figs. 3-4, para. [0032]), and wherein the outer elongate member includes an aperture positioned proximal of the distal portion (infusion ports 26, Fig. 2-3, para. [0031]);
an aspiration [syringe] fluidly coupled to the inner lumen and configured to aspirate the inner lumen (fluid is taken into aspirating port 34 of aspirating tube 20 to be processed and filtered, para. [0040]; implicitly, the system utilizes an aspiration source coupled to tube 20 for aspirating the fluid); 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 (fluid is returned as a jet from the infusion lumen, para. [0040]; jet of fluid exits from ports 26, para. [0039]; implicitly, the system utilizes an irrigation source coupled to the tube 24 for fluid return).
Rosenblatt fails to teach 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.
Calderon teaches a system for retrograde perfusion (Abstract) comprising an aspiration syringe fluidly coupled to an aspiration catheter and configured to aspirate the aspiration catheter (withdrawal syringe 70 coupled to catheter 40, Fig. 3, para. [0040]), and an irrigation syringe fluidly coupled to an irrigation catheter and configured to flow an irrigation fluid through the irrigation catheter (push syringe coupled to infusion catheter 60 for infusing fluids into patient, para. [0041]). It would have been obvious to one of ordinary skill in the art that the system of Rosenblatt could have been modified as claimed in view of Calderon for controlled aspiration and irrigation.

Claim 19 lacks an inventive step under PCT Article 33(3) as being obvious over Rosenblatt in view of US 2012/0143123 A1 to Agnew (hereinafter 'Agnew').

Regarding claim 19, Rosenblatt teaches the system of claim 1 wherein the inner elongate member is a [reinforced] catheter (tube 20, Fig. 2, para. [0030]), and wherein the outer elongate member is a tube (tube 24, Fig. 2, para. [0030]) [formed from a plastic material].
Agnew teaches a catheter assembly (Abstract) wherein an inner member is a reinforced catheter (inner catheter comprising a reinforcement structural layer (para. [0055]) and wherein an outer member is a tube formed from a plastic material (outer catheter being a polyurethane, para. [0055]). It would have been obvious to one of ordinary skill in the art that the system of Rosenblatt could have been modified as claimed in view of Agnew for desired advancement properties.

Claims 5-18 and 29 meet the criteria of PCT Article 33(2)-(3) because the prior art fails to teach or fairly suggest the limitations as claimed.

The prior art is exemplified by (1) Rosenblatt; (2) Agnew; (3) Calderon.

Regarding claim 5, Rosenblatt teaches the system of any one of claim 1, but fails to teach the system 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.
Agnew teaches a catheter assembly (Abstract), the assembly comprising:
an aspiration flow control assembly (valve member 270, Fig. 9, para. [0060]) coupled between an aspiration source and an aspiration lumen (valve member 270 for directing fluid flow from aspiration lumen 226 to extension tube 269 coupled to treatment unit, Fig. 9, para. [0060]), wherein the aspiration flow control is further fluidly coupled to a second leg 268 (Fig. 9), and wherein the aspiration flow control assembly is configured to
permit fluid flow from the aspiration lumen to an aspiration source while blocking fluid flow from the second leg to the aspiration source (valve member 270 for directing fluid flow from aspiration lumen 226 to extension tube 269 coupled to treatment unit, Fig. 9, para. [0060]), and
blocking fluid flow from the aspiration source to the aspiration lumen (para. [0060]).
Agnew fails to teach 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.

Regarding claim 6, the prior art fails to teach or fairly suggest the limitations as claimed because they depend from claim 5.

-*-Continued in next Supplemental Box-*-

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:
-*-Supplemental Box - Box No. V.2 - Citations and explanations-*-

Regarding claim 7, Rosenblatt teaches the system of claim 1, but fails to teach the system 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.
Agnew teaches an irrigation flow control assembly (valve member 260, Fig. 9, para. [0060]) fluidly coupled between an irrigation source and an irrigation lumen (valve member 260 between extracorporeal unit and infusion lumen 228, Fig. 9, para. [0059]-[0060]), wherein the irrigation flow control assembly is further fluidly coupled to an irrigation reservoir configured to hold an irrigation fluid (valve member 260 between fluid source and infusion lumen 228, Fig. 9, para. [0059]-[0060]), and wherein the irrigation flow control assembly is configured to
block fluid flow from the infusion lumen to the irrigation source (Fig. 9, para. [0060]), and
permit fluid flow from the irrigation source into the irrigation lumen while blocking flow of irrigation fluid from the irrigation source into the irrigation reservoir (valve member 260 opened between extracorporeal unit and infusion lumen 228, Fig. 9, para. [0059]-[0060]).
Agnew fails to teach 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.

Regarding claim 8, the prior art fails to teach or fairly suggest the limitations as claimed because they depend from claim 7.

Regarding claim 9, Rosenblatt teaches the system of claim 1, but fails to teach the system 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.
Agnew teaches a catheter assembly (Abstract), the assembly comprising:
an aspiration flow control assembly (valve member 270, Fig. 9, para. [0060]) coupled between an aspiration source and an aspiration lumen (valve member 270 for directing fluid flow from aspiration lumen 226 to extension tube 269 coupled to treatment unit, Fig. 9, para. [0060]), wherein the aspiration flow control is further fluidly coupled to a second leg 266 (Fig. 9), and wherein the aspiration flow control assembly is configured to
permit fluid flow from the aspiration lumen to an aspiration source while blocking fluid flow from the second leg to the aspiration source (valve member 270 for directing fluid flow from aspiration lumen 226 to extension tube 269 coupled to treatment unit, Fig. 9, para. [0060]), and
blocking fluid flow from the aspiration source to the aspiration lumen (para. [0060]);
an irrigation flow control assembly (valve member 260, Fig. 9, para. [0060]) fluidly coupled between an irrigation source and an irrigation lumen (valve member 260 between extracorporeal unit and infusion lumen 228, Fig. 9, para. [0059]-[0060]), wherein the irrigation flow control assembly is further fluidly coupled to an irrigation reservoir configured to hold an irrigation fluid (valve member 260 between fluid source and infusion lumen 228, Fig. 9, para. [0059]-[0060]), and wherein the irrigation flow control assembly is configured to
block fluid flow from the infusion lumen to the irrigation source (Fig. 9, para. [0060]), and
permit fluid flow from the irrigation source into the irrigation lumen while blocking flow of irrigation fluid from the irrigation source into the irrigation reservoir (valve member 260 opened between extracorporeal unit and infusion lumen 228, Fig. 9, para. [0059]-[0060]).
Agnew fails to teach 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
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.

-*-Continued in next Supplemental Box-*-

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:
-*-Supplemental Box - Box No. V.2 - Citations and explanations-*-

Regarding claims 10-11, the prior art fails to teach or fairly suggest the limitations as claimed because they depend from claim 9.

Regarding claim 12, Rosenblatt teaches the system of claim 1, but fails to teach the system 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.
Agnew teaches a catheter assembly (Abstract), the assembly comprising:
an aspiration flow control assembly (valve assembly, Fig. 9, para. [0060]) coupled between an aspiration source and an aspiration lumen (valve assembly for directing fluid flow from aspiration lumen 226 to extension tube 269 coupled to treatment unit, Fig. 9, para. [0060]), wherein the aspiration flow control assembly comprises:
a first connector configured to be fluidly coupled to the aspiration lumen (first leg 264 fluidly coupled to aspiration lumen 226, Fig. 9, para. [0060]);
a second connector configured to be fluidly coupled to a fluid source (leg 266 with connector end for coupling to fluid source, Fig. 9, para. [0060]);
a first valve positioned between the first connector and an aspiration source (valve member 270 for directing fluid flow from aspiration lumen 226 to extension tube 269 coupled to treatment unit, Fig. 9, para. [0060]); wherein the first valve is positioned to (a) permit fluid flow from the first connector from the inner lumen to the aspiration source (valve member 270 for directing fluid flow from aspiration lumen 226 to extension tube 269 coupled to treatment unit, Fig. 9, para. [0060]) and (b) inhibit fluid flow through the second connector from the fluid source to the aspiration source (Fig. 9, para. [0060]).
Agnew fails to teach wherein the aspiration flow control assembly comprises: a second connector configured to be fluidly coupled to a waste reservoir; 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.

Regarding claim 13, the prior art fails to teach or fairly suggest the limitations as claimed because they depend from claim 12.

Regarding claim 14, Rosenblatt teaches the system of claim 1, but fails to teach the system further comprising:
an irrigation flow control assembly fluidly coupled between the irrigation source and the outer lumen, wherein the aspiration flow control assembly [NOTE: See Box VIII] 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.
Agnew teaches an irrigation flow control assembly (valve system, Fig. 9, para. [0060]) fluidly coupled between an irrigation source and an irrigation lumen (valve member 260 between extracorporeal unit and infusion lumen 228, Fig. 9, para. [0059]-[0060]), wherein the irrigation flow control assembly comprises:
a first connector configured to be fluidly coupled to the infusion lumen (first leg 254 coupled to infusion lumen 228, Fig. 9, para. [0059]-[0060]);
a second connector configured to be fluidly coupled to an irrigation reservoir (second leg 256 with connector for coupling to a fluid source, para. [0060]);
a first valve positioned between the first connector and the irrigation source (valve member 260 between extracorporeal unit and infusion lumen 228, Fig. 9, para. [0059]-[0060]), wherein the first valve is positioned (a) to permit fluid flow through the first connector from the irrigation source to the irrigation lumen (valve member 260 opened between extracorporeal unit and infusion lumen 228, Fig. 9, para. [0059]-[0060]) and (b) inhibit fluid flow from the infusion lumen to the irrigation source (Fig. 9, para. [0060]).
Agnew fails to teach wherein the irrigation flow control assembly comprises:
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.

Regarding claim 15, the prior art fails to teach or fairly suggest the limitations as claimed because they depend from claim 14.

-*-Continued in next Supplemental Box-*-

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:
-*-Supplemental Box - Box No. V.2 - Citations and explanations-*-

Regarding claim 16, Rosenblatt teaches the system of claim 1, but fails to teach the system 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 [NOTE: see Box VIII] 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.
Agnew teaches an irrigation flow control assembly (valve member 260, Fig. 9, para. [0060]) fluidly coupled between an irrigation source and an irrigation lumen (valve member 260 between extracorporeal unit and infusion lumen 228, Fig. 9, para. [0059]-[0060]), wherein the irrigation flow control assembly is further fluidly coupled to an irrigation reservoir configured to hold an irrigation fluid (valve member 260 between fluid source and infusion lumen 228, Fig. 9, para. [0059]-[0060]), and wherein the irrigation flow control assembly is configured to
block fluid flow from the infusion lumen to the irrigation source (Fig. 9, para. [0060]), and
permit fluid flow from the irrigation source into the irrigation lumen while blocking flow of irrigation fluid from the irrigation source into the irrigation reservoir (valve member 260 opened between extracorporeal unit and infusion lumen 228, Fig. 9, para. [0059]-[0060]); and
an irrigation flow control assembly (valve system, Fig. 9, para. [0060]) fluidly coupled between an irrigation source and an irrigation lumen (valve member 260 between extracorporeal unit and infusion lumen 228, Fig. 9, para. [0059]-[0060]), wherein the irrigation flow control assembly comprises:
a third configured to be fluidly coupled to the infusion lumen (first leg 254 coupled to infusion lumen 228, Fig. 9, para. [0059]-[0060]);
a fourth configured to be fluidly coupled to an irrigation reservoir (second leg 256 with connector for coupling to a fluid source, para. [0060]);
a third valve positioned between the third connector and the irrigation source (valve member 260 between extracorporeal unit and infusion lumen 228, Fig. 9, para. [0059]-[0060]), wherein the third valve is positioned (a) to permit fluid flow through the third connector from the irrigation source to the irrigation lumen (valve member 260 opened between extracorporeal unit and infusion lumen 228, Fig. 9, para. [0059]-[0060]) and (b) inhibit fluid flow from the infusion lumen to the irrigation source (Fig. 9, para. [0060]).
Agnew fails to teach wherein the aspiration flow control assembly comprises: a second connector configured to be fluidly coupled to a waste reservoir;
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
wherein the aspiration flow control assembly comprises:
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.

Regarding claims 17-18, the prior art fails to teach or fairly suggest the limitations as claimed because they depend from claim 16.

Regarding claim 29, Rosenblatt in view of Calderon teach the system of claim 28. While Calderon teaches operation of the syringes 70 and 76 and their respective associated pumps may be automated (para. [0048]), Calderon fails to teach wherein the aspiration syringe and the irrigation syringe are mechanically linked to be actuated in synchronization.

Claims 1-19 and 28-29 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used by industry.

SEARCH HISTORY

Application Number	PCT/US 23/79428
Search Conducted By	AAY
Search Approved By	SCL

CPC/IPC Classifications Searched	IPC (8) INV. A61M 25/14 (2024.01) CPC: INV. A61M 25/0026; ADD. A61M 2025/0004, A61M 2025/0039, A61M 2025/0031
Date Conducted	28 February 2024 (28.02.2024)

Documentation Searched	IPC (8) A61M 25/00 (2024.01) CPC: A61M 25/00 UPC: 604/30
Search Terms Used	inner outer catheter aspiration irrigation coaxial tube system syringe fluid controlled control fluid simultaneous plunger suction vacuum negative pressure rinse seal concentric source inflow outflow one way valve reinforce plastic
Date Conducted	28 February 2024 (28.02.2024)

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: (European) 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	28 February 2024 (28.02.2024)
Search Logic:	

Search 1	FT=(catheter NEAR (inner OR outer))	31030 results
Search 2	1 AND FT=(catheter NEAR (aspirat* AND irrigat*))	68 results
Search 3	2 AND FT=((syringe OR plunger) NEAR (aspirat* AND irrigat*))	6 results
Search 4	1 AND FT=(inner NEAR (aspirat* OR suction* OR vacuum* OR (negative pressure)))	849 results
Search 5	4 AND FT=(outer NEAR (irrigat* OR fluid OR rinse#))	142 results
Search 6	5 AND FT=((syringe OR plunger) NEAR ((aspirat* OR suction* OR vacuum* OR (negative pressure)) OR (irrigat* OR fluid OR rinse#)))	69 results
Search 7	6 AND FT=(seal* NEAR outer)	26 results
Search 8	FT=((inner catheter) AND (outer catheter))	1821 results
Search 9	8 AND FT=((aspirat* OR suction* OR vacuum* OR (negative pressure)) AND (irrigat* OR fluid OR rinse#))	517 results
Search 10	9 AND FT=((catheter OR lumen) NEAR ((aspirat* OR suction* OR vacuum* OR (negative pressure)) OR (irrigat* OR fluid OR rinse#)))	434 results
Search 11	9 AND FT=(catheter NEAR ((aspirat* OR suction* OR vacuum* OR (negative pressure)) AND (irrigat* OR fluid OR rinse#)))	43 results
Search 12	CPC=(A61M2025/0004 OR A61M2025/0039)	1138 results
Search 13	12 AND FT=(catheter NEAR ((inner AND outer) OR concentric# OR coaxial#))	434 results
Search 14	13 AND FT=((aspirat* OR suction* OR vacuum* OR (negative pressure)) AND (irrigat* OR fluid OR rinse#))	181 results
Search 15	14 AND FT=((catheter OR lumen) NEAR ((aspirat* OR suction* OR vacuum* OR (negative pressure)) OR (irrigat* OR fluid OR rinse#)))	168 results
Search 16	15 AND FT=(syringe# NEAR ((aspirat* OR suction* OR vacuum* OR (negative pressure)) OR (irrigat* OR fluid OR rinse#)))	55 results
Search 17	RF=(79428)	4 results
Search 18	ctf 17	152 results
Search 19	18 AND (12 OR 8)	18 results
Search 20	13 AND FT=((aspirat* OR suction* OR vacuum*) NEAR (source OR syringe))	57 results
Search 21	20 AND FT=((irrigat* OR fluid OR rinse#) NEAR (source OR syringe))	29 results
Search 22	PN=US2020324079	1 results
Search 23	ctf 22 or ctb 22	27 results
Search 24	CPC= A61M2025/0031	604 results
Search 25	24 AND 12	80 results
Search 26	UC=604/30	615 results
Search 27	26 AND (12 OR 8)	12 results
Search 28	24 AND (12 oR 8)	96 results
Search 29	28 AND FT=((aspirat* OR suction* OR vacuum* OR (negative pressure OR outflow)) AND (irrigat* OR fluid OR rinse# OR inflow))	71 results
Search 30	CPC=(A61M2025/0031)	604 results

Search 31	30 AND FT=(inner NEAR (suction# OR aspirat* OR vacuum# OR (negative pressure)))	33 results
Search 32	(12 OR 8)	2823 results
Search 33	32 AND FT=((aspirat* OR suction* OR vacuum* OR (negative pressure) OR outflow) NEAR (catheter OR lumen))	588 results
Search 34	33 AND FT=((irrigat* OR infus* OR inflow) NEAR (catheter OR lumen))	226 results
Search 35	34 AND FT=(syringe# NEAR ((aspirat* OR suction* OR vacuum* OR (negative pressure) OR outflow) AND (irrigat* OR infus* OR inflow)))	5 results
Search 36	34 AND FT=(syringe# NEAR (aspirat* OR suction* OR vacuum* OR (negative pressure) OR outflow))	60 results
Search 37	34 AND FT=(syringe# NEAR (irrigat* OR infus* OR inflow))	26 results
Search 38	36 AND 37	14 results
Search 39	PN=US2006149219	1 results
Search 40	ctf 39	28 results
Search 41	40 AND FT=(syringe#)	7 results
Search 42	FT=(((irrigat* OR infus* OR inflow) NEAR catheter) AND ((aspirat* OR suction* OR vacuum* OR (negative pressure) OR outflow) NEAR catheter))	1611 results
Search 43	42 AND (12 OR 8)	149 results
Search 44	43 AND FT=(valve#)	112 results
Search 45	44 AND FT=(((one way) OR one%way) NEAR valve#)	26 results
Search 46	RF=(79428)	9 results
Search 47	46 AND FT=(reinforc* AND plastic)	1 results
Search 48	PN=US20120143123	1 results
Search 49	CTF 48	11 results
Search 50	IC=(A61M25/14)	5843 results
Search 51	50 OR IC=(A61M25/00)	47827 results
Search 52	51 AND (12 OR 8)	1567 results
Search 53	52 AND 42	113 results
Search 54	CPC=(A61M25/00 OR A61M25/0026)	4359 results
Search 55	54 AND (12 OR 8) AND 42	34 results

Electronic Database Searched	Google
Files Searched	Google Web
Date Conducted	28 February 2024 (28.02.2024)
Search Logic:	

inner catheter outer catheter aspiration irrigation
About 2,480,000 results (0.39 seconds)

coaxial tube catheters for aspiration and infusion
About 107,000 results (0.42 seconds)

Electronic Database Searched	Google
Files Searched	Google Scholar
Date Conducted	28 February 2024 (28.02.2024)
Search Logic:	

inner catheter outer catheter aspiration irrigation
About 7,150 results (0.09 sec)

coaxial tube catheters for aspiration and infusion
About 1,650 results (0.09 sec)

Electronic Database Searched	Google
Files Searched	Google Patents
Date Conducted	28 February 2024 (28.02.2024)
Search Logic:	

inner catheter outer catheter aspiration irrigation
About 11,529 results

coaxial tube catheters for aspiration and infusion
About 5,188 results

inner catheter outer catheter system with syringe fluid controlled
More than 100,000 results

syringe control for fluid infusion and aspiration simultaneously
More than 100,000 results

catheter simultaneous aspiration and infusion
About 35,288 results

outer catheter irrigation inner catheter aspiration
About 11,405 results

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

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	18/598,482 - Conf # 3249
	Filing Date	March 7, 2024
	First Named Inventor	Benjamin E. Merritt
	Art Unit	3738
	Examiner Name	Quynh-Nhu Hoang Vu
	Attorney Docket Number	111552.8016.US07

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.	20240074771	03-07-2024	Quick et al.	
	2.	20240082540	03-14-2024	Brodt et al.	
	3.	11925369	03-12-2024	Hauser	
	4.	11937838	03-26-2024	Cox et al.	
	5.	11937834	03-26-2024	Dinh	
	6.	11865291	01-09-2024	Merritt et al.	
	7.	11963861	04-23-2024	Strauss et al.	
	8.	3863624	02-04-1975	Gram	
	9.	3661144	05-09-1972	Jensen et al.	
	10.	20160128857	05-12-2016	Kao	
	11.	9566179	02-14-2017	Andreas et al.	
	12.	20150366690	12-24-2015	Lumauig	
	13.	20190366049	12-05-2019	Hannon et al.	
	14.	8529596	09-10-2013	Grandfield et al.	
	15.	8632584	01-21-2014	Henkes et al.	
	16.	8795317	08-05-2014	Grandfield et al.	
	17.	9072537	07-07-2015	Grandfield et al.	
	18.	10426644	10-01-2019	Shrivastava et al.	
	19.	10456151	10-29-2019	Slee et al.	
	20.	11337714	05-24-2022	Ferrera et al.	
	21.	20030004536	01-02-2003	Boylan et al.	
	22.	20110009950	01-13-2011	Grandfield et al.	
	23.	20190216476	07-18-2019	Barry et al.	
	24.	20230047682	02-16-2023	Deaton et al.	
	25.	20210154433	05-27-2021	Casey et al.	
	26.	20180235742	08-23-2018	Fields et al.	
	27.	20200078029	03-12-2020	Hansen et al.	
	28.	20030191425	10-09-2003	Rosenblatt et al.	
	29.	20060149219	07-06-2006	Calderon	

PTO/SB/08a (01-10)
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	Examiner Name	Quynh-Nhu Hoang Vu
	Attorney Docket Number	111552.8016.US07

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.	20120143123	06-07-2012	Agnew	
	31.	20200324079	10-15-2020	Jalgaonkar et al.	
	32.	20050080398	04-14-2005	Markel et al.	
	33.	11969332	04-30-2024	Merritt et al.	
	34.	11969333	04-30-2024	Merritt et al.	
	35.	11969331	04-30-2024	Merritt et al.	
	36.	11969178	04-30-2024	Hauser	
	37.	11974910	05-07-2024	Merritt et al.	
	38.	11974909	05-07-2024	Merritt et al.	
	39.	11980537	05-14-2024	Merritt et al.	
	40.	11986382	05-21-2024	Merritt et al.	
	41.	11266825	03-08-2022	Peter et al.	
	42.	20220296797	09-22-2022	Chawla	
	43.	8187465	05-29-2012	Nierich	
	44.	10994063	05-04-2021	Fisher et al.	
	45.	20230052964	02-16-2023	Singh et al.	
	46.	20230248502	08-10-2023	Buck et al.	
	47.	8439858	05-14-2013	Huang et al.	
	48.	10967111	04-06-2021	Iida	
	49.	11607483	03-21-2023	Iida	
	50.	9827364	11-28-2017	Peticca et al.	
	51.	11998436	06-04-2024	Merritt et al.	
	52.	12016580	06-25-2024	Quick et al.	
	53.	20240157041	05-16-2024	Zikry et al.	
	54.	20240198072	06-20-2024	Merritt et al.	
	55.	20170238951	08-24-2017	Yang et al.	
	56.				
	57.				
	58.				
	59.				

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	First Named Inventor	Benjamin E. Merritt
	Art Unit	3738
	Examiner Name	Quynh-Nhu Hoang Vu
	Attorney Docket Number	111552.8016.US07

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.	EP2231256	05-30-2018	Vortex Medical		
	4.	EP2394680	12-14-2011	CARDiONOVA S.R.L.		
	5.	EP2540328	10-02-2013	Eurosets S.R.L.		
	6.	WO2023069874	04-27-2023	IMPERATIVE CARE, INC.		
	7.	WO2024103036	05-16-2024	Shifamed Holdings LLC		
	8.	WO2019064306	04-04-2019	CERETRIVE LTD.		
	9.					
	10.					
	11.					
	12.					

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.	
	3.	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.	
	4.	Extended European Search Report for European Application No. 21818772.2, Applicant: Inari Medical, Inc., Date of Mailing: May 10, 9 pages.	
	5.		
	6.		
	7.		
	8.		

PTO/SB/08a (01-10)
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	Filing Date	March 7, 2024
	First Named Inventor	Benjamin E. Merritt
	Art Unit	3738
	Examiner Name	Quynh-Nhu Hoang Vu
	Attorney Docket Number	111552.8016.US07

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.

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

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 number **17/226,318** and 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)		
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	Filing Date	March 7, 2024
	First Named Inventor	Benjamin E. Merritt
	Art Unit	3738
	Examiner Name	Quynh-Nhu Hoang Vu
	Attorney Docket Number	111552.8016.US07

on **April 9, 2021,** application number **16/117,519** and filed **August 30, 2018,** and application number **18/515,079** and filed **November 20, 2023** and 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)	2024-07-01
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

To:
BENJAMIN D. CASHDOLLAR
PERKINS COIE LLP
P.O. BOX 1247
SEATTLE, WA 98111-1247
UNITED STATES OF AMERICA

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)

	Date of mailing *(day/month/year)* **26 April 2024 (26.04.2024)**
Applicant's or agent's file reference **111552-8039WO00**	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. **PCT/US2024/010875**	International filing date *(day/month/year)* **09 January 2024 (09.01.2024)**
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 *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, VA 22313-1450**	Authorized officer **MATOS** **TAINA**
Facsimile No. **571-273-8300**	Telephone No. **571-272-4300**

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	FOR FURTHER ACTION
111552-8039WO00	see Form PCT/ISA/220 as well as, where applicable, item 5 below.

International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2024/010875	09 January 2024 (09.01.2024)	09 January 2023 (09.01.2023)

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 43.6*bis*(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. **6A**

   ☑ 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/US2024/010875

A. CLASSIFICATION OF SUBJECT MATTER

IPC: ***A61F 2/06*** (2024.01); ***A61F 2/95*** (2024.01); *A61M 25/06* (2024.01)

CPC: ***A61F 2/06; A61F 2/95;*** *A61M 2025/0681*

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.
	US 2016/0128857 A1 (VENITI, INC.) 12 May 2016 (12.05.2016)	
X	entire document	1, 3-6, 9, 10, 15-18, 23, 24
Y	entire document	2, 7, 8, 11-14, 19-22, 25-32
	US 9,566,179 B2 (J.W. MEDICAL SYSTEMS LTD.) 14 February 2017 (14.02.2017)	
Y	entire document	2, 7, 8, 11-14, 19-22, 25-32
	JP 05694718 B2 (TERUMO CORP.) 01 April 2015 (01.04.2015)	
Y	see machine translation	29
	US 2015/0366690 A1 (ABBOTT CARDIOVASCULAR SYSTEMS INC.) 24 December 2015 (24.12.2015)	
A	entire document	1-32
	US 2019/0366049 A1 (MEDTRONIC VASCULAR, INC.) 05 December 2019 (05.12.2019)	
A	entire document	1-32

☐ 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	Date of mailing of the international search report
16 April 2024 (16.04.2024)	**26 April 2024 (26.04.2024)**
Name and mailing address of the ISA/US **Mail Stop PCT, Attn: ISA/US** **Commissioner for Patents** **P.O. Box 1450, Alexandria, VA 22313-1450** Facsimile No. **571-273-8300**	Authorized officer **MATOS** **TAINA** Telephone No. **571-272-4300**

Form PCT/ISA/210 (second sheet) (July 2022)

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
BENJAMIN D. CASHDOLLAR
PERKINS COIE LLP
P.O. BOX 1247
SEATTLE, WA 98111-1247
UNITED STATES OF AMERICA

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	**26 April 2024 (26.04.2024)**
Applicant's or agent's file reference **111552-8039WO00**	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2024/010875	**09 January 2024 (09.01.2024)**	**09 January 2023 (09.01.2023)**

International Patent Classification (IPC) or both national classification and IPC
IPC: ***A61F 2/06*** (2024.01); ***A61F 2/95*** (2024.01); *A61M 25/06* (2024.01)
CPC: ***A61F 2/06; A61F 2/95;*** *A61M 2025/0681*

Applicant
INARI MEDICAL, INC.

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

- [x] 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
- [x] Box No. V Reasoned statement under Rule 43*bis*.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
- [x] 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 66.1*bis*(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	Date of completion of this opinion	Authorized officer
Mail Stop PCT, Attn: ISA/US **Commissioner for Patents** **P.O. Box 1450, Alexandria, VA 22313-1450**	**16 April 2024 (16.04.2024)**	**MATOS, Taina**
Facsimile No. **571-273-8300**		Telephone No. **571-272-4300**

Form PCT/ISA/237 (cover sheet) (July 2022)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2024/010875

Box No. I Basis of the 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 13*ter*.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:

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

1. Statement

Novelty (N)	Claims	2, 7, 8, 11-14, 19-32	YES
	Claims	1, 3-6, 9, 10, 15-18	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-32	NO
Industrial applicability (IA)	Claims	1-32	YES
	Claims	None	NO

2. Citations and explanations:

---------- **EXPLANATION** ----------

Claims 1, 3-6, 9, 10, and 15-18 lack novelty under PCT Article 33(2) as being anticipated by US 2016/0128857 to Veniti, Inc. (hereinafter, "Veniti").

Regarding Claim 1, Veniti discloses an intravascular catheter for treatment of clot material from within a blood vessel of a human patient (stent delivery system 100, Fig. 1A; see also Paras. [0030] and [0045]), comprising: an outer sheath (shuttle sheath 120, Fig. 1A) having an outer sheath lumen (lumen of shuttle sheath 120, Figures 1A-1D); an outer sheath drive component (outer shaft 114, Fig. Figures 1A-1D; see also Para. [0051]) having an outer sheath drive component lumen (central lumen 116, Fig. 1A; see also Para. [0049]), wherein the outer sheath drive component is operably coupled to the outer sheath (Figures 1A-1D; see also Para. [0051], as outer shaft 114 is locked with shuttle sheath 120); a guidewire sheath (middle shaft 108, Fig.1A) including a guidewire sheath lumen configured to receive a guidewire (Fig.1A; see also Para. [0047], as middle shaft 108 is slidably disposed over inner shaft 102 and configured for over the wire use. Furthermore, a guidewire recived within the central lumen of inner shaft 102 would be disposed within the lumen of middle shaft 108), wherein at least a portion of the guidewire sheath is slidably disposed within the outer sheath lumen (Figures 1A-1D; see also Para. [0047]); a guidewire sheath drive component slidably disposed within the outer sheath drive component lumen (inner shaft 102, Fig. 2C; see also Para. [0051]), wherein the guidewire sheath drive component is operably coupled to the guidewire sheath (Figures 1A-1D); and a clot treatment component coupled to the guidewire sheath (stent 128, Figures 1A-1D; see also Para. [0048]), wherein the clot treatment component is configured to transition between (i) a first configuration in which the clot treatment component is positioned within the outer sheath lumen (Figures 1A-1B), and (ii) a second configuration in which at least a portion of the clot treatment component is exposed from the outer sheath lumen in response to movement of the outer sheath drive component, the guidewire sheath drive component, or both the outer sheath drive component and the guidewire sheath drive component (Figures 1C-1D; see also Para. [0051]).

Regarding Claim 3, Veniti discloses the catheter of claim 1 wherein the outer sheath drive component includes a region configured to overlap with a portion of the guidewire sheath when the clot treatment component is in the first configuration and the second configuration (Figures 1A-1D).

Regarding Claim 4, as best understood, Veniti discloses the catheter of claim 3 wherein the guidewire sheath includes a proximal segment (portion of middle shaft 108 disposed closest to hub 112, Fig. 1A) and a distal segment (portion of middle shaft 108 including and closest to stop 132, Fig. 1A), wherein at least part of the proximal segment is configured to be conterminous with the region of the outer sheath drive component (Fig. 1D, as in the illustrated configuration, the proximal portion of middle shaft 108 is enclosed within a common boundary of outer shaft 114), and wherein the distal segment is centered within the outer sheath lumen (Figures 1A-1B).

Regarding Claim 5, Veniti discloses the catheter of claim 4 wherein at least a portion of the clot treatment component is coupled to the distal segment of the guidewire sheath (Figures 1A-1D).

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

Regarding Claim 6, Veniti discloses the catheter of claim 5 wherein the distal segment of the guidewire sheath includes a distal tip of the catheter (nosecone 126, Figures 1A-1D), and wherein at least the portion of the clot treatment component is coupled to the distal tip (Figures 1A-1D).

Regarding Claim 9, Veniti discloses the catheter of claim 1 wherein the guidewire sheath includes a distal segment centered within the outer sheath lumen (Figures 1A-1B), and wherein at least a portion of the clot treatment component is coupled to the distal segment of the guidewire sheath (Figures 1A-1D).

Regarding Claim 10, Veniti discloses the catheter of claim 9 wherein the distal segment of the guidewire sheath includes a distal tip of the catheter (nosecone 126, Figures 1A-1D), and wherein at least the portion of the clot treatment component is coupled to the distal tip (Figures 1A-1D).

Regarding Claim 15, Veniti discloses a method for intravascular treatment of clot material from within a blood vessel of a human patient (Para. [0077]), the method comprising: advancing a catheter (delivery catheter, Fig. 6A; see also Para. [0075]) distally through the blood vessel (vessel V, Fig. 6A; see also Para. [0075]); and transitioning the catheter from (i) a first configuration (Fig. 6A) in which a clot men of shuttle sheath 610, Fig. 6A; see also Para. [0075], as stent 616 is only permitted to self expand after shuttle sheath 610 is proximally retracted) of an outer sheath of the catheter (shuttle sheath 610, Fig. 6A), and (ii) a second configuration (Figures 6B-6C) in which at least a portion of the clot treatment component is exposed from the outer sheath lumen (Figures 6B-6C; see also Para. [0075]), wherein the catheter includes (a) an outer sheath drive component (outer shaft/sheath 606, Fig. 6A) including an outer sheath drive component lumen (lumen of outer shaft/sheath 606, Figures 6A-6C) and coupled to the outer sheath (Figures 6A-6C; see also Para. [0075]) and (b) an elongate member operably coupled to the clot treatment component and slidably disposed within the outer sheath drive component lumen (inner shaft 602, Figures 6A-6C), and wherein transitioning the catheter includes at least one of moving the outer sheath drive component in a first direction relative to the clot treatment component to cause the outer sheath to uncover at least the portion of the clot treatment component, and/or moving the elongate member in a second direction relative to the outer sheath to cause at least the portion of the clot treatment component to extend beyond the outer sheath lumen (Figures 6A-6C; see also Para. [0075], as outer shaft/ sheath 606 is proximally retracted, proximally retracting shuttle sheath 610, to uncover stent 616).

Regarding Claim 16, Veniti discloses the method of claim 15 wherein the second direction (Figures 2B-2D) is opposite the first direction (Figures 6B-6C and see also 1B-1D; see also Para. [0075], as the exemplary method of treating the vessel be with a bi-directional stent delivery system of the prior disclosed embodiments).

Regarding Claim 17, Veniti discloses the method of claim 15, further comprising causing the clot treatment component to expand when the catheter is in the second configuration (Figures 6B-6C; see also Para. [0075]).

Regarding Claim 18, Veniti discloses the method of claim 17 wherein causing the clot treatment component to expand includes transitioning the catheter to the second configuration to allow the clot treatment component to expand (Figures 6B-6C; see also Para. [0075]).

Claims 23 and 24 lack an inventive step under PCT Article 33(3) as being obvious over US 2016/0128857 to Veniti, Inc. (hereinafter, "Veniti").

Regarding Claim 23, Veniti discloses the method of claim 15.

Veniti fails to further include, in the same embodiment, that the elongate member includes a guidewire sheath drive component, and wherein moving the elongate member includes moving the guidewire sheath drive component in the second direction relative to the outer sheath to cause at least the portion of the clot treatment component to extend beyond the outer sheath lumen.

Veniti teaches in a different embodiment, however, that an elongate member (inner shaft 102, Figures 2A-2D) includes a guidewire sheath drive component (Fig. 2C; see also Para. [0053]), and wherein moving the elongate member includes moving the guidewire sheath drive component in the second direction relative to an outer sheath (shuttle sheath 120, Figures 2B-2D) to cause at least a portion of a

clot treatment component (stent 128, Figures 2A-2D) to extend beyond the outer sheath lumen (Figures 2D-2D).

It would have been obvious to one of ordinary skill in the art to modify the first embodiment of Veniti to further include that the elongate member includes a guidewire sheath drive component, and wherein moving the elongate member includes moving the guidewire sheath drive component in the second direction relative to the outer sheath to cause at least the portion of the clot treatment component to extend beyond the outer sheath lumen, as taught by the latter embodiment of Veniti, the motivation being that Veniti discloses that the exemplary method of treating the vessel with a bi-directional stent delivery system of the prior disclosed embodiments (Para. [0075]).

Regarding Claim 24, Veniti discloses the method of claim 23.

Veniti fails to further include, in the same embodiment, that moving the guidewire sheath drive component includes causing movement of a guidewire sheath operably coupled to the guidewire sheath drive component, and wherein the clot treatment component is operably coupled to the guidewire sheath so that causing movement of the guidewire sheath includes causing at least the portion of the clot treatment component to extend beyond the outer sheath lumen.

Veniti teaches in a different embodiment, however, that moving the guidewire sheath drive component includes causing movement of a guidewire sheath operably coupled to the guidewire sheath drive component (middle shaft 108, Figures 2A-2D), and wherein the clot treatment component is operably coupled to the guidewire sheath (Figures 2A-2D) so that causing movement of the guidewire sheath includes causing at least the portion of the clot treatment component to extend beyond the outer sheath lumen (Figures 2C-2D).

It would have been obvious to one of ordinary skill in the art to modify the first embodiment of Veniti to further include that moving the guidewire sheath drive component includes causing movement of a guidewire sheath operably coupled to the guidewire sheath drive component, and wherein the clot treatment component is operably coupled to the guidewire sheath so that causing movement of the guidewire sheath includes causing at least the portion of the clot treatment component to extend beyond the outer sheath lumen, as taught by the latter embodiment, the motivation being that Veniti discloses that the exemplary method of treating the vessel with a bi-directional stent delivery system of the prior disclosed embodiments (Para. [0075]).

Claims 2, 7, 8, 11-14, 19-22, 25-28, and 30-32 lack an inventive step under PCT Article 33(3) as being obvious over US 2016/0128857 to Veniti, Inc. (hereinafter, "Veniti") in view of US 9,566,179 to J.W. Medical Systems Ltd. (hereinafter, "JW Medical").

Regarding Claim 2, Veniti discloses the catheter of claim 1.

Veniti fails to explicitly disclose a clot treatment drive component slidably disposed within the outer sheath drive component lumen and operably coupled to the clot treatment component, wherein the clot treatment component is configured to transition between the first configuration and the second configuration in response to movement of the clot treatment drive component, the outer sheath drive component, the guidewire sheath drive component, or any two or more of the outer sheath drive component, the guidewire sheath drive component, and clot treatment drive component.

JW Medical is in the field of interventional catheters and prostheses for treatment of vascular diseases, including coronary artery disease and peripheral vascular disease, as well as diseases of other body lumens and other structures (col. 1, lns.18-24), and teaches a clot treatment drive component (expandable member 30, Fig. 2A) slidably disposed within an outer sheath drive component lumen (lumen of sheath 38, Fig. 2A; see also col. 8, lns. 4-18) and operably coupled to a clot treatment component (stent segments 46, Figures 1-2B), wherein the clot treatment component is configured to transition between a first configuration (Fig. 2A) and a second configuration (Fig. 2B) in response to movement of the clot treatment drive component, the outer sheath drive component, a guidewire sheath drive component, or any two or more of the outer sheath drive component, the guidewire sheath drive component, and clot treatment drive component (clot treatment drive component and outer sheath drive component, Figures 2A-2B).

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

It would have been obvious to one of ordinary skill in the art before the priority date to modify the catheter of Veniti to further include a clot treatment drive component slidably disposed within the outer sheath drive component lumen and operably coupled to the clot treatment component, wherein the clot treatment component is configured to transition between the first configuration and the second configuration in response to movement of the clot treatment drive component, the outer sheath drive component, the guidewire sheath drive component, or any two or more of the outer sheath drive component, the guidewire sheath drive component, and clot treatment drive component, as taught by JW Medical, the motivation being that JW Medical attributes such a configuration for manipulation of interventional catheters with greater control, precision, and visibility (JW Medical, col. 7, lns. 40-42).

Regarding Claim 7, Veniti discloses the catheter of claim 4.

Veniti fails to explicitly disclose that at least a portion of the clot treatment component is slidably disposed on the distal segment.

JW Medical is in the field of interventional catheters and prostheses for treatment of vascular diseases, including coronary artery disease and peripheral vascular disease, as well as diseases of other body lumens and other structures (col. 1, lns. 18-24), and teaches at least a portion of a clot treatment component (plurality of stent segments 46, Figures 1-2A) slidably disposed on a distal segment of a guidewire sheath (distal segment of guidewire tube 40, Figures 1-2A; see also col. 7, ln. 64-col. 8, ln. 4).

It would have been obvious to one of ordinary skill in the art before the priority date to modify the intravascular catheter of Veniti to further include that at least a portion of the clot treatment component is slidably disposed on the distal segment, as taught by JW Medical, the motivation being that JW Medical attributes such a configuration for manipulation of interventional catheters with greater control, precision, and visibility (JW Medical, col. 7, lns. 40-42).

Regarding Claim 8, Veniti discloses the catheter of claim 4 wherein the guidewire sheath further includes an intermediate segment extending between the distal segment and the proximal segment (intermediate segment of middle shaft 108, Fig. 1A).

Veniti fails to explicitly disclose that the intermediate segment is sloped radially inward from the proximal segment toward the distal segment.

JW Medical is in the field of interventional catheters and prostheses for treatment of vascular diseases, including coronary artery disease and peripheral vascular disease, as well as diseases of other body lumens and other structures (col. 1, lns. 18-24), and teaches an intermediate segment of a guidewire sheath (intermediate segment of guidewire tube 40, Fig. 2A) that is sloped radially inward from a proximal segment toward a distal segment of the guidewire sheath (Fig. 2A, as guidewire tube 40 is sloped radially inward as it extends into sheath 38).

It would have been obvious to one of ordinary skill in the art before the priority date to modify the catheter of Veniti to further include that the intermediate segment is sloped radially inward from the proximal segment toward the distal segment, as taught by JW Medical, the motivation being that JW Medical attributes such a configuration for manipulation of interventional catheters with greater control, precision, and visibility (JW Medical, col. 7, lns. 40-42).

Regarding Claim 11, Veniti discloses the catheter of claim 9.

Veniti fails to explicitly disclose that at least a portion the clot treatment component is slidably disposed on the distal segment of the guidewire sheath.

JW Medical is in the field of interventional catheters and prostheses for treatment of vascular diseases, including coronary artery disease and peripheral vascular disease, as well as diseases of other body lumens and other structures (col. 1, lns. 18-24), and teaches at least a portion of a clot treatment component (plurality of stent segments 46, Figures 1-2A) slidably disposed on a distal segment of a guidewire sheath (distal segment of guidewire tube 40, Figures 1-2A; see also col. 7, ln. 64-col. 8, ln. 4).

It would have been obvious to one of ordinary skill in the art before the priority date to modify the catheter of Veniti to further include that at least a portion the clot treatment component is slidably disposed on the distal segment of the guidewire sheath, as taught by JW Medical, the motivation being that JW Medical

attributes such a configuration for manipulation of interventional catheters with greater control, precision, and visibility (JW Medical, col. 7, lns. 40-42).

Regarding Claim 12, Veniti discloses the catheter of claim 9 wherein the guidewire sheath further includes a proximal segment (portion of middle shaft 108 disposed closest to hub 112, Fig. 1A).

Veniti fails to explicitly disclose that the proximal segment is positioned radially outwardly from the distal segment of the guidewire sheath.

JW Medical is in the field of interventional catheters and prostheses for treatment of vascular diseases, including coronary artery disease and peripheral vascular disease, as well as diseases of other body lumens and other structures (col. 1, lns. 18-24), and teaches a proximal segment of a guidewire sheath (proximal segment of guidewire tube 40, Fig. 2A) positioned radially outwardly from a distal segment of the guidewire sheath (Fig. 2A, as guidewire tube 40 is sloped radially inward as it extends into and through sheath 38).

It would have been obvious to one of ordinary skill in the art before the priority date to modify the catheter of Veniti to further include that the proximal segment is positioned radially outwardly from the distal segment of the guidewire sheath, as taught by JW Medical, the motivation being that JW Medical attributes such a configuration for manipulation of interventional catheters with greater control, precision, and visibility (JW Medical, col. 7, lns. 40-42).

Regarding Claim 13, modified Veniti discloses the catheter of claim 12.

Veniti fails to explicitly disclose that the proximal segment is not centered within the outer sheath lumen.

JW Medical is in the field of interventional catheters and prostheses for treatment of vascular diseases, including coronary artery disease and peripheral vascular disease, as well as diseases of other body lumens and other structures (col. 1, lns. 18-24), and teaches a proximal segment of a guidewire sheath that is not centered within the outer sheath lumen (proximal segment of guidewire tube 40 extending outside of sheath 38, Fig. 2A).

It would have been obvious to one of ordinary skill in the art before the priority date to modify the catheter of Veniti to further include that the proximal segment is not centered within the outer sheath lumen, as taught by JW Medical, the motivation being that JW Medical attributes such a configuration for manipulation of interventional catheters with greater control, precision, and visibility (JW Medical, col. 7, lns. 40-42).

Regarding Claim 14, modified Veniti discloses the catheter of claim 12 wherein the guidewire sheath further includes an intermediate segment extending between the distal segment and the proximal segment (intermediate segment of middle shaft 108, Fig. 1A).

Veniti fails to explicitly disclose that the intermediate segment is sloped radially inward from the proximal segment toward the distal segment.

JW Medical is in the field of interventional catheters and prostheses for treatment of vascular diseases, including coronary artery disease and peripheral vascular disease, as well as diseases of other body lumens and other structures (col. 1, lns. 18-24), and teaches an intermediate segment of a guidewire sheath (intermediate segment of guidewire tube 40, Fig. 2A) that is sloped radially inward from a proximal segment toward a distal segment of the guidewire sheath (Fig. 2A, as guidewire tube 40 is sloped radially inward as it extends into sheath 38).

It would have been obvious to one of ordinary skill in the art before the priority date to modify the catheter of Veniti to further include that the intermediate segment is sloped radially inward from the proximal segment toward the distal segment, as taught by JW Medical, the motivation being that JW Medical attributes such a configuration for manipulation of interventional catheters with greater control, precision, and visibility (JW Medical, col. 7, lns. 40-42).

Regarding Claim 19, Veniti discloses the method of claim 17.

Veniti fails to explicitly disclose that causing the clot treatment component to expand includes moving a clot treatment drive component operably coupled to the clot treatment component relative to a guidewire sheath positioned within the catheter and adjacent to the outer sheath drive component.

JW Medical is in the field of interventional catheters and prostheses for treatment of vascular diseases, including coronary artery disease and peripheral vascular disease, as well as diseases of other body lumens and other structures (col. 1, lns. 18-24), and teaches that causing a clot treatment component (stent segments 46, Figures 1-2B) to expand includes moving a clot treatment drive component (expandable member 30, Fig. 2A) operably coupled to the clot treatment component (Figures 1-2B) relative to a guidewire sheath (guidewire tube 40, Fig. 2A) positioned within the catheter and adjacent to an outer sheath drive component (pusher 36, Figures 2A-2B).

It would have been obvious to one of ordinary skill in the art before the priority date to modify the method of Veniti to further include that causing the clot treatment component to expand includes moving a clot treatment drive component operably coupled to the clot treatment component relative to a guidewire sheath positioned within the catheter and adjacent to the outer sheath drive component, as taught by JW Medical, the motivation being that JW Medical attributes such a configuration for manipulation of interventional catheters with greater control, precision, and visibility (JW Medical, col. 7, lns. 40-42).

Regarding Claim 20, Veniti discloses the method of claim 17.

Veniti fails to explicitly disclose that causing the clot treatment component to expand includes moving a drive cuff of the catheter to cause the expansion of the clot treatment component.

JW Medical is in the field of interventional catheters and prostheses for treatment of vascular diseases, including coronary artery disease and peripheral vascular disease, as well as diseases of other body lumens and other structures (col. 1, lns. 18-24), and teaches causing a clot treatment component (plurality of stent segments 46, Figures 1-2A) to expand includes moving a drive cuff of a catheter (pusher 36, Fig. 2A) to cause the expansion of the clot treatment component (col. 8, lns. 12-17).

It would have been obvious to one of ordinary skill in the art before the priority date to modify the method of Veniti to further include that causing the clot treatment component to expand includes moving a drive cuff of the catheter to cause the expansion of the clot treatment component, as taught by JW Medical, the motivation being that JW Medical attributes such a configuration for manipulation of interventional catheters with greater control, precision, and visibility (JW Medical, col. 7, lns. 40-42).

Regarding Claim 21, modified Veniti discloses the method of claim 20.

Veniti fails to explicitly disclose that moving the drive cuff includes moving the drive cuff in the first direction relative to the clot treatment component to drive the expansion of the clot treatment component.

JW Medical is in the field of interventional catheters and prostheses for treatment of vascular diseases, including coronary artery disease and peripheral vascular disease, as well as diseases of other body lumens and other structures (col. 1, lns. 18-24), and teaches that moving the drive cuff includes moving the drive cuff in the first direction relative to the clot treatment component to drive the expansion of the clot treatment component (col. 8, lns. 12-17, as pusher 36 is drawn proximally in tandem with sheath 38).

It would have been obvious to one of ordinary skill in the art before the priority date to modify the method of Veniti to further include that moving the drive cuff includes moving the drive cuff in the first direction relative to the clot treatment component to drive the expansion of the clot treatment component, as taught by JW Medical, the motivation being that JW Medical attributes such a configuration for manipulation of interventional catheters with greater control, precision, and visibility (JW Medical, col. 7, lns. 40-42).

Regarding Claim 22, modified Veniti discloses the method of claim 20.

Veniti fails to explicitly disclose that moving the drive cuff includes moving the drive cuff in the first direction relative to the clot treatment component to allow the clot treatment component to expand.

JW Medical is in the field of interventional catheters and prostheses for treatment of vascular diseases, including coronary artery disease and peripheral vascular disease, as well as diseases of other body lumens and other structures (col. 1, lns. 18-24), and teaches moving the drive cuff includes moving the drive cuff

in the first direction relative to the clot treatment component to allow the clot treatment component to expand (col. 8, lns. 12-17, as pusher 36 is drawn proximally in tandem with sheath 38).

It would have been obvious to one of ordinary skill in the art before the priority date to modify the method of Veniti to further include that moving the drive cuff includes moving the drive cuff in the first direction relative to the clot treatment component to allow the clot treatment component to expand, as taught by JW Medical, the motivation being that JW Medical attributes such a configuration for manipulation of interventional catheters with greater control, precision, and visibility (JW Medical, col. 7, lns. 40-42).

Regarding Claim 25, as best understood, Veniti discloses a catheter for treating a human patient (stent delivery system 100, Fig. 1A; see also Paras. [0030] and [0045]), the catheter comprising: an outer sheath (shuttle sheath 120, Fig. 1A) having an outer sheath lumen (lumen of shuttle sheath 120, Figures 1A-1D); an outer sheath drive component (outer shaft 114, Fig. Figures 1A-1D; see also Para. [0051]) having an outer sheath drive component lumen (central lumen 116, Fig. 1A; see also Para. [0049]), wherein the outer sheath drive component is operably coupled to the outer sheath (Figures 1A-1D; see also Para. [0051], as outer shaft 114 is locked with shuttle sheath 120); a guidewire sheath (middle shaft 108, Fig.1A) including a guidewire sheath lumen configured to receive a guidewire (Fig.1A; see also Para. [0047], as middle shaft 108 is slidably disposed over inner shaft 102 and configured for over the wire use. Furthermore, a guidewire received within the central lumen of inner shaft 102 would be disposed within the lumen of middle shaft 108), wherein at least a portion of the guidewire sheath is slidably disposed within the outer sheath (Figures 1A-1D; see also Para. [0047]); a guidewire sheath drive component slidably disposed within the outer sheath drive component (inner shaft 102, Fig. 2C; see also Para. [0051]), wherein the guidewire sheath drive component is operably coupled to the guidewire sheath (Figures 1A-1D); a clot treatment component coupled to the guidewire sheath (stent 128, Figures 1A-1D; see also Para. [0048]); wherein the catheter is configured to transition between a (i) first configuration in which the clot treatment component is positioned within the outer sheath lumen (Figures 1A-1B), and (ii) a second configuration in which at least a portion of the clot treatment component is exposed from the outer sheath lumen in response to at least one of (a) first movement the outer sheath drive component relative to the guidewire sheath in a first direction (Figures 1C-1D; see also Para. [0051]), and (b) second movement of the guidewire sheath drive component relative to the outer sheath in a second direction (Figures 2B-2D), and the clot treatment drive component is configured to transition the clot treatment component between (i) a first state in which the clot treatment component has a first dimension (Figures 1A-1B), and (ii) a second state in which the clot treatment component has a second dimension greater or less than the first dimension (Figures 1C-1D).

Veniti fails to explicitly disclose that the outer sheath drive component is slidably disposed within the outer sheath lumen; that at least a portion of the guidewire sheath is laterally adjacent to the outer sheath drive component; and a clot treatment drive component slidably disposed within the outer sheath drive component lumen and operably coupled to the clot treatment component.

JW Medical is in the field of interventional catheters and prostheses for treatment of vascular diseases, including coronary artery disease and peripheral vascular disease, as well as diseases of other body lumens and other structures (col. 1, lns. 18-24), and teaches an outer sheath drive component (pusher 36, Fig. 2A) slidably disposed within an outer sheath lumen (lumen of sheath 38, Fig. 2A; see also col. 8, lns. 4-18); that at least a portion of a guidewire sheath (guidewire tube 40, Fig. 2A) is laterally adjacent to the outer sheath drive component (Fig. 2A); and a clot treatment drive component (expandable member 30, Fig. 2A) slidably disposed within the outer sheath drive component lumen and operably coupled to the clot treatment component (Figures 2A-2B; see also col. 8, lns. 38-45).

It would have been obvious to one of ordinary skill in the art before the priority date to modify the catheter of Veniti to further include that the outer sheath drive component is slidably disposed within the outer sheath lumen; that at least a portion of the guidewire sheath is laterally adjacent to the outer sheath drive component; and a clot treatment drive component slidably disposed within the outer sheath drive component lumen and operably coupled to the clot treatment component, as taught by JW Medical, the motivation being that JW Medical attributes such a configuration for manipulation of interventional catheters with greater control, precision, and visibility (JW Medical, col. 7, lns. 40-42).

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

Regarding Claim 26, modified Veniti discloses the catheter of claim 25 wherein: in the first state, the clot treatment component has a first mechanical property (Figures 1A-1B), and in the second state, the clot treatment component has a second mechanical property (Figures 1C-1D; see also Para. [0051]).

Regarding Claim 27, modified Veniti discloses the catheter of claim 26 wherein: the first mechanical property includes at least one of a first radial force, a first tensile force, a first compressive force, and/or a first shape (first compressive force and shape, Figures 1A-1B), and the second mechanical property includes at least one of a second radial force, a second tensile force, a second compressive force, and/or a second shape (second compressive force and shape, Figures 1C-1D).

Regarding Claim 28, modified Veniti discloses the catheter of claim 25 wherein the clot treatment component includes a mechanical thrombectomy component extending radially outwardly from the guidewire sheath (Figures 1C-1D).

Regarding Claim 30, modified Veniti discloses the catheter of claim 25.

Veniti fails to explicitly disclose that the clot treatment drive component is a first clot treatment drive component operably coupled to a first portion of the clot treatment component, the catheter further comprising a second clot treatment drive component slidably coupled to a second portion of the clot treatment component.

JW Medical is in the field of interventional catheters and prostheses for treatment of vascular diseases, including coronary artery disease and peripheral vascular disease, as well as diseases of other body lumens and other structures (col. 1, lns. 18-24), and teaches that the clot treatment drive component is a first clot treatment drive component operably coupled to a first portion of the clot treatment component (expandable member 30, Figures 2A-2B), the catheter further comprising a second clot treatment drive component slidably coupled to a second portion of the clot treatment component (inflation shaft 34, Figures 2A-2B; see also col. 8, lns. 3-4, as stent segments 46 are slidable).

It would have been obvious to one of ordinary skill in the art before the priority date to modify the catheter of Veniti to further include that the clot treatment drive component is a first clot treatment drive component operably coupled to a first portion of the clot treatment component, the catheter further comprising a second clot treatment drive component slidably coupled to a second portion of the clot treatment component, as taught by JW Medical, the motivation being that JW Medical attributes such a configuration for manipulation of interventional catheters with greater control, precision, and visibility (JW Medical, col. 7, lns. 40-42).

Regarding Claim 31, modified Veniti discloses the catheter of claim 30.

Veniti fails to explicitly disclose that the first clot treatment drive component includes a first clot treatment drive component lumen, and wherein the second clot treatment drive component is slidably disposed within the first clot treatment drive component lumen.

JW Medical is in the field of interventional catheters and prostheses for treatment of vascular diseases, including coronary artery disease and peripheral vascular disease, as well as diseases of other body lumens and other structures (col. 1, lns. 18-24), and teaches that the first clot treatment drive component includes a first clot treatment drive component lumen (Fig. 2B), and wherein the second clot treatment drive component is slidably disposed within the first clot treatment drive component lumen (Figures 2A-2B).

It would have been obvious to one of ordinary skill in the art before the priority date to modify the catheter of Veniti to further include that the first clot treatment drive component includes a first clot treatment drive component lumen, and wherein the second clot treatment drive component is slidably disposed within the first clot treatment drive component lumen, as taught by JW Medical, the motivation being that JW Medical attributes such a configuration for manipulation of interventional catheters with greater control, precision, and visibility (JW Medical, col. 7, lns. 40-42).

Regarding Claim 32, modified Veniti discloses the catheter of claim 25 wherein the second direction (Figures 2B-2D) is opposite the first direction (Figures 1B-1D).

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

Claim 29 lacks an inventive step under PCT Article 33(3) as being obvious over US 2016/0128857 to Veniti, Inc. (hereinafter, "Veniti") in view of US 9,566,179 to J.W. Medical Systems Ltd. (hereinafter, "JW Medical") and JP 05694718 to Terumo Corp. (hereinafter, "Terumo").

Regarding Claim 29, modified Veniti discloses the catheter of claim 25.

Veniti fails to explicitly disclose that the clot treatment component includes a coring element having a proximally-facing leading edge.

Terumo is in the field of stent grafts and stent graft systems to deliver the stent graft into the body (Abstract), and teaches a clot treatment component (stent graft 10, Figures 6A-6B) that includes a coring element (blades 22, Figures 6A-6B) having a proximally-facing leading edge (Figures 6A-6B).

It would have been obvious to one of ordinary skill in the art before the priority date to modify the catheter of Veniti to further include that the clot treatment component includes a coring element having a proximally-facing leading edge, as taught by Terumo, the motivation being that such a configuration simplifies procedures wherien cutting or damaging a desired biological tissue and blocking the function thereof is necessary (Terumo, Paras. [0002] and [0005]-[0006]).

Claims 1-32 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.

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:

Claims 4 and 25 are objected under PCT Rule 66.2(a)(v) as lacking clarity under PCT Article 6 because claims 4 and 25 are indefinite for the following reasons: Claim 4, depends from claim 3 and refers to "… the portion of the outer sheath drive component…", which does not have any antecedent basis in claim 13. For the purposes of this opinion, the noted claim language is best understood as intending to instead recite, --...the region of the outer sheath drive component...--. Claim 25 recites, "...in response to movement in response to at least one of (a) first movement the outer sheath drive component relative to the guidewire sheath in a first direction, and (b) second movement..." Such language is unclear, and therefore renders the claim indefinite. For the purposes of this Written Opinion, the noted claim language is interpreted as intending to instead recite, --...in response to at least one of (a) first movement the outer sheath drive component relative to the guidewire sheath in a first direction, and (b) second movement...--.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Benjamin E. Merritt et al.

Application No.: 18/598,482	Confirmation No.: 3249
Filed: March 7, 2024	Art Unit: 3783
For: HEMOSTASIS VALVES AND METHODS OF USE	Examiner: Quynh-Nhu Hoang Vu

AMENDMENT AND RESPONSE TO RESTRICTION REQUIREMENT UNDER 37 C.F.R. § 1.142

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

Dear Commissioner:

In response to the Restriction Requirement mailed on May 8, 2024, please amend and consider the above-identified U.S. patent application as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2.

Remarks begin on page 9.

AMENDMENTS TO THE CLAIMS

Please withdraw claims 15–30. Following is a complete listing of the claims pending in the application, as amended:

1. (Original) A valve assembly, comprising:

a tubular member defining a lumen;

a first filament extending in a first loop around the tubular member, wherein the first filament is flexible;

a second filament extending in a second loop around the tubular member, wherein the second filament is flexible;

a pair of actuators movable from a first position to a second position, wherein—

the first filament includes a first portion operably acted upon by a first one of the actuators and a second portion operably acted upon by a second one of the actuators;

the second filament includes a first portion operably acted upon by the first one of the actuators and a second portion operably acted upon by the second one of the actuators;

in the first position, the actuators are positioned to tension the first filament and the second filament thereby decreasing a dimension of the first loop and a dimension of the second loop to constrict the lumen of the tubular member;

in the second position, the actuators are positioned to loosen the first filament and the second filament thereby permitting the tubular member to expand against the first loop and the second loop to increase the dimension of the first loop and the dimension of the second loop to at least partially open the lumen of the tubular member; and

the actuators are biased to the first position.

2. (Original) The valve assembly of claim 1 wherein the first loop extends completely around the tubular member, and wherein the second loop extends completely around the tubular member.

3. (Original) The valve assembly of claim 1 wherein the first portion of the first filament is a first end portion of the first filament, wherein the second portion of the first filament is a second end portion of the first filament, wherein the first portion of the second filament is a first end portion of the second filament, and wherein the second portion of the second filament is a second end portion of the second filament.

4. (Original) The valve assembly of claim 3 wherein the first end portion of first filament is directly attached to the first one of the actuators, wherein the second end portion of the first filament is directly attached to the second one of the actuators, wherein the first end portion of the second filament is directly attached to the first one of the actuators, and wherein the second end portion of the second filament is directly attached to the second one of the actuators.

5. (Original) The valve assembly of claim 1 wherein the tubular member extends along a longitudinal axis, and wherein the first loop is proximate to the second loop along the longitudinal axis.

6. (Original) The valve assembly of claim 1 wherein the first filament and the second filament each comprise a plurality of strands woven together.

7. (Original) The valve assembly of claim 1 wherein the tubular member is elastically deformable.

8. (Original) The valve assembly of claim 1 wherein the tubular member is configured to resiliently expand.

9. (Original) The valve assembly of claim 1, further comprising a rigid housing, wherein the tubular member, the first filament, and the second filament are positioned within the housing, and wherein the actuators are movably coupled to the housing.

10. (Original) The valve assembly of claim 1 wherein the actuators are depressed toward one another in the second position, and wherein the actuators are moved away from one another in the first position.

11. (Original) The valve assembly of claim 1 wherein, in the second position, the tubular member has a diameter of at least 14 French.

12. (Original) The valve assembly of claim 1 wherein, in the second position, the tubular member has a diameter of at least 16 French.

13. (Original) The valve assembly of claim 1 wherein, in the second position, the tubular member has a diameter of at least 20 French.

14. (Original) The valve assembly of claim 1 wherein, in the second position, the tubular member has a diameter of at least 24 French.

15. (Withdrawn) A valve assembly, comprising:

a tubular member defining a lumen, wherein the tubular member is elastically deformable from a first position in which the lumen is constricted to a second position in which the lumen is at least partially open;

a first actuator;

a second actuator;

a first filament configured in a first loop completely around the tubular member and having a first portion extending from the first loop toward the first actuator and a second portion extending from the first loop toward the second actuator; and

a second filament configured in a second loop completely around the tubular member and having a first portion extending from the second loop toward the first actuator and a second portion extending from the second loop toward the second actuator;

wherein—

the first actuator and the second actuator are biased away from one another to elastically deform the tubular member to the first position by (a) increasing a tension in the first filament to decrease a dimension of the first loop and (b) increasing a tension in the second filament to decrease a dimension of the second loop; and

the first actuator and the second actuator are movable toward one another to permit the tubular member to return to the second position by (a) decreasing the tension in the first filament and (b) decreasing the tension in the second filament.

16. (Withdrawn) The valve assembly of claim 15 wherein the first actuator and the second actuator each comprise a button.

17. (Withdrawn) The valve assembly of claim 15 wherein the first filament is flexible, and wherein the second filament is flexible.

18. (Withdrawn) The valve assembly of claim 15 wherein the first portion of first filament is directly attached to the first actuator, wherein the second portion of the first filament is directly attached to the second actuator, wherein the first portion of the second filament is directly

attached to the first actuator, and wherein the second portion of the second filament is directly attached to the second actuator.

19. (Withdrawn) The valve assembly of claim 15 wherein the tubular member extends along a longitudinal axis, wherein the first portion of the first filament extends toward the first actuator along a first axis extending generally orthogonal to the longitudinal axis proximate the tubular member, wherein the second portion of the first filament extends toward the second actuator along a second axis extending generally orthogonal to the longitudinal axis proximate the tubular member, wherein the first portion of the second filament extends toward the first actuator along a third axis extending generally orthogonal to the longitudinal axis proximate the tubular member, wherein the second portion of the second filament extends toward the second actuator along a fourth axis extending generally orthogonal to the longitudinal axis proximate the tubular member, wherein the second axis is positioned between the first axis and the fourth axis, and wherein the fourth axis is positioned between the second axis and the third axis.

20. (Withdrawn) The valve assembly of claim 15 wherein, in the second position, the tubular member has a diameter of at least 16 French.

21. (Withdrawn) The valve assembly of claim 15 wherein, in the second position, the tubular member has a diameter of at least 20 French.

22. (Withdrawn) The valve assembly of claim 15 wherein, in the second position, the tubular member has a diameter of at least 24 French.

23. (Withdrawn) A valve assembly, comprising:

a tubular member defining a lumen;

a first filament extending in a first loop around the tubular member;

a second filament extending in a second loop around the tubular member; and

a pair of actuators biased to circumferentially constrict the first loop and the second loop to elastically deform the tubular member to a first position in which the lumen is constricted, wherein at least one the actuators is movable to decrease a level of tension in the first filament and a level of tension in the second filament to permit the tubular member to expand against the first loop and the second loop to a second position in which the lumen of the tubular member is at least partially open.

24. (Withdrawn) The valve assembly of claim 23 wherein the actuators each comprise a button.

25. (Withdrawn) The valve assembly of claim 23 wherein the first filament includes a first portion operably coupled to a first one of the actuators and a second portion operably coupled to a second one of the actuators, and wherein the second filament includes a first portion operably coupled to the first one of the actuators and a second portion operably coupled to the second one of the actuators.

26. (Withdrawn) The valve assembly of claim 25 wherein the first portion of first filament is directly attached to the first one of the actuators, wherein the second portion of the first filament is directly attached to the second one of the actuators, wherein the first portion of the second filament is directly attached to the first one of the actuators, and wherein the second portion of the second filament is directly attached to the second one of the actuators.

27. (Withdrawn) The valve assembly of claim 23 wherein the first filament is flexible, and wherein the second filament is flexible.

28. (Withdrawn) The valve assembly of claim 23 wherein, in the second position, the tubular member has a diameter of at least 16 French.

29. (Withdrawn) The valve assembly of claim 23 wherein, in the second position, the tubular member has a diameter of at least 20 French.

30. (Withdrawn) The valve assembly of claim 23 wherein, in the second position, the tubular member has a diameter of at least 24 French.

REMARKS

In the May 8, 2024 Restriction Requirement, the Examiner required an election of a single species from the following:

Species I: Claims 1–14;

Species II: Claims 15–22; or

Species III: Claims 23–30

Additionally, the Examiner required an election of a single species from the following:

Species A: Figs. 1–4;

Species B: Fig. 5;

Species C: Fig. 6;

Species D: Fig. 7;

Species E: Fig. 8;

Species F: Figs. 9; or

Species G: Fig. 12.

As a preliminary matter, the undersigned attorney wishes to thank the Examiner for engaging in a productive telephone interview on July 1, 2024, to discuss the present Restriction Requirement. At that time, the Examiner agreed that the restriction between Species A–G was improper and that the Applicant should elect (i) one of Species A, B, and G and (ii) one of Species C, D, E, or F.

In response, the Applicant elects Species I (claims 1–14), Species A (Figures 1–4), and Species D (Figure 7), without traverse. Based on the Applicant's review, claims 1–14 read on Species A and D. Non-elected claims 15–30 have been withdrawn pending allowance of a corresponding generic claim. The foregoing election is made with the understanding that the Examiner and the U.S. Patent and Trademark Office are bound to the finding of non-obviousness between each of the species.

The remarks set forth herein summarize and expand on the July 1st 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 promptly addressed.

Please charge any underpayment or credit any overpayment to our Deposit Account No. 50-0665, under Order No. 111552-8016.US07 from which the undersigned is authorized to draw.

Dated: July 1, 2024

Respectfully submitted,

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/598,482	**07/01/2024 06:46:50 PM Z ET**	**111552.8016.US07**

Title of Invention

HEMOSTASIS VALVES AND METHODS OF USE

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	3249	FILED BY	JiYoung Anderson
PATENT CENTER #	66200461	FILING DATE	03/07/2024
CUSTOMER #	25096	FIRST NAMED INVENTOR	Benjamin E. Merritt
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Matthew Williams

Documents

TOTAL DOCUMENTS: 16

DOCUMENT		PAGES	DESCRIPTION	SIZE (KB)
2024-7-1 Response to Restriction Requirement - 111552-8016US7.pdf		10	-	94 KB
2024-7-1 Response to Restriction Requirement - 111552-8016US7-ELC..pdf	(1-1)	1	Response to Election / Restriction Filed	75 KB
2024-7-1 Response to Restriction Requirement - 111552-8016US7-IACS.pdf	(2-8)	7	Amendment Copy Claims/Response to Suggested Claims	85 KB
2024-7-1 Response to Restriction Requirement - 111552-8016US7-REM.pdf	(9-10)	2	Applicant Arguments/Remarks Made in an Amendment	77 KB

2024-7-1 - IDS SB08 - 111552.8016.US07.pdf	5	Information Disclosure Statement (IDS) Form (SB08)	143 KB

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NPL_ISR - PCT-US-2024_010875 - April 26 2024 - 15 pages.pdf	15	Non Patent Literature	2964 KB
NPL_ISR_WO_PCTUS20239428_May_29_2024_18pages - uspto.pdf	18	Non Patent Literature	3167 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
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2024-7-1 - IDS SB08 - 111552.8016.US07.pdf	AEDC699F3C1E2D19C3509077A4CC8607F7F899B2C868C785904B88CB478C0BFD5B52C5AD8010ACE9BE94959EF326BB3FDA71ED4C8685170A4BF1E17C82DCD50A
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FOR_EP2231256B1.pdf	2503105C5E0B2136A780471073AFEB21B055C260A5BB8F36642D74A5E8F158DBACA2C32246268EEAC113741B35C43605BDC5307C3C93E59D613245BBC9F86C80
FOR_EP2540328A1.pdf	B38DB8FCAE65479D7017E44094FDE5255672B2C0F5682AD600EDC5836E7E2F86E69C8C49C522A264BE3F42B6F305300B0CDB0FE49509065D416F0DCE2E9ED09F
FOR_JP5694718.pdf	825D92987C52DD263B05EF782941B949DC54AEF6D88A6A437E789CE4385EB7725675792607 8C1E340E9B305E046A65F5319C814F9482CDC8FE1FA512925A52CC

FOR_WO2019064306.pdf	2D75B1477BADF02A2BD6679FE18B9D7469FABA236265457EB7A176CCD5BE1A9AE3E6C22A5F0BF3BBBD8968EA952876B0CB964D6AA73D9309A946999F680E8425
FOR_WO2024103036.pdf	90E8C64D663DC4CB0C67B06AAC3B7E6AC462E22C353917EFD94555CDC3B7DD74820C040B67A1DB1379CB4DEB7100F7542E254C266A4D984CB4FAF69867959C74
FOR_JP2007222658A_Counterpart_WO1998050103.pdf	6542B7568F6D3547C5E7F9C42057396997AC99AD29E9EA3CEF1A5DF624C7BC8DEE1C5DDA8A9EEAA4E0D64EC1AD8490F5B014BE24CB45CA2F5436755394800660D
FOR_WO2023069874A1.pdf	3B9BD99D772C4A05C43809AC5B53CF9838520BC07027BC47F65FA53FF67DE6A8ED73E6F70FEA65DCCF4C32D02DEF4280777C7C61A1A5B65FEFAE6912C8483555
NPL_JP_OA_EN_translation_2022_160947_Jan_19_2024_8pages.pdf	72D013D8162FB1A486EC922A19BA0CEFFD50054B3EDD9A7246982FD6E19E8D9CD4A2644EDC743C7E767556FF37B9E9B869A17E030CF6159F1B62500DAA532383
NPL_EESR_21818772.2 mailed May 10 2024 _ 9 pages.pdf	7EDEAB2DA2A51EDBE25EA8BC0E9C3D87E2E8E5AB2E469CDF8F130514AE7E864B31E312CBB8DB961114DD91F62AA834E30D826E4F4A2FF69D2FA162A7D772DB66
NPL_ISR - PCT-US-2024_010875 - April 26 2024 - 15 pages.pdf	A2DCDD4F24DBCE02E2A7FCD28EFB7CAB8D842AABBE43544AF8ED5738A3AB0C7C7173A65756CEBE8C1BF33292ABAE97356FAF6E7924F8B0833B43ECCC43D7512D
NPL_ISR_WO_PCTUS202379428_May_29_2024_18pages - uspto.pdf	F614625CBD016F46B4585B56252CE611333C28038C1B4198E81D24BA60778F7B7A2969B3E4C97204CE9A021D2EE2EEA14BD212E2CCF98D6ACD3AD55FD2E92B44

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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.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. 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 displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 18/598,482	Filing Date 03/07/2024	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $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	07/01/2024	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 30	Minus	** 30	= 0		x $100 =	0
	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	0

		(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".	/SHARAIN E MORELAND/
*** 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
18/598,482	03/07/2024	Benjamin E. Merritt	111552.8016.US07

CONFIRMATION NO. 3249

25096
PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

PUBLICATION NOTICE

OC000000074527814

Date Mailed: 06/27/2024

Title:HEMOSTASIS VALVES AND METHODS OF USE

Publication No.US-2024-0207593-A1
Publication Date:06/27/2024

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 viewed using the USPTO's publicly available Searchable Databases via the Patent Public Search tool at www.uspto.gov. The direct link to access the Patent Public Search tool is currently https://ppubs.uspto.gov/pubwebapp/static/pages/ppubsbasic.html.

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 Patent Center, the USPTO's electronic patent application filing and management system. The direct link to access this status information is currently https://patentcenter.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of Patent Center.

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

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

TO: patentprocurement@perkinscoie.com
FROM: noreply@uspto.gov
CC: patentcenter_eofficeaction@uspto.gov
SUBJECT: USPTO: Patent Electronic System - e-Postcard Notification for Customer Number 25096

Wed May 15 05:06:36 EDT 2024

Dear Patent Center Customer:

Correspondence Address:

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

An email notification regarding the correspondence was sent to the following email address(es) associated with customer number 25096:

patentprocurement@perkinscoie.com

This is a courtesy reminder that new correspondence is available for the application. If you have not done so already, please review the correspondence listed below. The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Application	Document	Mailroom Date	Attorney Docket No.
18598482	CTRS	05/08/2024	111552.8016.US07

To view your correspondence online, please sign in to Patent Center and then select Workbench/View correspondence. Or to update your email addresses, select Manage/Manage customer numbers.

If you have any questions, please contact the Patent Electronic Business Center (EBC) at ebc@uspto.gov or 866-217-9197 Monday – Friday, 6 a.m. to midnight ET.

Please do not reply to this email as it was sent from an unmonitored mailbox.

Sincerely,

The Patent Center Team

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/598,482	03/07/2024	Benjamin E. Merritt	111552.8016.US07	3249

25096 7590 05/08/2024

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

EXAMINER
VU, QUYNH-NHU HOANG

ART UNIT	PAPER NUMBER
3783	

NOTIFICATION DATE	DELIVERY MODE
05/08/2024	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

Office Action Summary	Application No. 18/598,482	Applicant(s) Merritt et al.	
	Examiner QUYNH-NHU H VU	Art Unit 3783	AIA (FITF) Status Yes

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

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

Status

1)☑ Responsive to communication(s) filed on 03/07/24.

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

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

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

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

Disposition of Claims*

5) ☑ Claim(s) 1-30 is/are pending in the application.

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

6) ☐ Claim(s) _____ is/are allowed.

7) ☐ Claim(s) _____ is/are rejected.

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

9) ☑ Claim(s) 1-30 are subject to restriction and/or election requirement

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

Application Papers

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

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

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

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

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

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

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

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

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

Attachment(s)

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

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

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

4) ☐ Other: _____.

DETAILED ACTION

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.

Election/Restriction

This application contains claims directed to the following patentably distinct species:

I) Claims 1-14 require that: *a first filament is flexible; a second filament is flexible; the first filament includes a first portion operably acted upon by a first one of the actuators, and a second portion operably acted upon by a second one of the actuators; the second filament includes a first portion operably acted upon by the first one of the actuators and a second portion operably acted upon by the second one of the actuators*. These limitations above do not include in the species II & III.

II) Claims 15-22 require that: *a tubular member is elastically deformable; a first filament configured in a first loop completely around the tubular member and having a first portion extending from the first loop toward the first actuator and a second portion extending from the first loop toward the second actuator; a second filament configured in a second loop completely around the tubular member and having a first portion extending from the second loop toward the first actuator and a second portion extending from the second loop toward the second actuator; wherein—the first actuator and the second actuator are biased away from one another to elastically deform the tubular member to the first position by (a) increasing a tension in the first filament to decrease a dimension of the first loop and (b) increasing a tension in the second filament to decrease a dimension of the second loop; and the first actuator and the second actuator are movable toward one another to permit the tubular member to return to the second position by (a) decreasing the tension in the first filament and (b) decreasing the tension in the second filament*. These limitations above do not include in the species I & III.

III) Claims 23-30 require that: *a pair of actuators biased to circumferentially constrict the first loop and the second loop to elastically deform the tubular member to a first position in which the lumen is constricted, wherein at least one the actuators is movable to decrease a level of tension in the first filament and a level of tension in the second filament to permit the tubular member to expand against the*

first loop and the second loop to a second position in which the lumen of the tubular member is at least partially open. These limitations above do not include in the species I & II.

This application contains claims directed to the following patentably distinct sub-species:

1) Figs. 1-4 2) Fig. 5 3) Fig. 6 4) Fig. 7

5) Fig. 8 6) Fig. 9 7) Fig. 12

The species and sub-species are independent or distinct because they are not obvious variants of each other based on the current record.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species, or a single grouping of patentably indistinct species, for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, no claim is generic.

There is a serious search and/or examination burden for the patentably distinct species as set forth above because at least the following reason(s) apply:

(a) the inventions have acquired a separate status in the art due to their recognized divergent subject matter;

(b) the inventions require a different field of search (for example, searching different classes/subclasses or electronic resources, or employing different search queries);

(c) the prior art applicable to one invention would not likely be applicable to another invention.

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a species to be examined even though the requirement may be traversed (37 CFR 1.143) **and (ii) identification of the claims encompassing the elected species or grouping of patentably indistinct species**, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

The election may be made with or without traverse. To preserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the election of species requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added

after the election, applicant must indicate which of these claims are readable on the elected species or grouping of patentably indistinct species.

Should applicant traverse on the ground that the species, or groupings of patentably indistinct species from which election is required, are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing them to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the species unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103 or pre-AIA 35 U.S.C. 103(a) of the other species.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141.

Applicant is reminded that upon the cancelation of claims to a non-elected invention, the inventorship must be corrected in compliance with 37 CFR 1.48(a) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. A request to correct inventorship under 37 CFR 1.48(a) must be accompanied by an application data sheet in accordance with 37 CFR 1.76 that identifies each inventor by his or her legal name and by the processing fee required under 37 CFR 1.17(i).

The examiner has required restriction between product or apparatus claims and process claims. Where applicant elects claims directed to the product/apparatus, and all product/apparatus claims are subsequently found allowable, withdrawn process claims that include all the limitations of the allowable product/apparatus claims should be considered for rejoinder. All claims directed to a nonelected process invention must include all the limitations of an allowable product/apparatus claim for that process invention to be rejoined.

In the event of rejoinder, the requirement for restriction between the product/apparatus claims and the rejoined process claims will be withdrawn, and the rejoined process claims will be fully examined for patentability in accordance with 37 CFR 1.104. Thus, to be allowable, the rejoined claims must meet all criteria for patentability including the requirements of 35 U.S.C. 101, 102, 103 and 112. Until all claims to the elected product/apparatus are found allowable, an otherwise proper restriction requirement

between product/apparatus claims and process claims may be maintained. Withdrawn process claims that are not commensurate in scope with an allowable product/apparatus claim will not be rejoined. See MPEP § 821.04. Additionally, in order for rejoinder to occur, applicant is advised that the process claims should be amended during prosecution to require the limitations of the product/apparatus claims. **Failure to do so may result in no rejoinder.** Further, note that the prohibition against double patenting rejections of 35 U.S.C. 121 does not apply where the restriction requirement is withdrawn by the examiner before the patent issues. See MPEP § 804.01.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to QUYNH-NHU HOANG VU whose telephone number is (571)272-3228. The examiner can normally be reached M-F 7:30 am-4:00 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, Michael Tsai can be reached on 571-270-5246. 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.

/QUYNH-NHU H. VU/
Primary Examiner, Art Unit 3783

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	18/598,482	Merritt et al.
	Examiner	Art Unit
	QUYNH-NHU H VU	3783

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	05/02/2024								
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
18/598,482	03/07/2024	Benjamin E. Merritt	111552.8016.US07	3249

25096 7590 04/12/2024

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ART UNIT	PAPER NUMBER
OPAP	

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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

Decision Granting Request for Prioritized Examination (Track I)	**Application No.** 18/598,482	**Applicant(s)** Merritt et al.	
	Examiner FIKIRTE A GEREMEW	**Art Unit** OMBL	**AIA (FITF) Status** Yes

1. THE REQUEST FILED 07 March 2024 IS **GRANTED** .

The above-identified application has met the requirements for prioritized examination

A. ☑ for an original nonprovisional application (Track I).
B. ☐ for an application undergoing continued examination (RCE).

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:

A. filing a **petition for extension of time** to extend the time period for filing a reply;

B. filing an **amendment to amend the application to contain more than four independent claims, more than thirty total claims** , or a multiple dependent claim;

C. filing a **request for continued examination** ;

D. filing a notice of appeal;

E. filing a request for suspension of action;

F. mailing of a notice of allowance;

G. mailing of a final Office action;

H. completion of examination as defined in 37 CFR 41.102; or

I. abandonment of the application.

Telephone inquiries with regard to this decision should be directed to FIKIRTE GEREMEW at (703) 756-1930. In his/her absence, calls may be directed to Petition Help Desk at (571) 272-3282.

/FIKIRTE A GEREMEW/ PROGRAM SUPPORT SPECIALIST, OMBL	

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United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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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
18/598,482	03/07/2024		2820	111552.8016.US07	30	3

CONFIRMATION NO. 3249

FILING RECEIPT



25096
PERKINS COIE LLP - SEA General
PATENT-SEA
P.O. BOX 1247
SEATTLE, WA 98111-1247

Date Mailed: 03/21/2024

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)

Benjamin E. Merritt, San Clemente, CA;
John C. Thress, Capistrano Beach, CA;
Paul Lubock, Monarch 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 18/515,079 11/20/2023
which is a CON of 17/226,318 04/09/2021 PAT 11,844,921
which is a CON of 16/117,519 08/30/2018 PAT 11,000,682
which claims benefit of 62/554,931 09/06/2017

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: 03/18/2024
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 18/598,482**
Projected Publication Date: 06/27/2024
Non-Publication Request: No
Early Publication Request: No
Title

HEMOSTASIS VALVES AND METHODS OF USE

Preliminary Class

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

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Title 37, Code of Federal Regulations, 5.11 & 5.15

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 18/598,482

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	320
SEARCH FEE (37 CFR 1.16(k), (i), 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))	30 minus 20 =	* 10			OR	x 100 =	1000
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*				x =	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
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	2820

APPLICATION AS AMENDED - PART II

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

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

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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Derrick Brent
Deputy Under Secretary of Commerce for Intellectual Property and
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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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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	18/598,482 - Conf # 3249
	Filing Date	March 7, 2024
	First Named Inventor	Benjamin E. Merritt
	Art Unit	Not Yet Assigned
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552.8016.US07

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
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	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	
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	11.	4222380	09-16-1980	Terayama	
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	13.	4287808	09-08-1981	Leonard et al.	
	14.	4324262	04-13-1982	Hall	
	15.	4393872	07-19-1983	Reznik et al.	
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	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.	
	21.	4650466	03-17-1987	Luther	
	22.	4863440	09-05-1989	Chin et al.	
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	27.	4978341	12-18-1990	Niederhauser	
	28.	5059178	10-22-1991	Ya	
	29.	5100423	03-31-1992	Fearnot	

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
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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
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	31.	5129910	07-14-1992	Phan et al.	
	32.	5192286	03-09-1993	Phan et al.	
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	34.	5329923	07-19-1994	Lundquist	
	35.	5360417	11-01-1994	Gravener et al.	
	36.	5364345	11-15-1994	Lowery et al.	
	37.	5389100	02-14-1995	Bacich et al.	
	38.	5419774	05-30-1995	Willard et al.	
	39.	5443443	08-22-1995	Shiber	
	40.	5476450	12-19-1995	Ruggio	
	41.	5490859	02-13-1996	Mische et al.	
	42.	5591137	01-07-1997	Stevens	
	43.	5662703	09-02-1997	Yurek et al.	
	44.	5746758	05-05-1998	Nordgren et al.	
	45.	5749858	05-12-1998	Cramer	
	46.	5782817	07-21-1998	Franzel et al.	
	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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	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.	
	64.	6228060	05-08-2001	Howell	
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	68.	6258115	07-10-2001	Dubrul	
	69.	6306163	10-23-2001	Fitz	
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	73.	6383205	05-07-2002	Samson et al.	
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	77.	6511492	01-28-2003	Rosenbluth et al.	
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	84.	6596011	07-22-2003	Johnson et al.	
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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.	
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	99.	6824553	11-30-2004	Gene et al.	
	100.	6830561	12-14-2004	Jansen et al.	
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	105.	7004954	02-28-2006	Voss et al.	
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	107.	7041084	05-09-2006	Fotjik	
	108.	7052500	05-30-2006	Bashiriet al.	
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	111.	7094249	08-22-2006	Thomas et al.	
	112.	7179273	02-20-2007	Palmer et al.	
	113.	7232432	06-19-2007	Fulton III et al.	
	114.	7244243	07-17-2007	Lary	
	115.	7285126	10-23-2007	Sepetka et al.	
	116.	7306618	12-11-2007	Demond et al.	

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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
	117.	7320698	01-22-2008	Eskuri	
	118.	7323002	01-29-2008	Johnson et al.	
	119.	7331980	02-19-2008	Dubrul et al.	
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	121.	7578830	08-25-2009	Kusleika et al.	
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	Art Unit	Not Yet Assigned
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	111552.8016.US07

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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CERTIFICATION STATEMENT

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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

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☐ 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

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 number **17/226,318** and filed on **April 9, 2021**, application number **16/117,519** and filed **August 30, 2018**, and application number **18/515,079** and filed **November 20, 2023** and 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)	2024-03-12
Name/Print	Matthew S. Williams	Registration Number	77,516

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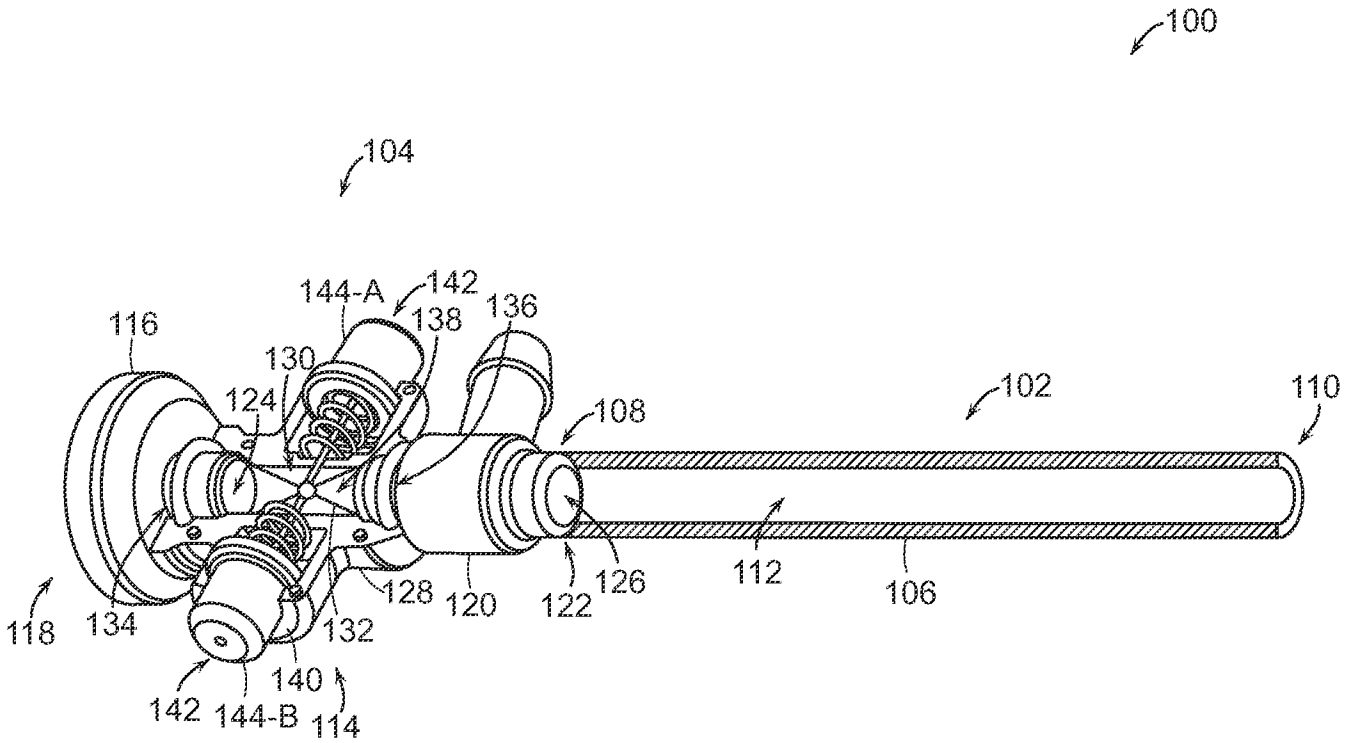

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FIG. 1

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FIG. 3

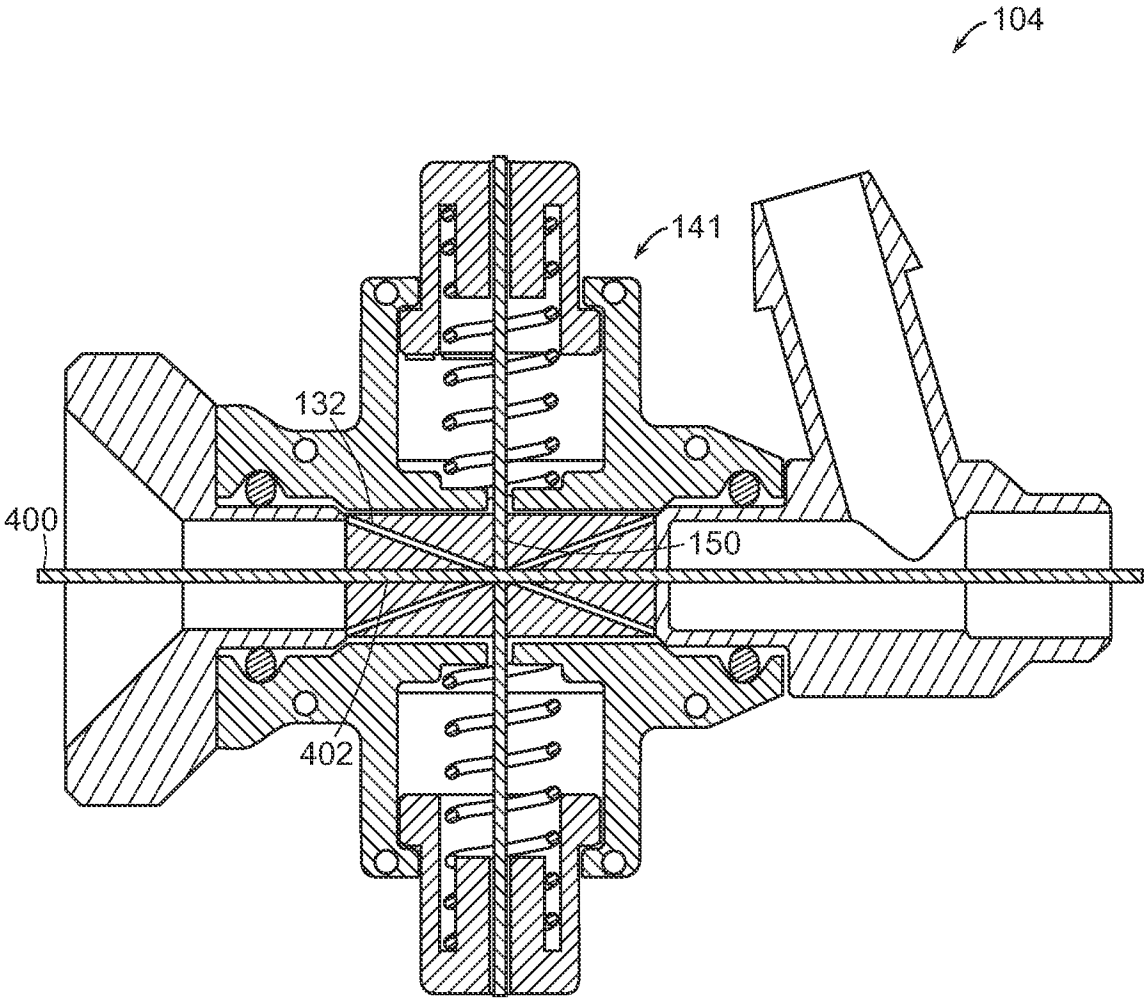


FIG. 4

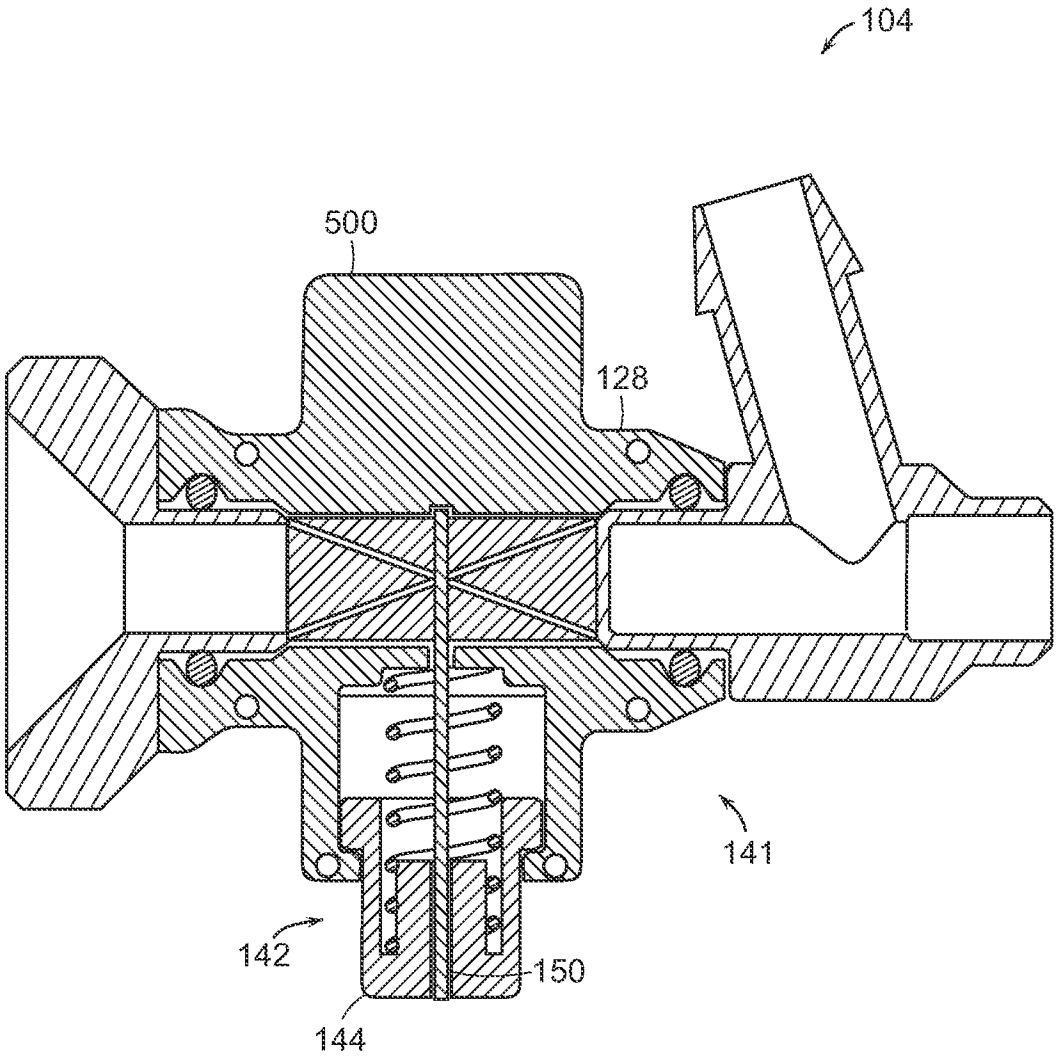


FIG. 5

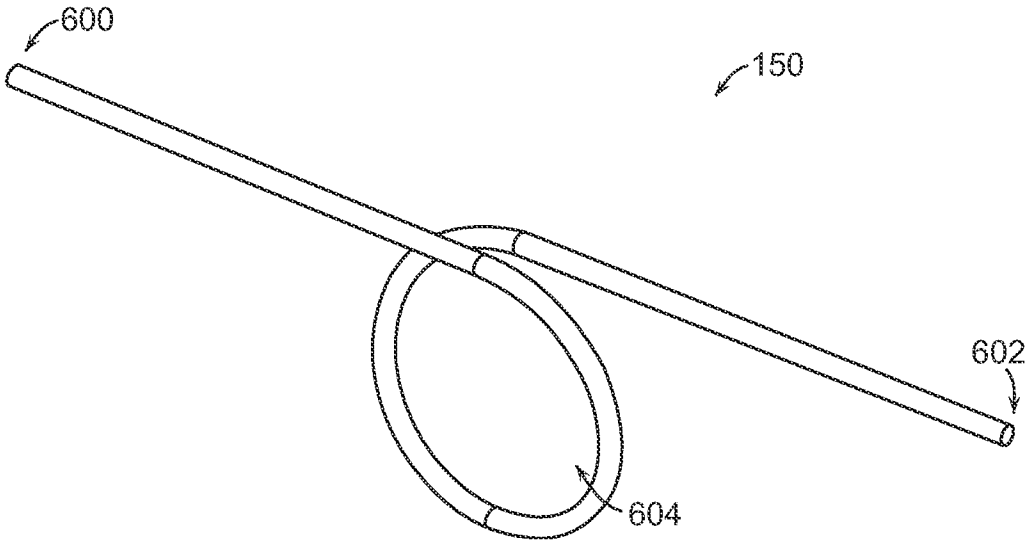


FIG. 6

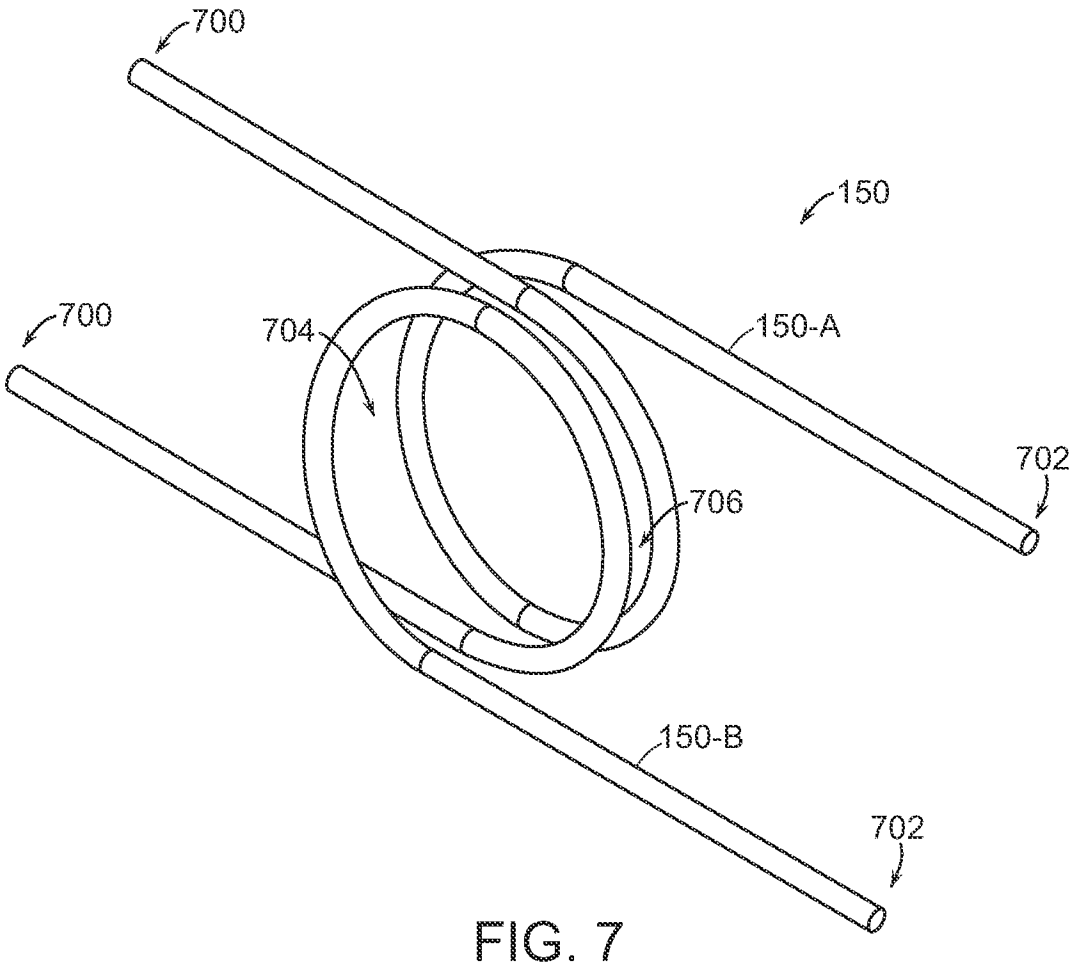


FIG. 7

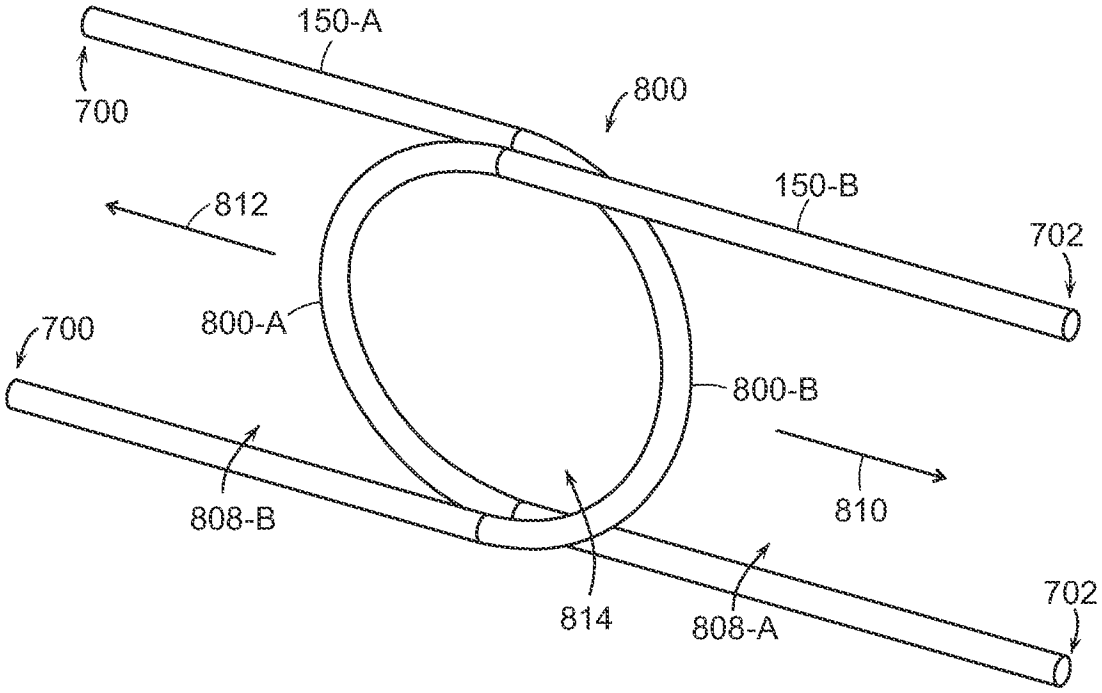

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FIG. 8

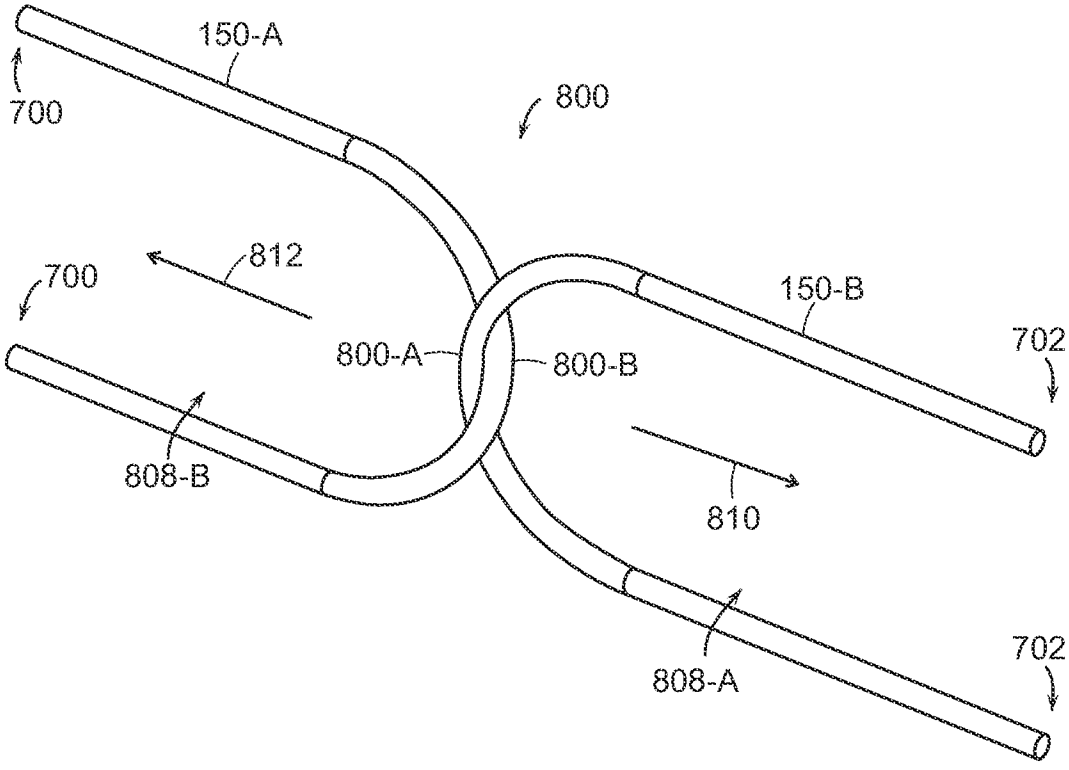

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FIG. 9

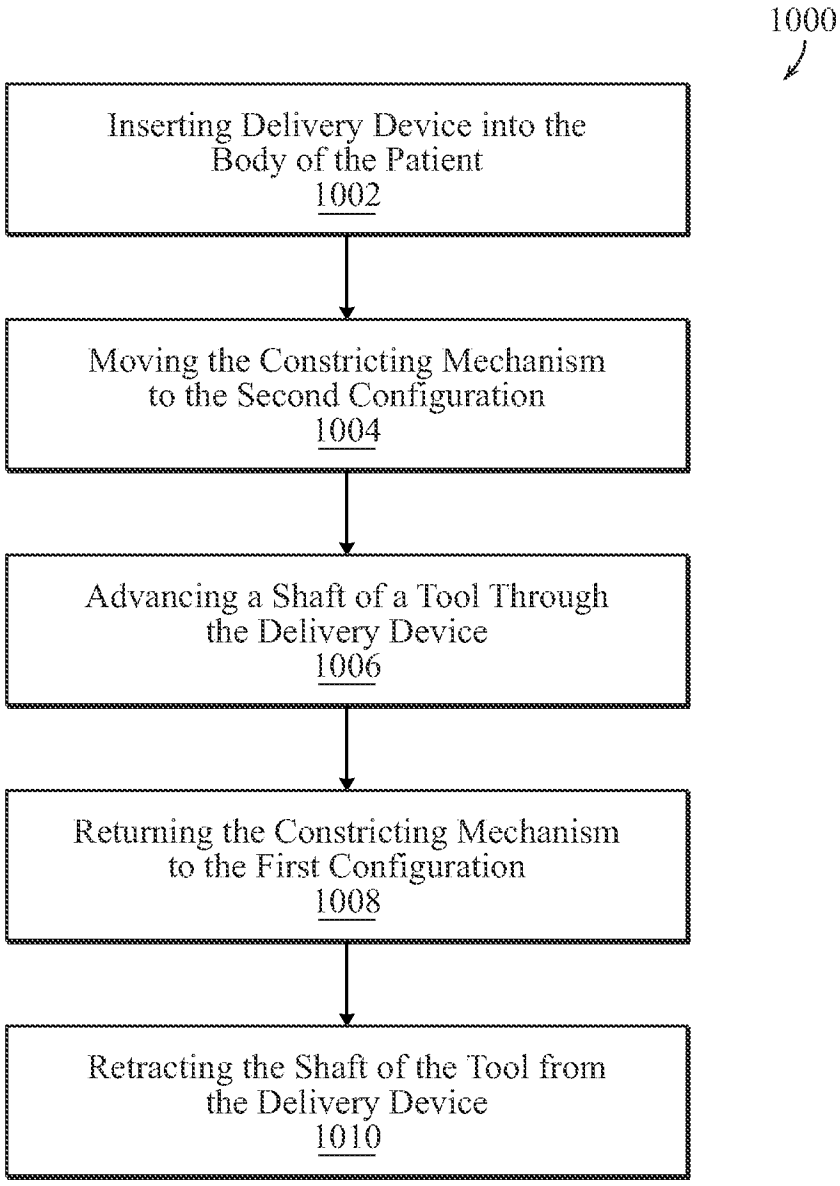

1000
Inserting Delivery Device into the Body of the Patient
1002
Moving the Constricting Mechanism to the Second Configuration
1004
Advancing a Shaft of a Tool Through the Delivery Device
1006
Returning the Constricting Mechanism to the First Configuration
1008
Retracting the Shaft of the Tool from the Delivery Device
1010

FIG. 10

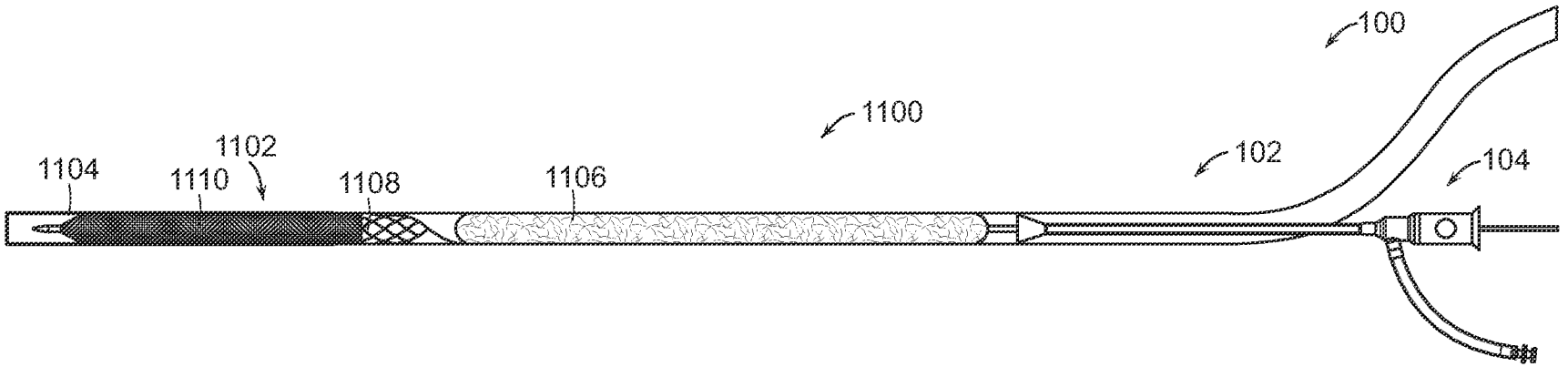


FIG. 11

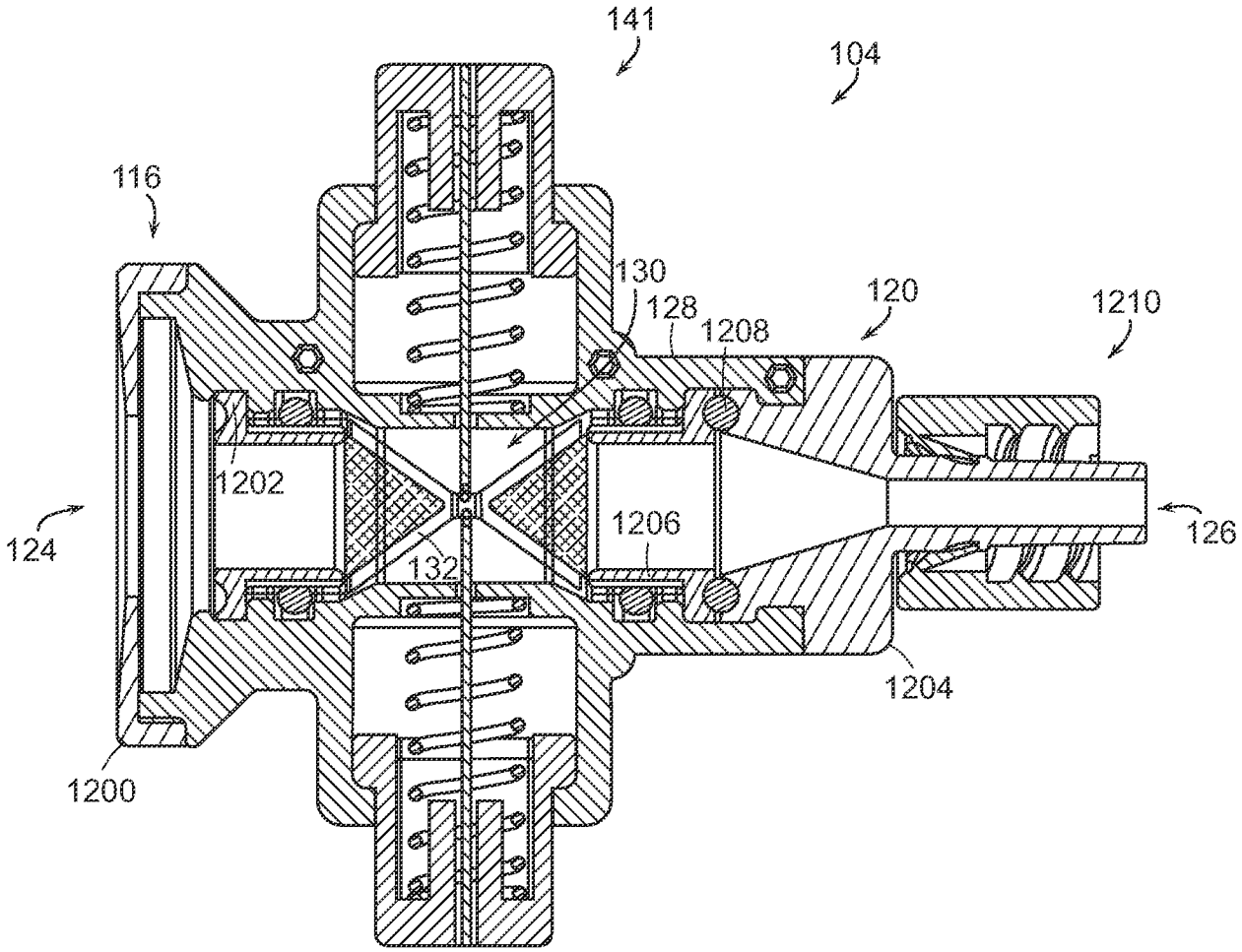

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FIG. 12

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	111552.8016.US07
	Application Number	
Title of Invention	HEMOSTASIS VALVES AND METHODS OF USE	

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

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
	Benjamin	E.	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 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	John	C.	Thress	

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

City	Capistrano Beach	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

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	111552.8016.US07
	Application Number	
Title of Invention	HEMOSTASIS VALVES AND METHODS OF USE	

City	Monarch Beach	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

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	HEMOSTASIS VALVES AND METHODS OF USE		
Attorney Docket Number	111552.8016.US07	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	10	**Suggested Figure for Publication (if any)**	2

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.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	111552.8016.US07
	Application Number	
Title of Invention	HEMOSTASIS VALVES AND METHODS OF USE	

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	18/515079	2023-11-20

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
18/515079	Continuation of	17/226318	2021-04-09	11844921	2023-12-19

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
17/226318	Continuation of	16/117519	2018-08-30	11000682	2021-05-11

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16/117519	Claims benefit of provisional	62/554931	2017-09-06

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	111552.8016.US07
	Application Number	
Title of Invention	HEMOSTASIS VALVES AND METHODS OF USE	

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	111552.8016.US07
	Application Number	
Title of Invention	HEMOSTASIS VALVES AND METHODS OF USE	

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.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	111552.8016.US07
	Application Number	
Title of Invention	HEMOSTASIS VALVES AND METHODS OF USE	

Applicant Information:

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

Applicant 1 Remove

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

Clear

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

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

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	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			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

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.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	111552.8016.US07
	Application Number	
Title of Invention	HEMOSTASIS VALVES AND METHODS OF USE	

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		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)	2024-03-07
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

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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.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	111552.8016.US07
	Application Number	
Title of Invention	HEMOSTASIS VALVES AND METHODS OF USE	

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 CooperationTreaty.

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

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

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

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.

Doc Code: TRACK1.REQ
Document Description: TrackOne Request

PTO/AIA/424 (04-14)

CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION UNDER 37 CFR 1.102(e) (Page 1 of 1)

First Named Inventor:	Benjamin E. Merritt	Nonprovisional Application Number (if known):	
Title of Invention:	HEMOSTASIS VALVES AND METHODS OF USE		

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 2024-03-07
Name (Print/Typed) Matthew S. Williams	Practitioner Registration Number 77,516

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.

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APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
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Title of Invention

HEMOSTASIS VALVES AND METHODS OF USE

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	3249	FILED BY	JiYoung Anderson
PATENT CENTER #	64593384	FILING DATE	-
CUSTOMER #	25096	FIRST NAMED INVENTOR	Benjamin E. Merritt
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Matthew Williams

Documents

TOTAL DOCUMENTS: 10

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
ADS-111552-8016US7.pdf	9	Application Data Sheet	1781 KB
Warning: The attached version of the AIA/14 form is not the current version and data may not fully load to USPTO systems.			
track one application 111552 8016US07-APP.TEXT.docx	39	Application body structured text document	49 KB
Warning: Bookmarks were found and have been removed.			
Drawings-111552-8016US7 - uspto.pdf	10	Drawings-only black and white line drawings	192 KB
General Fee Authorization - 111552.8016.US07.pdf	2	Authorization for Extension of Time all replies	101 KB
Track One Request - 111552.8016.US07.pdf	2	Track One Request	863 KB

US_POA-signed_2021-Inari.pdf	1	Power of Attorney	120 KB
POA_Trans-111552-8016.US07.pdf	1	Power of Attorney	615 KB
Track one application 111552 8016US07 - uspto.pdf	39	Auxiliary PDF of Application	178 KB
Declarations-parent-111552-8016US7.pdf	3	Oath or Declaration filed	514 KB
Track one application 111552 8016US07 - uspto.pdf	39	Specification	178 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
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Track one application 111552 8016US07 - uspto.pdf	9EBDF64A83A807851B4FA4E3FB82925EE82089727679EFC9BC06A00A665053CA6E679C97FC6F57EC8FE155FA4BF0475BA92C0501EAEDB1A0AC7803D7A8D761A7

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HEMOSTASIS VALVES AND METHODS OF USE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of U.S. Patent Application No. 18/515,079, filed on November 20, 2023, titled "HEMOSTASIS VALVES AND METHODS OF USE," which is a continuation of U.S. Patent Application No. 17/226,318, filed on April 9, 2021, issued as U.S. Patent No. 11,844,921, and titled "HEMOSTASIS VALVES AND METHODS OF USE," which is a continuation of U.S. Patent Application No. 16/117,519, filed on August 30, 2018, now issued as U.S. Patent No. 11,000,682, and titled "HEMOSTASIS VALVES AND METHODS OF USE," which claims the benefit of U.S. Provisional Patent Application No. 62/554,931, filed on September 6, 2017, and titled "HEMOSTASIS VALVES AND METHODS OF USE," each of which is incorporated by reference herein in its entirety.

BACKGROUND

[0002] During a surgical procedure, a portion of a patient's body (e.g., vasculature) is accessed to allow for performance of a desired intervention or treatment. During such surgical procedures, it is desired to minimize patient blood loss, prevent delivery of air into the vasculature, and to maintain the sterility of the accessed portions or sites of the patient's body so as to prevent issues such as infection. Further, the desire for improved patient outcomes has led to the development of hemostasis valves that facilitate minimally invasive surgery.

[0003] In minimally invasive surgery, small incisions are created through a blood vessel which one or several catheters are inserted. Each of these one or several catheters can define a lumen extending longitudinally through that catheter. These catheters are moved to a position proximate to tissue, nerves, or other body structures targeted by the surgery, and then tools for performing the procedure are inserted through the lumens of some or all of these catheters.

[0004] To minimize blood loss, prevent delivery of air into the vasculature, and to facilitate maintenance of sterility within the patient's body (e.g., blood vessel), these catheters are equipped with hemostasis valves. These valves seal or selectably seal the lumens of the catheters. In many instances, these valves can seal the lumen of the catheter when a tool extends through the catheter,

and specifically through the valve. Additionally the valves can seal the lumen when a tool is removed or does not extend through the catheter.

[0005] While such traditional hemostasis valves are greatly beneficial for intravascular access, they have some drawbacks. For example, some valves may not seal adequately for all interventional applications or tools, and/or the operation of some valves may be complicated for operator use. The drawbacks of such valve designs may in turn increase the complexity of any surgery performed therewith and/or reduce patient safety (e.g., bleeding, infection, and/or other detrimental complications). Accordingly, new and improved hemostasis valves and methods of use are desired.

SUMMARY

[0006] The following relates to valves, medical systems incorporating valves, and methods of using the same. The valve can include a tubular member that can be constricted, collapsed, and/or sealed by one or several tensioning mechanisms. The tensioning mechanism can include at least one filament that extends around at least a portion of the tubular member. The filament can interact with the tubular member to constrict, collapse, and/or seal the tubular member via manipulation of the tensioning mechanism(s). A tool can be inserted through the valve to gain access to a patient's body and specifically to gain access to a blood vessel. Through the use of the tensioning mechanism and filament to constrict, collapse, and/or seal the tubular member, the valve can seal around a wide range of tool sizes and shapes, as well as multiple tools of differing sizes simultaneously. Additionally, such a valve creates a robust seal that maintains its seal when a vacuum is applied such as occurs during aspiration.

[0007] Aspects of the present disclosure relate to a hemostatic valve for sealing a medical device. The hemostatic valve includes an elongate member having a first end, a second end, and a central lumen extending therebetween. In some embodiments, the elongate member is pliable. The hemostatic valve can include a reinforcement structure extending along at least a portion of the elongate member, such that the reinforcement structure is coupled to the elongate member. The hemostatic valve includes an active tensioning mechanism coupled to the elongate member. In some embodiments, the tensioning mechanism is moveable between a first configuration in which the central lumen is constricted and sealed and a second configuration in which the central lumen is open. Optionally, the valve may be manually adjusted by the user to intermediate positions between fully

open and fully closed. Additionally, an instrument (e.g. catheter) may provide an intermediate position where the valve creates hemostasis without user adjustment.

[0008] In some embodiments, the elongate member can be a compliant polymer tube. In some embodiments, the tensioning mechanism can include at least one filament extending at least partially around the elongate member. In some embodiments, the reinforcement structure is positioned between the at least one filament and the elongate member. In some embodiments, the reinforcement structure can be a braided mesh. In some embodiments, the reinforcement structure is coupled to the elongate member at a position proximate to the first end of the elongate member and at a position proximate to the second end of the elongate member. In some embodiments, the reinforcement structure is not coupled to the elongate member at a position between the first end of the elongate member and the second end of the elongate member. In some embodiments, the central portion of the compliant polymer tube that is constrained or collapsed by the tensioning mechanism, and at least one filament, is not coupled to the reinforcement structure.

[0009] In some embodiments, the tensioning mechanism can include an actuator coupled to the at least one filament. In some embodiments there are two tensioning mechanisms coupled to the at least one filament that operate in opposite directions. In some embodiments the two tensioning mechanisms are attached to the same filament. In some embodiments the two tensioning mechanisms are attached to opposing filaments. In some embodiments, the actuator can be moveable to control movement of the at least one filament from a first position in which the central lumen is constricted and sealed to a second position in which the central lumen is open. In some embodiments, the at least one filament is in the first position when the tensioning mechanism is in the first configuration. In some embodiments, the actuator is biased towards the first position. In some embodiments, the actuator is biased toward the second position. In some embodiments, the actuator can be a manual actuator.

[0010] In some embodiments, the at least one filament forms a loop around the elongate member. In some embodiments, the at least one filament forms a bight around a portion of the elongate member. In some embodiments, the at least one filament can include a first filament and a second filament. In some embodiments, each of the first filament and the second filament are coupled to the same actuator. In some embodiments, each of the first filament and the second filament are coupled to different actuators. In some embodiments, the first filament and the second filament are

moveable from the first position to the second position. In some embodiments, each of the first filament and the second filament form a loop around the elongate member. In some embodiments, the first filament forms a first bight around a first portion of the elongate member, and the second filament forms a second bight around a second portion of the elongate member. In some embodiments, the first bight extends through the second bight.

[0011] In some embodiments, the hemostatic valve can include a shell defining a first aperture and a second aperture. In some embodiments, the elongate member extends from the first aperture to the second aperture and fluidly couples the first aperture and the second aperture. In some embodiments, the tensioning mechanism is self-adjustable to seal around tools of different sizes extending through the hemostatic valve. In some embodiments, the central lumen can comprise a single lumen, and in some embodiments, the central lumen can comprise a plurality of lumens.

[0012] One aspect of the present disclosure relates to a delivery system for intravascular access of a blood vessel within a patient's body. The delivery system includes a catheter having a first end, a second end, and a catheter lumen extending therebetween and a hemostatic valve coupled to the first end of the catheter. The hemostatic valve includes a tubular member having a first end, a second end, and a central lumen extending therebetween. In some embodiments, the central lumen of the tubular member is fluidly coupled with the catheter lumen. The hemostatic valve includes an active tensioning mechanism coupled to the tubular member, the tensioning mechanism can be moveable between a first configuration in which the tensioning mechanism constricts on the central lumen and the central lumen is sealed and a second configuration in which the central lumen is open.

[0013] In some embodiments, the hemostatic valve further includes a reinforcement structure extending along at least a portion of the tubular member. In some embodiments, the reinforcement structure is located between the tensioning mechanism and the tubular member. In some embodiments, the reinforcement structure can be a braided mesh. In some embodiments, the reinforcement structure is coupled to the tubular member at a position proximate to the first end of the tubular member and at a position proximate to the second end of the tubular member. In some embodiments, the reinforcement structure is adhered to the tubular member at the first end of the tubular member and at the second end of the tubular member. In some embodiments, the reinforcement structure is uncoupled to the tubular member between the first end of the tubular member and the second end of the tubular member.

[0014] In some embodiments, the tensioning mechanism can include at least one filament extending at least partially around the tubular member. In some embodiments, the tensioning mechanism can include an actuator coupled to the at least one filament. In some embodiments, moving the tensioning mechanism from the first configuration to the second configuration can include moving the actuator and the thereto coupled at least one filament from a first position to a second position. In some embodiments, the filament constricts and seals the central lumen of the tubular member when the filament is in the first position.

[0015] In some embodiments, the actuator can be a manual actuator. In some embodiments, the actuator can include a pair of opposing and depressable buttons, which buttons can be biased towards an undepressed position. In some embodiments, the central lumen is sealed when the buttons are in the undepressed position. In some embodiments, the filament can be a monofilament. In some embodiments, the filament can be at least one of: a polymer filament; or a metallic filament. In some embodiments, the catheter can include a thrombus extraction device.

[0016] One aspect of the present disclosure relates to a method of sealing a delivery device accessing a blood vessel of a patient. The method includes inserting the delivery device including a catheter and a hemostatic valve into the blood vessel of the patient. In some embodiments, the catheter can have a first end, a second end, and a catheter lumen extending therethrough. In some embodiments, the hemostatic valve can be coupled to the first end and can have a tubular member defining a central lumen fluidly coupled with the catheter lumen and a tensioning mechanism coupled with the tubular member. In some embodiments, the tensioning mechanism collapses and seals the central lumen in a first configuration and thereby seals access to the blood vessel. The method can include moving the tensioning mechanism of the hemostatic valve to a second configuration. In some embodiments, the central lumen is open and access to the blood vessel is unsealed when the tensioning mechanism is in the second configuration. The method can include advancing a shaft of a tool through the delivery device until a first end of the tool reaches a desired position within the blood vessel of the patient and a portion of the shaft is positioned within the central lumen of the tubular member. The method can include returning the tensioning mechanism of the hemostatic valve to the first configuration such that the tubular member collapses on the shaft of the tool and seals around the shaft of the tool.

[0017] In some embodiments, the method includes retracting the shaft of the tool from the delivery device. In some embodiments, the tensioning mechanism is maintained in the first configuration during and after the retracting of the shaft of the tool from the delivery device. In some embodiments, the tensioning mechanism is moved to the second configuration during the retracting of the shaft of the tool from the delivery device, and the tensioning mechanism is returned to the first configuration after the shaft of the tool is retracted from the delivery device.

[0018] In some embodiments, the tensioning mechanism can include at least one filament extending at least partially around the tubular member. In some embodiments, the at least one filament collapses the tubular member when the tensioning mechanism is in the first configuration. In some embodiments, the at least one filament circumferentially constricts the tubular member to collapse the tubular member when the tensioning mechanism is in the first configuration. In some embodiments, the hemostatic valve can include a reinforcement structure located between the at least one filament and the tubular member.

[0019] In some embodiments, the at least one filament forms a loop around the elongate member, and moving the tensioning mechanism from the second configuration to the first configuration reduces a size of the loop to thereby constrict the tubular member within the loop. In some embodiments, the filament forms at least one bight around a portion of the elongate member. In some embodiments, the filament can include a first filament and a second filament. In some embodiments, the at least one bight can include a first bight oriented in a first direction and formed by the first filament and a second bight oriented in a second direction and formed by the second filament. In some embodiments, the first and second bights overlap to encircle a portion of the tubular member within a constricting area.

[0020] In some embodiments, moving the tensioning mechanism from the second configuration to the first configuration can include moving the first bight in the first direction and the second bight in the direction to reduce the size of the constricting area and collapse and seal the central lumen of the tubular member. In some embodiments, the tensioning mechanism can include an actuator. In some embodiments, moving the tensioning mechanism to the second configuration can include manipulating the actuator. In some embodiments, the method includes applying a vacuum to the delivery device and/or delivery system to aspirate material through the catheter. In some

embodiments, the central lumen remains sealed during the aspiration. In some embodiments, the tool can include a thrombus extraction device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] Figure 1 is a perspective view of one embodiment of a delivery device.

[0022] Figure 2 is a side-section view of one embodiment of a hemostasis valve in a first configuration.

[0023] Figure 3 is a side-section view of one embodiment of the valve in a second configuration.

[0024] Figure 4 is a side-section view of one embodiment of the valve in the first configuration and with a tool extending through the valve.

[0025] Figure 5 is a side-section view of one embodiment of a single-button hemostasis valve in a first configuration.

[0026] Figure 6 is a perspective view of a filament of a valve forming a loop.

[0027] Figure 7 is a perspective view of two filaments of a valve, each of the filaments forming a loop.

[0028] Figure 8 is a perspective view of two overlapping and interlocked bights in an open configuration.

[0029] Figure 9 is a perspective view of two overlapping and interlocked bights in a closed configuration.

[0030] Figure 10 is a flowchart illustrating one embodiment of a method for sealing a valve and/or catheter.

[0031] Figure 11 is a side view of one embodiment of a thrombectomy system including the delivery device.

[0032] Figure 12 is a side-section view of another embodiment of a hemostasis valve having two-piece caps.

DETAILED DESCRIPTION

[0033] The present disclosure relates to a valve that can be used a hemostasis valve. This valve, also referred to herein as a garrote valve can seal with or without a tool extending through the valve. The garrote valve provides convenient, single-handed operation for a wide range of medical devices including catheters, wires, embolectomy systems, or the like. This single-handed operation of the garrote valve allows the user to easily and quickly swap different tools being used through the valve without compromising hemostasis and therefore simplifying the procedure. Combined with single-handed operation, the garrote valve provides robust sealing either with or without a tool extending through the valve. This robust sealing minimizes leakage in applications with a pressure differential on different sides of the valve. This pressure differential can arise, for example, during the application of vacuum aspiration in a procedure. Even under such conditions, as well as under other conditions, the garrote valve maintains seal integrity and prevents leakage in one or both directions.

[0034] The garrote valve includes a tubular member. The tubular member is a flexible member that defines a central lumen, which can, in some embodiments, define a single lumen, and in some embodiments, defines a plurality of lumens. In some embodiments, each of the plurality of lumens can comprise the same size and shape, and in some embodiments, some or all of the plurality of lumens can comprise different sizes and shapes. In some embodiments, for example, the plurality of lumens can comprise a lumen sized and/or shaped to receive a guide wire and a lumen sized and/or shaped to receive a tool. The tubular member extends at least partially through a constricting mechanism. The constricting mechanism can be moved from a first configuration to a second configuration, and the constricting mechanism can collapse and/or seal the central lumen of the tubular member when the constricting mechanism is in the first configuration. The constricting mechanism creates the above-discussed robust seal of the tubular member and thus of the valve.

[0035] With reference now to **Figure 1**, a perspective view of one embodiment of a delivery system 100, also referred to herein as a delivery device 100, is shown. The delivery system 100 can include a catheter 102 and a garrote valve 104, also referred to herein as valve 104. The catheter 102 can comprise a shaft 106, also referred to herein as an elongate sheath 106, having a proximal end 108, also referred to herein as a first end 108, that can connect to the valve 104 and a distal end 110, also referred to herein as a second end 110. The shaft 106 can define a catheter lumen 112 extending from the proximal end 108 of the shaft 106 to the distal end 110 of the shaft 106. The catheter 102

and specifically the shaft 106 can comprise a variety of shapes and sizes and can be made from a variety of materials. In some embodiments, the catheter 102 can be flexible and/or can be made from a biocompatible material. The elongate sheath 106 can have an outer diameter of at least 4 French, at least 6 French, at least 8 French, at least 10 French, at least 12 French, at least 14 French, at least 18 French, at least 20 French, at least 22 French, between 4 French and 30 French, between 8 French and 24 French, between 12 French and 20 French, and/or any other or intermediate size.

[0036] The valve 104 can include an outer shell 114. The outer shell 114 can comprise a variety of shapes and sizes and can be made from a variety of materials. In some embodiments, the outer shell 114 can be made from one or several polymers or composites. The outer shell 114 can include features that allow interaction with and/or control of the valve 104 to move the valve 104 between the first configuration and the second configuration.

[0037] The outer shell 114 can include a proximal cap 116 located at a proximal end 118 of the outer shell 114 and a distal cap 120 located at a distal end 122 of the shell 114. The proximal cap 116 can include and/or house a proximal aperture 124, also referred to herein as a proximal channel 124, a first channel 124, or a first aperture 124, that extends through the proximal cap 116, and the distal cap 120 can include and/or house a distal aperture 126, also referred to herein as a distal channel 126, a second channel 126, or second aperture 126, that extends through the distal cap 120. As seen in Figure 1, the distal cap 120 connects to the shaft 106 of the catheter 102 at the distal end 122 of the valve 104.

[0038] The proximal cap 116 and the distal cap 120 are connected via a housing 128. The housing 128 can be a one-piece housing 128 or a multi-piece housing 128. In the embodiment depicted in Figure 1, the housing comprises a two-piece housing 128. The housing 128 can be configured to receive and couple with each of the proximal cap 116 and the distal cap 120, and as seen in Figure 1, the housing 128 is coupled with each of the proximal cap 116 and the distal cap 120 to secure the relative position of the proximal cap 116 and the distal cap 120 with respect to each other.

[0039] The housing 128 can define an interior channel 130 through which an elongate member 132, also referred to herein as a tubular member 132, a septum 132, or a tubular septum 132, can extend and connect the proximal cap 116 and the distal cap 120. The elongate member 132 can comprise a variety of shapes and sizes and can be made from a variety of materials. In some

embodiments, the elongate member 132 can comprise a compliant tubular structure that can be, for example, a thin-walled compliant tubular structure. The thin-walled structure of the elongate member 132 can facilitate the collapse, and specifically the uniform collapse of the elongate member 132 and the sealing of the elongate member 132. In some embodiments, the elongate member 132 is an elastic, resilient material that may comprise a polymer including either a natural or synthetic polymer. In some embodiments, the elongate member can comprise an elastic, resilient material that may comprise silicone, urethane, ethylene-vinyl acetate, natural or synthetic rubber or other elastomers known in the art. In some embodiments, the elongate member 132 can comprise a silicone tube.

[0040] The elongate member 132 can comprise a proximal end 134, also referred to herein as a first end 134, that can couple to the proximal cap 116, and a distal end 136, also referred to herein as a second end 136, that can couple to the distal cap 120. The elongate member 132 can define a central lumen 138 that can extend from the first end 134 to the second end 136 of the elongate member 132. The elongate member 132 can be coupled to the proximal cap 116 such that the central lumen 138 is fluidly coupled with the proximal aperture 124 of the proximal cap 116, and the elongate member 132 can be coupled to the distal cap 120 such that the central lumen 138, as seen in **Figure 2** and in **Figure 3**, is fluidly coupled with the distal aperture 126 of the distal cap 120.

[0041] The central lumen 138 of the elongate member 132 can be defined by a wall of the elongate member 132 that can have a thickness that is uniform along the length of the elongate member 132 between the first end 134 and the second end 136, or that is non-uniform along the length of the elongate member 132 between the first end 134 and the second end 136. In some embodiments, the wall can have a thickness that is approximately between 0.005 inches and 0.05 inches, and/or approximately between 0.010 inches and 0.030 inches. As used anywhere herein, "approximately" refers to a range of +/- 10% of the value and/or range of values for which "approximately" is used.

[0042] In some embodiments, the elongate member 132 can be cylindrically shaped, and specifically can be circular-cylindrically shaped. In some embodiments, the elongate member 132 can be dog-bone shaped to facilitate, for example, connection to each of the proximal cap 116 and the distal cap 120. In some embodiments, the elongate member 132 can include one or several outward-extending protuberances that engage with all or portions of a constricting mechanism 141, also referred to herein as a tensioning mechanism 141, of the valve 104 to secure a position of all or portions of the constricting mechanism 141 with respect to the elongate member 132. In some

embodiments, the constricting mechanism 141 can be self-adjusting to seal around tools of different sizes extending through the valve 104.

[0043] The constricting mechanism 141 can, in some embodiments, collapse and seal the elongate member 132 via compression and/or constriction, and specifically via constriction with at least one filament 150. The constricting mechanism 141 can comprise: an actuator 142 which can be a manual actuator such as one or several buttons 144; and the at least one filament 150 that can extend at least partially around the elongate member 132. In some embodiments, the use of the constricting mechanism 141 can facilitate sealing of the valve around tools or instruments of a wide range of sizes and/or diameters, and particularly around tools or instruments that fit through the elongate member 132.

[0044] The housing 128 can further include one or several retention features 140. The one or several retention features 140 of the housing can engage with and retain all or portions of the constricting mechanism 141 of the valve 104. In some embodiments, the one or several retention features 140 of the housing 128 can retain the actuator 142 and/or can couple the actuator 142 to the housing 128. The actuator 142 can comprise any desired type of actuator including, for example, a manual actuator and/or an automated actuator such as, for example, an electromechanical actuator including a solenoid-based actuator. In some embodiments, the actuator can comprise one or several buttons 144, and specifically, as depicted in Figure 1, the actuator 142 can comprise a first button 144-A and a second button 144-B. Alternatively, and as depicted in **Figure 5**, the actuator 142 can comprise a single button 144. In such an embodiment, the filament 150 can be coupled to the single button 144 and to a portion of the housing 128 such as, for example, to grip portion 500 of the housing 128 such that the movement of the single button 144 causes the sealing and/or opening of the elongate member 132 and of the valve 104.

[0045] The actuator 142 can be biased towards a configuration such as, for example, biased towards the first configuration or biased towards the second configuration. As depicted in Figure 2, which shows the constricting mechanism 141 in the first configuration, the actuator 142 can be biased towards the first configuration wherein the elongate member 132 is collapsed and/or sealed by a bias feature 146. In this first configuration, the buttons 144 can be in a first position, also referred to herein as an undepressed position. This bias feature 146 can, as shown in Figure 2, include a first spring 148-A configured to bias the first button 144-A towards the first position corresponding to the

first configuration of the constricting mechanism 141, and a second spring 148-B configured to bias the second button 144-B towards a first position corresponding to the first configuration of the constricting mechanism 141. One or both of the first spring 148-A and the second spring 148-B can comprise a tension spring, compression spring, a torsion spring, a coil spring, or any other desired type of spring.

[0046] In some embodiments, one or both of the first spring 148-A and the second spring 148-B can generate sufficient force so as to allow actuation of the actuator 142 with a single hand and so as to collapse and seal the elongate member 132 when the constricting mechanism 141 is in the first configuration. In some embodiments, one or both of the first spring 148-A and the second spring 148-B can generate a force of: at least 0.1 pounds, at least 0.2 pounds, at least 0.3 pounds, at least 0.4 pounds, at least 0.5 pounds, at least 0.6 pounds, at least 0.7 pounds, at least 0.8 pounds, at least 0.9 pounds, at least 1 pound, at least 1.5 pounds, at least 2 pounds, at least 3 pounds, at least 5 pounds, and/or at least 10 pounds and in some embodiments one or both of the first spring 148-A and the second spring 148-B can generate a force approximately between: 0.1 and 10 pounds, 0.1 and 5 pounds, 0.1 and 1.5 pounds, 0.2 and 1 pounds, and/or 0.4 and 0.8 pounds.

[0047] The constricting mechanism 141 can include at least one filament 150 that extends at least partially around the elongate member 132. In some embodiments, the at least one filament 150 can circumferentially constrict the elongate member 132 to collapse and seal the elongate member 132 when the constricting mechanism 141 is in the first configuration. The filament can be made from a variety of materials including, for example, a polymer, a synthetic, and/or a metal. In some embodiments, the filament 150 can be nylon, stainless steel, nitinol, silicone, or the like. In some embodiments, the filament can comprise a single strand such as, for example, a monofilament, and in some embodiments, the filament can comprise a plurality of strands that can be, for example, twisted, woven, grouped, and/or fused to form the filament. In some embodiments, the filament 150 can comprise one or several threads, lines, cords, rope, ribbon, flat wire, sheet, or tape.

[0048] The filament 150 can be coupled to the actuator 142 such that the filament 150 selectively constricts, collapses, and/or seals the elongate member 132, and specifically the central lumen 138 of the elongate member 132 based on the movement and/or position of the actuator 142. In some embodiments, the filament 150 can be connected to one or both of the buttons 144-A, 144-B such that the filament 150 collapses, constricts, and/or seals the elongate member 132 and specifically

the central lumen 138 of the elongate member 132 when the buttons 144-A, 144-B are in the first position, and the filament 150 can be connected to one or both of the buttons 144-A, 144-B such that the elongate member 132 and specifically the central lumen 138 of the elongate member 132 is open and uncollapsed when the buttons 144-A, 144-B are in the second position. In some embodiments in which the actuator 142 comprises a single button 144, as depicted in Figure 5, the filament 150 can be connected to the button 144 and to the housing 128 such that the filament 150 is tightened when the button 144 moves to the first position.

[0049] In some embodiments, the at least one filament 150 can extend along an axis 152 that can be perpendicular to a central axis 154 of the elongate member 132 and/or of the apertures 124, 126. In some embodiments, the axis 152 of the at least one filament 150 can intersect and be perpendicular to the central axis 154 of the elongate member 132 and/or of the apertures 124, 126. In some embodiments, the actuator 142, and specifically the buttons 144-A, 144-B can move along this axis 152 when moved from the first position to the second position.

[0050] In Figure 3, an embodiment of the valve 104 with the constricting mechanism 141 in the second configuration is shown. As specifically shown, both of the first and second buttons 144-A, 144-B are in the second position, depressed into the retention features 140 of the housing 128. In this second position, the filament 150 is loosened, thereby allowing the expansion of the elongate member 132 and the unsealing of the central lumen 138 of the elongate member 132.

[0051] As further seen in Figure 3, the proximal cap 116 has a proximal end 300 and a distal end 302. The proximal cap 116 can include a funnel portion 301 of the proximal aperture 124, which funnel portion 301 can facilitate insertion of a tool into the proximal aperture 124. The distal end 302 of the proximal cap 116 can partially extend into the interior channel 130 of the housing 128. The proximal cap 116 can include a mating feature 304 that can mate with the proximal end 134 of the elongate member 132. In some embodiments, the proximal end 134 of the elongate member 132 can fit over the mating feature 304 of the proximal cap 116. The proximal end 134 of the elongate member 132 can be compressed between the mating feature 304 of the elongate member 132 and a portion of the interior channel 130 of the housing 128 into which the mating feature 304 is inserted to thereby secure the proximal end 134 of the elongate member 132 on the mating feature 304. In some embodiments, the proximal end 134 of the elongate member 132 can be further secured on the mating feature 304 by a proximal O-ring 306 that can be compressed between the housing 128 and the mating

feature 304 of the proximal cap 116 to sealingly couple the elongate member 132 to the proximal cap 116.

[0052] The distal cap 120 has a proximal end 308 and a distal end 310. The distal cap can include a mating feature 312 located on the proximal end 308 of the distal cap 120, which mating feature 312 can mate with the distal end 136 of the elongate member 132. In some embodiments, the distal end 136 of the elongate member 132 can fit over the mating feature 312 of the distal cap 123. The distal end 136 of the elongate member 132 can be compressed between the mating feature 312 of the elongate member 132 and a portion of the interior channel 130 of the housing 128 into which the mating feature 312 is inserted to thereby secure the distal end 136 of the elongate member 132 on the mating feature 312. In some embodiments, the distal end 136 of the elongate member 132 can be further secured on the mating feature 312 by a distal O-ring 314 that can be compressed between the housing 128 and the mating feature 312 of the proximal cap 116 to sealingly couple the elongate member 132 to the distal cap 120.

[0053] The distal cap 120 can, in some embodiments, further include a side port barb 314 that can extend laterally away from the distal cap 120 and specifically away from the distal aperture 126 of the distal cap 120. The side port barb 314 can define a side port channel 316 that can extend through the side port barb 314 and fluidly connect to the distal aperture 126. In some embodiments, the side port barb 314 can include a securement feature 318 such as a barb that can secure coupling of a hose or tube to the side port barb 314.

[0054] In some embodiments, the side barb 314 can be used to apply a vacuum to the portions of the delivery device 100, and particularly to portions of the delivery device 100 that are distal of the axis 152 along which the elongate member 132 seals. This vacuum can be applied to aspirate a material through the delivery device 100, and specifically through the catheter 102 of the delivery device. This aspirated material can be a biological material including, for example, bodily fluids, multi-phase bodily materials that can include, for example, a fluidic portion and at least one solid portion, or the like.

[0055] In some embodiments, due to the narrowing shape of the elongate member 132 when the constricting mechanism 141 is in the first configuration, a vacuum applied to the portions of the delivery device 100 distal to the axis 152 draws the elongate member 132 towards the first configuration and can, in some embodiments, increase the strength, robustness, and/or strength of the

seal of the valve 104. This attribute of the valve 104 can provide benefits over other valve designs in which a vacuum can compromise the seal of the valve, and thus the ability to draw a vacuum and aspirate can be limited.

[0056] In some embodiments, the valve 104 can further include a reinforcement structure 320 that can extend along all or portions of the elongate member 132. The reinforcement structure 320 can facilitate the uniform collapse of the elongate member 132, can prevent the at least one filament 150 from cutting through and/or tearing the elongate member 132, and can assist in guiding one or several tools through the elongate member 132. The reinforcement structure 320 can be tubular, can extend along and around the elongate member 132, and can be positioned so as to be between the elongate member 132 and the at least one filament 150.

[0057] The reinforcement structure 320 can include a proximal end 322 and a distal end 324. In some embodiments, the reinforcement structure 320 extends along and around the elongate member 132, and is positioned such that the proximal end 322 of the reinforcement structure 320 is proximate to the first end 134 of the elongate member 132 and the distal end 324 of the reinforcement structure 320 is proximate to the second end 136 of the elongate member 132.

[0058] The reinforcement structure 320 can be coupled to the elongate member 132. In some embodiments, the reinforcement structure 320 is coupled to the elongate member 132 along the length of the reinforcement structure 320, and in some embodiments, the reinforcement structure 320 is coupled to the elongate member 132 and distinct positions along the length of the elongate member 132 and/or the reinforcement structure 320. In one embodiment, for example, the reinforcement structure 320 can be coupled to the elongate member 132 at one or both of the proximal end 322 of the reinforcement structure 320 and the distal end 324 of the reinforcement structure 320 and/or at one or both of the first end 134 and the second end 136 of the elongate member 132. In some embodiments, the reinforcement structure 320 can be coupled to the elongate member 132 via one or several other components of the valve 104. In some embodiments, the reinforcement structure 320 can be coupled to the elongate member 132 via the compression of the reinforcement structure 320 and the elongate member 132 between the housing 128 and one or both of the proximal 116 and the distal 120.

[0059] In some embodiments, the reinforcement structure 320 can be adhered to the elongate member 132 via, for example, an adhesive such as silicone adhesive. In some embodiments, the

adhesive can be circumferentially applied to the reinforcement structure 320 and/or the elongate member 132 in an adhesive ring that can, for example, a have a length approximately between: 0.010 inches and 0.5 inches; 0.02 and 0.4 inches; 0.050 inches and 0.0250 inches, or any other or intermediate range.

[0060] In one embodiment, each of the proximal end 322 and the distal end 324 of the reinforcement structure 320 can be adhered via an adhesive to the elongate member 132. In such an embodiment, the reinforcement structure 320 may be uncoupled to the elongate member 132 at positions other than the coupling at one or both of the proximal end 322 and the distal end 324 of the reinforcement structure 320, and thus the reinforcement structure 320 is uncoupled to the elongate member 132 at a position between the first end 134 and the second end 136 of the elongate member 134 and/or between the proximal end 322 and the distal end 324 of the reinforcement structure 320.

[0061] The lack of coupling of the reinforcement structure 320 to the elongate member 132 can facilitate and improve the collapse of the elongate member 132 around a tool 400, also referred to herein as instrument 400 or device 400, inserted through the valve 104 as shown in **Figure 4**. The tool 400 can be any device inserted through the valve 104 including, for example, one or several additional catheters, lines, wires, grippers, punches, cutters, or the like. As seen in Figure 4, the tool 400 is inserted through the valve 104 and specifically through the elongate member 132 of the valve. As shown, the constricting mechanism 141 is in the first configuration and the elongate member 132 and the central lumen 138 of the elongate member 132 is collapsed around the tool 400, and specifically around a shaft 402 of the tool 400 to thereby seal the valve 104 around the tool 400 and specifically around the shaft 402 of the tool 400. The constricting mechanism 141 can seal around tools 400 that fit through the elongate member 132, regardless of the size of the tool 400. Thus, the valve can be used with a wide variety of tools.

[0062] The reinforcement structure 320 can comprise a variety of designs, shapes, sizes, and materials. In some embodiments, the reinforcement structure 320 can be sized and shaped so as to receive elongate member 132 and to be positioned between the elongate member 132 and the at least one filament 150. In some embodiments, the reinforcement structure 320 can be made from a material sufficiently strong to prevent the cutting of the at least one filament 150 through the elongate member 132.

[0063] In some embodiments, the reinforcement structure can comprise a coil or a mesh sheath. The mesh sheath can, in some embodiments, comprise a braided mesh. The braided mesh can be made from any desired number of wires in any desired configuration. In some embodiments, the braided mesh can comprise a 4 wire braided mesh, an 8 wire braided mesh, a 12 wire braided mesh, a 16 wire braided mesh, a 20 wire braided mesh, a 24 wire braided mesh, a 32 wire braided mesh, a 48 wire braided mesh, a 64 wire braided mesh, a 72 wire braided mesh, an 80 wire braided mesh, a 96 wire braided mesh, or any other or intermediate braided mesh. In some embodiments, the braided mesh can comprise: a 1x1 configuration. In some embodiments, the wire in the braided mesh can be any desired material including, for example, a metal wire such as a nitinol wire or a stainless steel wire, a polymer wire, or a natural wire. In one embodiment, the braided mesh can comprise a 48 wire mesh in a 1x1 configuration made with a nitinol wire having a diameter of 0.003 inches.

[0064] With reference now to **Figures 6** through **9**, different embodiments and/or configurations of the filament 150 are shown. The filament 150 can comprise a single filament 150 having a first end 600 and a second end 602 as shown in Figure 6. The filament 150, and specifically which first and second ends 600, 602 can be coupled to the actuator 142 to move the filament 150 between the first and second configurations or positions and/or from the first configuration or position to the second configuration or position. In some embodiments, both of the first end 600 and the second end 602 can be coupled to a single button 144, in some embodiments, each of the first end 600 and the second end 602 can be coupled to different buttons 144, and in some embodiments, one of the first end 600 and the second end 602 can be coupled to a button 144 and the other of the first end 600 and the second end 602 can be coupled to the housing 128 or other portion of the valve 104.

[0065] In some embodiments, the filament 150 can comprise multiple filaments, and specifically, as shown in Figures 7 through 9, the filament 150 can comprise a first filament 150-A and a second filament 150-B. In embodiments in which the filament 150 comprises multiple filaments, each of the multiple filaments can have a first end 700 and a second end 702. The first and second filaments 150-A, 150-B can be coupled to the actuator 142. In such embodiments, the first and second ends 700, 702 can be coupled to the actuator 142 to move the filaments 150-A, 150-B between the first and second configurations and/or from the first configuration to the second configuration. In some embodiments, both of the first end 700 and the second end 702 of one or more of the multiple filaments 150 can be coupled to a single button 144, in some embodiments, each of

the first end 700 and the second end 702 of one or more of the multiple filaments 150 can be coupled to different buttons 144, and in some embodiments, one of the first end 700 and the second end 702 of one or more of the multiple filaments 150 can be coupled to one button 144 and the other of the first end 700 and the second end 702 of those one or more filaments 150 can be coupled to the housing 128 or other portion of the valve 104.

[0066] The filament 150 can be arranged in a variety of configurations. In some embodiments, the filament 150 can be configured to form a single loop 604 that can extend around the elongate member 132 and/or through which the elongate member 132 can be received as shown in Figure 6, and in some embodiments, the filament 150 can be configured to form multiple loops, and specifically a first loop 704 and a second loop 706 as shown in Figure 7. The first and second loops 704, 706 can each receive the elongate member 132. In some embodiments, a diameter or size of the loop 604, or of the loops 704, 706 can decrease when the constricting mechanism 141 is moved from the second configuration to the first configuration.

[0067] In some embodiments, the filament 150 can be configured to form a bight 800, which bight 800 can be a single bight or multiple bights. As used herein, a "bight" refers to a U-shaped section between the two ends of the filament 150. As depicted in Figures 8 and 9, the bight 800 can comprise multiple bights, and specifically a first bight 800-A and a second bight 800-B. In some embodiments, the first bight 800-A can extend through the second bight 800-B such that the first and second bights 800-A, 800-B interlock, whereas in other embodiments, the first and second bights 800-A, 800-B can be non-interlocking. Similarly, in embodiments containing the filament 150 having multiple loops, one or several of the multiple loops can be interlocking.

[0068] In some embodiments, the bight 800, and specifically one or both of the first bight 800-A and the second bight 800-B can be formed around a portion of the elongate member 132 and/or can extend around a portion of the elongate member 132. Each bight 800 can define a partially enclosed receiving area 808 wherein the elongate member 132 can be received. Thus, the first bight 800-A can define a first receiving area 808-A and the second bight 800-B can define a second receiving area 808-B.

[0069] As seen in Figures 8 and 9, multiple bights, and specifically the first and the second bights 800-A, 800-B can be positioned and oriented such that the first bight 800-A has a first orientation or first direction as indicated by arrow 810, and the second bight has a second orientation

or second direction as indicated by the arrow 812. In some embodiments, the first orientation is different from the second orientation such that the first and second receiving areas 808-A, 808-B overlap and define an encircled area 814, also referred to herein as a constricting area 814. The elongate member 132 can be received within the encircled area 814. In embodiments in which bights 800-A, 800-B overlap to define the encircled area 814, the movement of the constricting mechanism 141 to the first configuration can result in and/or include the first bight 800-A moving in the direction indicated by the arrow 810 and/or the second bight 800-B moving in the direction indicated by the arrow 812, which movement of the bights 800-A, 800-B decreases the size of the encircled area 814 and constricts, collapses, and/or seals the elongate member 132 extending through the encircled area 814.

[0070] The filament(s) 150 forming the bights 800 can each apply an arcuate line or narrow longitudinal zone of pressure to the elongate member 132. If the filament(s) are circular in cross-section, the zone of pressure can be very small, and can, in some embodiments, be less than the diameter or thickness of the filament. In some embodiments, the filaments have a diameter or width less than about 2.5mm, less than about 2mm, less than about 1.5mm, less than about 1.25mm, less than about 1mm, less than about 0.75mm, less than about 0.5mm, and/or less than about 0.25mm. In some embodiments, the filaments can have a diameter or width of between about 0.01mm and 2.5mm, between about 0.05mm and 2mm, between about 0.1mm and 1mm, and/or between about 0.125mm and 0.70mm. In some embodiments, the arcuate line or zone of pressure may form two opposing arcs and in other embodiments, the arcuate line of pressure may be a singular substantially circular line or zone that encircles the elongate member at least once. The longitudinal length of the of the line or zone of pressure may be very short compared to other valves known in the art. In some embodiments, the longitudinal length of the zone of pressure applied to the elongate member 132 by the filament(s) 150 may be less than about 2.0mm and in some embodiments less than about 0.5mm. In some embodiments, the filament(s) 150 can have any desired cross-sectional shape including, for example, a circular cross-section, a rectangular cross-section, an oval cross-section, a square cross-section, a polygonal cross-section, a triangular cross-section, or any other desired shape of cross-section.

[0071] With reference now to **Figure 10**, a flowchart illustrating one embodiment of a process 1000 for sealing a valve 104 and/or catheter 102 accessing a body of a patient is shown. The process 1000 can be performed using the valve 104 and/or the delivery system 100. The process 1000 begins

at block 1002, wherein the delivery device 100, and specifically the catheter 102 of the delivery device 100 is inserted into the body of the patient. In some embodiments, this can include inserting the catheter 102 into a portion of the circulator system of the patient such as, for example, a blood vessel including an artery or a venous vessel. In some embodiments, the delivery device 100 can be inserted into the body of the patient directly through an aperture or incision in the patient, and in some embodiments, the delivery device 100 can be inserted into the body of the patient via another catheter or device. In some embodiments, the constricting mechanism 141 can be in the first configuration while the delivery device 100 and/or the catheter 102 is inserted into the patient's body.

[0072] After the delivery device 100 is inserted into the body of the patient, the process 1000 proceeds to block 1004, wherein the constricting mechanism 141 is moved from the first configuration to the second configuration. As described above, the central lumen 138 of the elongate member 132 is unsealed when the constricting mechanism 141 is in the second configuration. In some embodiments, the moving of the constricting mechanism 141 from the first configuration to the second configuration can include the manipulation of the actuator 142 and/or the control of the actuator 142, and specifically the depressing of the one or several buttons 144 to move the filament 150 from the first position to the second position to allow the expansion and opening of the central lumen 138 of the elongate member 132.

[0073] After the constricting mechanism 141 is moved from the first configuration to the second configuration, the process 1000 proceeds to block 1006, wherein the tool 400, and specifically the shaft 402 of the tool 400 is advanced through the delivery device 100 and specifically through the valve 104 until a first end of the tool reaches a desired position within the body of the patient. In some embodiments, a portion of the shaft 402 can be positioned within the central lumen 138 of the elongate member 132 after the advancing of the tool 400 through the delivery device 100. In some embodiments, after the tool 400 is advanced through the delivery device 100, the desired procedure can be performed with the tool.

[0074] After the tool 400 is advanced through the delivery device 100, or while the tool 400 is being advanced through the delivery device 100, the process 1000 proceeds to block 1008, wherein the constricting mechanism 141 is returned to the first configuration. In some embodiments, the returning of the constricting mechanism 141 to the first configuration can include the release of the one or several buttons 144 and/or the control of the actuator 142 to reconfigure the constricting

mechanism 141 to the first configuration. In some embodiments, the return of the constricting mechanism 141 to the first configuration can result in the collapse and/or sealing of the elongate member 132 and specifically the central lumen 138 of the elongate member 132 around the tool 400 and specifically around the shaft 402 of the tool 400. The return of the constricting mechanism 141 to the first configuration, or the movement of the constricting mechanism 141 to the first configuration can include the decreasing of the size and/or diameter of one or several loops formed by the filament 150 and/or the movement of one or several bights 800 such as, for example, the movement of the first bight 800-A in the first direction indicated by arrow 810 and the movement of the second bight 800-B in the second direction indicated by arrow 812 to reduce the size of the constricting area 814. In some embodiments, after the constricting mechanism is returned to the first configuration, the desired procedure can be performed with the tool.

[0075] After the constricting mechanism is returned to the first configuration, the process 1000 proceeds to block 1010, wherein the tool 400, and specifically the shaft 402 of the tool 400 is retracted from the delivery device 100, and more specifically from the valve 104. In some embodiments, the valve 104 can remain sealed during the retracing of the tool 400 and/or the shaft 402 of the tool. In some embodiments, the valve 104 remains sealed during the retracting of the tool 400 and/or the retracting of the shaft 402 of the tool 400 as the constricting mechanism 141 can remain in the first configuration during the retracing of the tool 400 and/or the shaft 402 of the tool 400.

[0076] In some embodiments, the constricting mechanism 141 can be moved to the second configuration to allow the retraction of the tool 400 and/or the shaft 402 of the tool 400 from the valve 104, and the constricting mechanism 141 can be returned to the first configuration when the tool 400 and/or the shaft 402 of the tool 400 is removed from the valve 104. In some embodiments, the retraction of the tool 400 and/or shaft 402 of the tool 400 from the valve 104 can be performed with the constricting mechanism 141 left in the first configuration. In some embodiments, the constricting mechanism 141 can be moved to the second configuration, and then returned to the first configuration via the manipulation and/or control of the actuator 142, which manipulation and/or control of the actuator 142 can include the depressing of the one or several buttons 144 to move the constricting mechanism 141 to the second configuration, and the release of the one or several buttons 144 to return the constricting mechanism 141 to the first configuration. In some embodiments, if the procedure is

complete, the delivery device 100 can then be removed from the body of the patient, and any incision created for the procedure can be closed.

[0077] With reference now to Figure 11, a side view of one embodiment of a thrombectomy system 1100 including the delivery device 100 and a thrombus extraction device 1102 is shown. In some embodiments, the thrombectomy system 1100 can be used to access a blood vessel 1104 to treat and/or extract a thrombus 1106 from the blood vessel 1104. The thrombus extraction device 1102 can include a self-expanding coring element 206 and expandable cylindrical portion 208. In some embodiments, and as shown in Figure 11, the thrombus extraction device 1102 can be the tool 400 that can extend through the valve 104, and in some embodiments, the valve 104 can be a part of the thrombus extraction device 1102. Further details of thrombectomy systems, thrombus extraction devices, and methods of using the same are disclosed in: U.S. Application No. 15/268,296, filed September 16, 2016, and entitled "INTRAVASCULAR TREATMENT OF VASCULAR OCCLUSION AND ASSOCIATED DEVICES, SYSTEMS, AND METHODS"; U.S. Application No. 15/498,320, filed April 26, 2017, and entitled "DEVICES AND METHODS FOR TREATING VASCULAR OCCLUSION"; and U.S. Application No. 15/466,740, filed on March 22, 2017, and entitled "DEVICE AND METHOD FOR TREATING VASCULAR OCCLUSION", the entirety of each of which is hereby incorporated by reference herein.

[0078] With reference now to Figure 12, a side-section view of another embodiment of the hemostasis valve 104 having two piece caps 116, 120 is shown. The valve 104 can include a housing 128 defining an interior channel 130 through which the tubular member 132 can extend. The valve 104 can include the proximal cap 116 and the distal cap 120. In some embodiments, the proximal cap 116 can comprise a two piece cap and can include a proximal exterior member 1200 and a proximal channel member 1202. In some embodiments, the distal cap 120 can comprise a two-piece cap and can include a distal exterior member 1204 and a distal channel member 1206. In some embodiments, this coupling between the proximal exterior member 1200 and the proximal channel member 1202 and/or the coupling between the distal exterior member 1204 and the distal channel member 1206 can be a sealed coupling so as to prevent the leakage of material including fluid or gas between the respective ones of the proximal exterior member 1200 and the proximal channel member 1202 and/or the distal exterior member 1204 and the distal channel member 1206. In some embodiments, this sealing coupling can be achieved and/or maintained via a seal such as an O-ring

1208 that can be positioned between the proximal exterior member 1200 and the proximal channel member 1202 and/or between the distal exterior member 1204 and the distal channel member 1206.

[0079] In some embodiments, the proximal exterior member 1200 can be coupled, and in some embodiments, rotatingly coupled to the proximal channel member 1202 in a manner to allow the rotation of the proximal exterior member 1200 without rotating the proximal channel member 1202. Similarly, in some embodiments, the distal exterior member 1204 can be rotatingly coupled to the distal channel member 1206 in a manner to allow the rotation of the distal exterior member 1204 without the rotating of the distal channel member 1206. In some such embodiments, the channel members 1202, 1206 can be non-rotatable with respect to the housing 128 and/or the tubular member 132, and one or both of the exterior members 1200, 1204 can be rotatable with respect to the housing 128 and/or the tubular member 132. In such an embodiment, the maintaining of the rotational position of the channel members 1202, 1206 with respect to the housing 128 and/or the tubular member 132 can prevent the twisting of the tubular member 132 which can result in the sealing of the tubular member 132 regardless of the configuration of the constructing mechanism 141.

[0080] The exterior members 1200, 1204 can comprise a variety of shapes and sizes and can include a variety of features. In some embodiments, one or both of the exterior members 1200, 1204 can be coupled to, for example, a shaft similar to the shaft 106 shown in figure 1. In some embodiments, for example, the distal exterior member 1204 can be coupled to a shaft 106, including, for example, can be non-detachably coupled to the shaft 106. In some embodiments, one or both of the exterior members can include one or several features configured to facilitate coupling with the valve 104. These one or several features can include, for example, one or several male or female: connectors; couplers; attachment mechanisms; or the like. In some embodiments, these one or several features can facilitate use of the valve with other existing components, instruments, tools, or the like. In some embodiments, for example, one or both of the exterior members 1200, 1204 can comprise either a male or female luer fitting, and specifically as shown in Figure 12, the distal exterior member 1204 can comprise a male luer fitting 1210.

[0081] Several aspects of the present technology are set forth in the following examples.

1. A hemostatic valve for sealing a medical device, the hemostatic valve comprising:

an elongate member having a first end, a second end, and a central lumen extending therebetween, wherein the elongate member is pliable;

a reinforcement structure extending along at least a portion of the elongate member, wherein the reinforcement structure is coupled to the elongate member; and

an active tensioning mechanism coupled to the elongate member, wherein the tensioning mechanism is moveable between a first configuration wherein the central lumen is constricted and sealed and a second configuration wherein the central lumen is open.

2. The hemostatic valve of example 1, wherein the elongate member comprises a compliant polymer tube.

3. The hemostatic valve of example 1 or 2, wherein the tensioning mechanism comprises at least one filament extending at least partially around the elongate member.

4. The hemostatic valve of example 3, wherein the reinforcement structure is positioned between the at least one filament and the elongate member.

5. The hemostatic valve of example 4, wherein the reinforcement structure comprises a braided mesh.

6. The hemostatic valve of example 4 or 5, wherein the reinforcement structure is coupled to the elongate member at a position proximate to the first end of the elongate member and at a position proximate to the second end of the elongate member.

7. The hemostatic valve of example 6, wherein the reinforcement structure is not coupled to the elongate member at a position between the first end of the elongate member and the second end of the elongate member.

8. The hemostatic valve of any one of examples 3–7, wherein the tensioning mechanism comprises an actuator coupled to the at least one filament, wherein the actuator is moveable to control

movement of the at least one filament from a first position wherein the central lumen is constricted and sealed to a second position wherein the central lumen is open, wherein the at least one filament is in the first position when the tensioning mechanism is in the first configuration.

9. The hemostatic valve of example 8, wherein the actuator is biased towards the first position.

10. The hemostatic valve of example 8 or 9, wherein the actuator is biased toward the second position.

11. The hemostatic valve of any one of examples 8–10, wherein the actuator comprises a manual actuator.

12. The hemostatic valve of any one of examples 8–11, wherein the at least one filament forms a loop around the elongate member.

13. The hemostatic valve of any one of examples 8–12, wherein the at least one filament forms a bight around a portion of the elongate member.

14. The hemostatic valve of any one of examples 8–13, wherein the at least one filament comprises a first filament and a second filament, wherein each of the first filament and the second filament are coupled to the actuator, and wherein the first filament and the second filament are moveable from the first position to the second position.

15. The hemostatic valve of example 14, wherein each of the first filament and the second filament form a loop around the elongate member.

16. The hemostatic valve of example 14 or 15, wherein the first filament forms a first bight around a first portion of the elongate member, and wherein the second filament forms a second bight around a second portion of the elongate member.

17. The hemostatic valve of example 16, wherein the first bight extends through the second bight.

18. The hemostatic valve of any one of examples 1–17, further comprising a shell defining a first aperture and a second aperture, wherein the elongate member extends from the first aperture to the second aperture and fluidly couples the first aperture and the second aperture.

19. The hemostatic valve of any one of examples 1–18, wherein the tensioning mechanism is self-adjustable to seal around tools of different sizes extending through the hemostatic valve.

20. The hemostatic valve of any one of examples 1–19, wherein the central lumen comprises a single lumen.

21. The hemostatic valve of any one of examples 1–20, wherein the central lumen comprises a plurality of lumens.

22. A delivery system for intravascular access of a blood vessel within a patient's body, the delivery system comprising:

a catheter having a first end, a second end, and a catheter lumen extending therebetween;

a hemostatic valve coupled to the first end of the catheter, the hemostatic valve comprising:

a tubular member having a first end, a second end, and a central lumen extending therebetween, wherein the central lumen of the tubular member is fluidly coupled with the catheter lumen; and

an active tensioning mechanism coupled to the tubular member, the tensioning mechanism moveable between a first configuration wherein the tensioning mechanism constricts on the central lumen and the central lumen is sealed and a second configuration wherein the central lumen is open.

23. The delivery system of example 22, wherein the hemostatic valve further comprises a reinforcement structure extending along at least a portion of the tubular member.

24. The delivery system of example 22 or 23, wherein the reinforcement structure is located between the tensioning mechanism and the tubular member.

25. The delivery system of example 24, wherein the reinforcement structure comprises a braided mesh.

26. The delivery system of example 24 or 25, wherein the reinforcement structure is coupled to the tubular member at a position proximate to the first end of the tubular member and at a position proximate to the second end of the tubular member.

27. The delivery system of example 26, wherein the reinforcement structure is adhered to the tubular member at the first end of the tubular member and at the second end of the tubular member.

28. The delivery system of example 27, wherein the reinforcement structure is uncoupled to the tubular member between the first end of the tubular member and the second end of the tubular member.

29. The delivery system of any one of examples 22–28, wherein the tensioning mechanism comprises at least one filament extending at least partially around the tubular member.

30. The delivery system of example 29, wherein the tensioning mechanism comprises an actuator coupled to the at least one filament, wherein moving the tensioning mechanism from the first configuration to the second configuration comprises moving the actuator and the thereto coupled at least one filament from a first position to a second position, wherein the filament constricts and seals the central lumen of the tubular member when the filament is in the first position.

31. The delivery system of example 30, wherein the actuator comprises a manual actuator.

32. The delivery system of example 31, wherein the actuator comprises a pair of opposing and depressable buttons, wherein the buttons are biased towards an undepressed position.

33. The delivery system of example 31 or 32, wherein the central lumen is sealed when the buttons are in the undepressed position.

34. The delivery system of any one of examples 30–33, wherein the filament comprises a monofilament.

35. The delivery system of any one of examples 30–34, wherein the filament comprises at least one of: a polymer filament; or a metallic filament.

36. The delivery system of any one of examples 22–35, wherein the catheter comprises a thrombus extraction device.

37. A method of sealing a delivery device accessing a blood vessel of a patient, the method comprising:

inserting the delivery device comprising a catheter and a hemostatic valve into the blood vessel of the patient, the catheter having a first end, a second end, and a catheter lumen extending therethrough, and the hemostatic valve coupled to the first end and having a tubular member defining a central lumen fluidly coupled with the catheter lumen and a tensioning mechanism coupled with the tubular member, wherein the tensioning mechanism collapses and seals the central lumen in a first configuration and thereby seals access to the blood vessel;

moving the tensioning mechanism of the hemostatic valve to a second configuration, wherein the central lumen is open and access to the blood vessel is unsealed when the tensioning mechanism is in the second configuration;

advancing a shaft of a tool through the delivery device until a first end of the tool reaches a desired position within the blood vessel of the patient and a portion of the shaft is positioned within the central lumen of the tubular member; and

returning the tensioning mechanism of the hemostatic valve to the first configuration such that the tubular member collapses on the shaft of the tool and seals around the shaft of the tool.

38. The method of example 37, further comprising retracting the shaft of the tool from the delivery device.

39. The method of example 38, wherein the tensioning mechanism is maintained in the first configuration during and after the retracting of the shaft of the tool from the delivery device.

40. The method of example 38 or 39, wherein the tensioning mechanism is moved to the second configuration during the retracting of the shaft of the tool from the delivery device, and wherein the tensioning mechanism is returned to the first configuration after the shaft of the tool is retracted from the delivery device.

41. The method of any one of examples 37–40, wherein the tensioning mechanism comprises at least one filament extending at least partially around the tubular member, wherein the at least one filament collapses the tubular member when the tensioning mechanism is in the first configuration.

42. The method of example 41, wherein the at least one filament circumferentially constricts the tubular member to collapse the tubular member when the tensioning mechanism is in the first configuration.

43. The method of example 41 or 42, wherein the hemostatic valve comprises a reinforcement structure located between the at least one filament and the tubular member.

44. The method of any one of examples 41–43, wherein the at least one filament forms a loop around the elongate member, and wherein moving the tensioning mechanism from the second configuration to the first configuration reduces a size of the loop to thereby constrict the tubular member within the loop.

45. The method of any one of examples 41–44, wherein the filament forms at least one bight around a portion of the elongate member.

46. The method of example 45, wherein the filament comprises a first filament and a second filament, and wherein the at least one bight comprises a first bight oriented in a first direction and formed by the first filament and a second bight oriented in a second direction and formed by the second filament, wherein the first and second bights overlap to encircle a portion of the tubular member within an constricting area.

47. The method of example 46, wherein moving the tensioning mechanism from the second configuration to the first configuration comprises moving the first bight in the first direction and the second bight in the direction to reduce the size of the constricting area and collapse and seal the central lumen of the tubular member.

48. The method of any one of examples 37–47, wherein the tensioning mechanism comprises an actuator, and wherein moving the tensioning mechanism to the second configuration comprises manipulating the actuator.

49. The method of any one of examples 37–48, further comprising applying a vacuum to the delivery device to aspirate material through the catheter, wherein the central lumen remains sealed during the aspiration.

50. The method of any one of examples 37–49, wherein the tool comprises a thrombus extraction device.

51. A hemostatic valve for sealing a medical device, the hemostatic valve comprising:

an elongate member having a first end, a second end, and a central lumen comprising a plurality of lumens extending therebetween, wherein the elongate member is pliable; and

an active tensioning mechanism coupled to the elongate member, wherein the tensioning mechanism is moveable between a first configuration wherein the central lumen is constricted and sealed and a second configuration wherein the central lumen is open.

[0082] Other variations are within the spirit of the present invention. Thus, while the invention is susceptible to various modifications and alternative constructions, certain illustrated embodiments thereof are shown in the drawings and have been described above in detail. It should be understood, however, that there is no intention to limit the invention to the specific form or forms disclosed, but on the contrary, the intention is to cover all modifications, alternative constructions, and equivalents falling within the spirit and scope of the invention, as defined in the appended claims.

[0083] In the previous description, various embodiments of the present invention are described. For purposes of explanation, specific configurations and details are set forth in order to provide a thorough understanding of the embodiments. However, it will also be apparent to one skilled in the art that the present invention may be practiced without the specific details. Furthermore, well-known features may be omitted or simplified in order not to obscure the embodiment being described.

[0084] The use of the terms "a" and "an" and "the" and similar referents in the context of describing the invention (especially in the context of the following claims) are to be construed to cover both the singular and the plural, unless otherwise indicated herein or clearly contradicted by context. The terms "comprising," "having," "including," and "containing" are to be construed as open-ended terms (i.e., meaning "including, but not limited to,") unless otherwise noted. The term "connected" is to be construed as partly or wholly contained within, attached to, or joined together, even if there is something intervening. Recitation of ranges of values herein are merely intended to serve as a shorthand method of referring individually to each separate value falling within the range, unless otherwise indicated herein, and each separate value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g., "such as") provided herein, is intended merely to better illuminate embodiments of the invention and does not pose a limitation on the scope of the invention unless otherwise claimed. No language in the specification should be construed as indicating any non-claimed element as essential to the practice of the invention.

[0085] Preferred embodiments of this invention are described herein, including the best mode known to the inventors for carrying out the invention. Variations of those preferred embodiments may become apparent to those of ordinary skill in the art upon reading the foregoing description. The inventors expect skilled artisans to employ such variations as appropriate, and the inventors intend

for the invention to be practiced otherwise than as specifically described herein. Accordingly, this invention includes all modifications and equivalents of the subject matter recited in the claims appended hereto as permitted by applicable law. Moreover, any combination of the above-described elements in all possible variations thereof is encompassed by the invention unless otherwise indicated herein or otherwise clearly contradicted by context.

[0086] All references, including publications, patent applications, and patents, cited herein are hereby incorporated by reference to the same extent as if each reference were individually and specifically indicated to be incorporated by reference and were set forth in its entirety herein.

WHAT IS CLAIMED IS:

1. A valve assembly, comprising:

a tubular member defining a lumen;

a first filament extending in a first loop around the tubular member, wherein the first filament is flexible;

a second filament extending in a second loop around the tubular member, wherein the second filament is flexible;

a pair of actuators movable from a first position to a second position, wherein—

the first filament includes a first portion operably acted upon by a first one of the actuators and a second portion operably acted upon by a second one of the actuators;

the second filament includes a first portion operably acted upon by the first one of the actuators and a second portion operably acted upon by the second one of the actuators;

in the first position, the actuators are positioned to tension the first filament and the second filament thereby decreasing a dimension of the first loop and a dimension of the second loop to constrict the lumen of the tubular member;

in the second position, the actuators are positioned to loosen the first filament and the second filament thereby permitting the tubular member to expand against the first loop and the second loop to increase the dimension of the first loop and the dimension of the second loop to at least partially open the lumen of the tubular member; and

the actuators are biased to the first position.

2. The valve assembly of claim 1 wherein the first loop extends completely around the tubular member, and wherein the second loop extends completely around the tubular member.

3. The valve assembly of claim 1 wherein the first portion of the first filament is a first end portion of the first filament, wherein the second portion of the first filament is a second end portion of the first filament, wherein the first portion of the second filament is a first end portion of

the second filament, and wherein the second portion of the second filament is a second end portion of the second filament.

4. The valve assembly of claim 3 wherein the first end portion of first filament is directly attached to the first one of the actuators, wherein the second end portion of the first filament is directly attached to the second one of the actuators, wherein the first end portion of the second filament is directly attached to the first one of the actuators, and wherein the second end portion of the second filament is directly attached to the second one of the actuators.

5. The valve assembly of claim 1 wherein the tubular member extends along a longitudinal axis, and wherein the first loop is proximate to the second loop along the longitudinal axis.

6. The valve assembly of claim 1 wherein the first filament and the second filament each comprise a plurality of strands woven together.

7. The valve assembly of claim 1 wherein the tubular member is elastically deformable.

8. The valve assembly of claim 1 wherein the tubular member is configured to resiliently expand.

9. The valve assembly of claim 1, further comprising a rigid housing, wherein the tubular member, the first filament, and the second filament are positioned within the housing, and wherein the actuators are movably coupled to the housing.

10. The valve assembly of claim 1 wherein the actuators are depressed toward one another in the second position, and wherein the actuators are moved away from one another in the first position.

11. The valve assembly of claim 1 wherein, in the second position, the tubular member has a diameter of at least 14 French.

12. The valve assembly of claim 1 wherein, in the second position, the tubular member has a diameter of at least 16 French.

13. The valve assembly of claim 1 wherein, in the second position, the tubular member has a diameter of at least 20 French.

14. The valve assembly of claim 1 wherein, in the second position, the tubular member has a diameter of at least 24 French.

15. A valve assembly, comprising:

a tubular member defining a lumen, wherein the tubular member is elastically deformable from a first position in which the lumen is constricted to a second position in which the lumen is at least partially open;

a first actuator;

a second actuator;

a first filament configured in a first loop completely around the tubular member and having a first portion extending from the first loop toward the first actuator and a second portion extending from the first loop toward the second actuator; and

a second filament configured in a second loop completely around the tubular member and having a first portion extending from the second loop toward the first actuator and a second portion extending from the second loop toward the second actuator;

wherein—

the first actuator and the second actuator are biased away from one another to elastically deform the tubular member to the first position by (a) increasing a tension in the first filament to decrease a dimension of the first loop and (b) increasing a tension in the second filament to decrease a dimension of the second loop; and

the first actuator and the second actuator are movable toward one another to permit the tubular member to return to the second position by (a) decreasing the tension in the first filament and (b) decreasing the tension in the second filament.

16. The valve assembly of claim 15 wherein the first actuator and the second actuator each comprise a button.

17. The valve assembly of claim 15 wherein the first filament is flexible, and wherein the second filament is flexible.

18. The valve assembly of claim 15 wherein the first portion of first filament is directly attached to the first actuator, wherein the second portion of the first filament is directly attached to the second actuator, wherein the first portion of the second filament is directly attached to the first actuator, and wherein the second portion of the second filament is directly attached to the second actuator.

19. The valve assembly of claim 15 wherein the tubular member extends along a longitudinal axis, wherein the first portion of the first filament extends toward the first actuator along a first axis extending generally orthogonal to the longitudinal axis proximate the tubular member, wherein the second portion of the first filament extends toward the second actuator along a second axis extending generally orthogonal to the longitudinal axis proximate the tubular member, wherein the first portion of the second filament extends toward the first actuator along a third axis extending generally orthogonal to the longitudinal axis proximate the tubular member, wherein the second portion of the second filament extends toward the second actuator along a fourth axis extending generally orthogonal to the longitudinal axis proximate the tubular member, wherein the second axis is positioned between the first axis and the fourth axis, and wherein the fourth axis is positioned between the second axis and the third axis.

20. The valve assembly of claim 15 wherein, in the second position, the tubular member has a diameter of at least 16 French.

21. The valve assembly of claim 15 wherein, in the second position, the tubular member has a diameter of at least 20 French.

22. The valve assembly of claim 15 wherein, in the second position, the tubular member has a diameter of at least 24 French.

23. A valve assembly, comprising:

a tubular member defining a lumen;

a first filament extending in a first loop around the tubular member;

a second filament extending in a second loop around the tubular member; and

a pair of actuators biased to circumferentially constrict the first loop and the second loop to elastically deform the tubular member to a first position in which the lumen is constricted, wherein at least one the actuators is movable to decrease a level of tension in the first filament and a level of tension in the second filament to permit the tubular member to expand against the first loop and the second loop to a second position in which the lumen of the tubular member is at least partially open.

24. The valve assembly of claim 23 wherein the actuators each comprise a button.

25. The valve assembly of claim 23 wherein the first filament includes a first portion operably coupled to a first one of the actuators and a second portion operably coupled to a second one of the actuators, and wherein the second filament includes a first portion operably coupled to the first one of the actuators and a second portion operably coupled to the second one of the actuators.

26. The valve assembly of claim 25 wherein the first portion of first filament is directly attached to the first one of the actuators, wherein the second portion of the first filament is directly attached to the second one of the actuators, wherein the first portion of the second filament is directly attached to the first one of the actuators, and wherein the second portion of the second filament is directly attached to the second one of the actuators.

27. The valve assembly of claim 23 wherein the first filament is flexible, and wherein the second filament is flexible.

28. The valve assembly of claim 23 wherein, in the second position, the tubular member has a diameter of at least 16 French.

29. The valve assembly of claim 23 wherein, in the second position, the tubular member has a diameter of at least 20 French.

30. The valve assembly of claim 23 wherein, in the second position, the tubular member has a diameter of at least 24 French.

ABSTRACT OF THE DISCLOSURE

Devices, systems, and methods for sealing medical devices, particularly during intravascular access, are disclosed herein. Some aspects relate to a hemostatic valve for sealing a wide range of medical devices, such as catheters, wires, embolectomy systems. The valve can include an elongate member having a first end, a second end, and a central lumen extending therebetween. A reinforcement structure extends along at least a portion of the elongate member and is coupled to the elongate member. A shell defining a first aperture and a second aperture may be included, which first and second apertures can be fluidly coupled by the elongate member. A tensioning mechanism is coupled to the shell and to the elongate member, the tensioning mechanism can be moveable between a first configuration wherein the tensioning mechanism is collapsed and the central lumen is sealed and a second configuration wherein the central lumen is open.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	HEMOSTASIS VALVES AND METHODS OF USE

As the below named inventor, I hereby declare that:

This declaration is directed to:

[ ] The attached application, or

[x] United States application or PCT international application number 16/117,519

filed on August 30, 2018.

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.

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LEGAL NAME OF INVENTOR

Inventor: Benjamin E. Merritt Date: 8/31/18

Signature: _____

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LEGAL NAME OF INVENTOR

Inventor: John C. Thress Date: 8/31/18

Signature: _____

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LEGAL NAME OF INVENTOR

Inventor: Paul Lubock Date: September 14, 2018

Signature:

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Signature		Date (Optional)	10 Dec 2021
Name	Brian Strauss		
Title	Vice President, Inari Medical, Inc.		

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Application Number	Not Yet Assigned
Filing Date	Concurrently Herewith
First Named Inventor	Benjamin E. Merritt
Title	HEMOSTASIS VALVES AND METHODS OF USE
Art Unit	Not Yet Assigned
Examiner Name	Not Yet Assigned
Attorney Docket Number	111552.8016.US07

SIGNATURE of Applicant or Patent Practitioner

Signature	/Matthew S. Williams/	Date (Optional)	2024-03-07
Name	Matthew S. Williams	Registration Number	77,516
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Applicant Name (if Applicant is a juristic entity)	Inari Medical, Inc.		

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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
18/598,482	**03/07/2024 03:09:08 PM Z ET**	**111552.8016.US07**

Title of Invention

HEMOSTASIS VALVES AND METHODS OF USE

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	3249	FILED BY	JiYoung Anderson
PATENT CENTER #	64593384	AUTHORIZED BY	Matthew Williams
CUSTOMER #	25096	FILING DATE	-
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Benjamin E. Merritt

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 5111	**E202437F09445307**	**JiYoung Anderson**

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	10	1000.00

TOTAL AMOUNT:	**$7,160.00**

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

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New International Application Filed with the USPTO as a Receiving Office

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Benjamin E. Merritt et al.

Application No.: Not Yet Assigned	Confirmation No.: NA
Filed: Concurrently Herewith	Art Unit: Not Yet Known
For: HEMOSTASIS VALVES AND METHODS OF USE	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: March 7, 2024

Respectfully submitted,

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HEMOSTASIS VALVES AND METHODS OF USE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of U.S. Patent Application No. 18/515,079, filed on November 20, 2023, titled "HEMOSTASIS VALVES AND METHODS OF USE," which is a continuation of U.S. Patent Application No. 17/226,318, filed on April 9, 2021, issued as U.S. Patent No. 11,844,921, and titled "HEMOSTASIS VALVES AND METHODS OF USE," which is a continuation of U.S. Patent Application No. 16/117,519, filed on August 30, 2018, now issued as U.S. Patent No. 11,000,682, and titled "HEMOSTASIS VALVES AND METHODS OF USE," which claims the benefit of U.S. Provisional Patent Application No. 62/554,931, filed on September 6, 2017, and titled "HEMOSTASIS VALVES AND METHODS OF USE," each of which is incorporated by reference herein in its entirety.

BACKGROUND

[0002] During a surgical procedure, a portion of a patient's body (e.g., vasculature) is accessed to allow for performance of a desired intervention or treatment. During such surgical procedures, it is desired to minimize patient blood loss, prevent delivery of air into the vasculature, and to maintain the sterility of the accessed portions or sites of the patient's body so as to prevent issues such as infection. Further, the desire for improved patient outcomes has led to the development of hemostasis valves that facilitate minimally invasive surgery.

[0003] In minimally invasive surgery, small incisions are created through a blood vessel which one or several catheters are inserted. Each of these one or several catheters can define a lumen extending longitudinally through that catheter. These catheters are moved to a position proximate to tissue, nerves, or other body structures targeted by the surgery, and then tools for performing the procedure are inserted through the lumens of some or all of these catheters.

[0004] To minimize blood loss, prevent delivery of air into the vasculature, and to facilitate maintenance of sterility within the patient's body (e.g., blood vessel), these catheters are equipped with hemostasis valves. These valves seal or selectably seal the lumens of the catheters. In many instances, these valves can seal the lumen of the catheter when a tool extends through the catheter,

and specifically through the valve. Additionally the valves can seal the lumen when a tool is removed or does not extend through the catheter.

[0005] While such traditional hemostasis valves are greatly beneficial for intravascular access, they have some drawbacks. For example, some valves may not seal adequately for all interventional applications or tools, and/or the operation of some valves may be complicated for operator use. The drawbacks of such valve designs may in turn increase the complexity of any surgery performed therewith and/or reduce patient safety (e.g., bleeding, infection, and/or other detrimental complications). Accordingly, new and improved hemostasis valves and methods of use are desired.

SUMMARY

[0006] The following relates to valves, medical systems incorporating valves, and methods of using the same. The valve can include a tubular member that can be constricted, collapsed, and/or sealed by one or several tensioning mechanisms. The tensioning mechanism can include at least one filament that extends around at least a portion of the tubular member. The filament can interact with the tubular member to constrict, collapse, and/or seal the tubular member via manipulation of the tensioning mechanism(s). A tool can be inserted through the valve to gain access to a patient's body and specifically to gain access to a blood vessel. Through the use of the tensioning mechanism and filament to constrict, collapse, and/or seal the tubular member, the valve can seal around a wide range of tool sizes and shapes, as well as multiple tools of differing sizes simultaneously. Additionally, such a valve creates a robust seal that maintains its seal when a vacuum is applied such as occurs during aspiration.

[0007] Aspects of the present disclosure relate to a hemostatic valve for sealing a medical device. The hemostatic valve includes an elongate member having a first end, a second end, and a central lumen extending therebetween. In some embodiments, the elongate member is pliable. The hemostatic valve can include a reinforcement structure extending along at least a portion of the elongate member, such that the reinforcement structure is coupled to the elongate member. The hemostatic valve includes an active tensioning mechanism coupled to the elongate member. In some embodiments, the tensioning mechanism is moveable between a first configuration in which the central lumen is constricted and sealed and a second configuration in which the central lumen is open. Optionally, the valve may be manually adjusted by the user to intermediate positions between fully

open and fully closed. Additionally, an instrument (e.g. catheter) may provide an intermediate position where the valve creates hemostasis without user adjustment.

[0008] In some embodiments, the elongate member can be a compliant polymer tube. In some embodiments, the tensioning mechanism can include at least one filament extending at least partially around the elongate member. In some embodiments, the reinforcement structure is positioned between the at least one filament and the elongate member. In some embodiments, the reinforcement structure can be a braided mesh. In some embodiments, the reinforcement structure is coupled to the elongate member at a position proximate to the first end of the elongate member and at a position proximate to the second end of the elongate member. In some embodiments, the reinforcement structure is not coupled to the elongate member at a position between the first end of the elongate member and the second end of the elongate member. In some embodiments, the central portion of the compliant polymer tube that is constrained or collapsed by the tensioning mechanism, and at least one filament, is not coupled to the reinforcement structure.

[0009] In some embodiments, the tensioning mechanism can include an actuator coupled to the at least one filament. In some embodiments there are two tensioning mechanisms coupled to the at least one filament that operate in opposite directions. In some embodiments the two tensioning mechanisms are attached to the same filament. In some embodiments the two tensioning mechanisms are attached to opposing filaments. In some embodiments, the actuator can be moveable to control movement of the at least one filament from a first position in which the central lumen is constricted and sealed to a second position in which the central lumen is open. In some embodiments, the at least one filament is in the first position when the tensioning mechanism is in the first configuration. In some embodiments, the actuator is biased towards the first position. In some embodiments, the actuator is biased toward the second position. In some embodiments, the actuator can be a manual actuator.

[0010] In some embodiments, the at least one filament forms a loop around the elongate member. In some embodiments, the at least one filament forms a bight around a portion of the elongate member. In some embodiments, the at least one filament can include a first filament and a second filament. In some embodiments, each of the first filament and the second filament are coupled to the same actuator. In some embodiments, each of the first filament and the second filament are coupled to different actuators. In some embodiments, the first filament and the second filament are

moveable from the first position to the second position. In some embodiments, each of the first filament and the second filament form a loop around the elongate member. In some embodiments, the first filament forms a first bight around a first portion of the elongate member, and the second filament forms a second bight around a second portion of the elongate member. In some embodiments, the first bight extends through the second bight.

[0011] In some embodiments, the hemostatic valve can include a shell defining a first aperture and a second aperture. In some embodiments, the elongate member extends from the first aperture to the second aperture and fluidly couples the first aperture and the second aperture. In some embodiments, the tensioning mechanism is self-adjustable to seal around tools of different sizes extending through the hemostatic valve. In some embodiments, the central lumen can comprise a single lumen, and in some embodiments, the central lumen can comprise a plurality of lumens.

[0012] One aspect of the present disclosure relates to a delivery system for intravascular access of a blood vessel within a patient's body. The delivery system includes a catheter having a first end, a second end, and a catheter lumen extending therebetween and a hemostatic valve coupled to the first end of the catheter. The hemostatic valve includes a tubular member having a first end, a second end, and a central lumen extending therebetween. In some embodiments, the central lumen of the tubular member is fluidly coupled with the catheter lumen. The hemostatic valve includes an active tensioning mechanism coupled to the tubular member, the tensioning mechanism can be moveable between a first configuration in which the tensioning mechanism constricts on the central lumen and the central lumen is sealed and a second configuration in which the central lumen is open.

[0013] In some embodiments, the hemostatic valve further includes a reinforcement structure extending along at least a portion of the tubular member. In some embodiments, the reinforcement structure is located between the tensioning mechanism and the tubular member. In some embodiments, the reinforcement structure can be a braided mesh. In some embodiments, the reinforcement structure is coupled to the tubular member at a position proximate to the first end of the tubular member and at a position proximate to the second end of the tubular member. In some embodiments, the reinforcement structure is adhered to the tubular member at the first end of the tubular member and at the second end of the tubular member. In some embodiments, the reinforcement structure is uncoupled to the tubular member between the first end of the tubular member and the second end of the tubular member.

[0014] In some embodiments, the tensioning mechanism can include at least one filament extending at least partially around the tubular member. In some embodiments, the tensioning mechanism can include an actuator coupled to the at least one filament. In some embodiments, moving the tensioning mechanism from the first configuration to the second configuration can include moving the actuator and the thereto coupled at least one filament from a first position to a second position. In some embodiments, the filament constricts and seals the central lumen of the tubular member when the filament is in the first position.

[0015] In some embodiments, the actuator can be a manual actuator. In some embodiments, the actuator can include a pair of opposing and depressable buttons, which buttons can be biased towards an undepressed position. In some embodiments, the central lumen is sealed when the buttons are in the undepressed position. In some embodiments, the filament can be a monofilament. In some embodiments, the filament can be at least one of: a polymer filament; or a metallic filament. In some embodiments, the catheter can include a thrombus extraction device.

[0016] One aspect of the present disclosure relates to a method of sealing a delivery device accessing a blood vessel of a patient. The method includes inserting the delivery device including a catheter and a hemostatic valve into the blood vessel of the patient. In some embodiments, the catheter can have a first end, a second end, and a catheter lumen extending therethrough. In some embodiments, the hemostatic valve can be coupled to the first end and can have a tubular member defining a central lumen fluidly coupled with the catheter lumen and a tensioning mechanism coupled with the tubular member. In some embodiments, the tensioning mechanism collapses and seals the central lumen in a first configuration and thereby seals access to the blood vessel. The method can include moving the tensioning mechanism of the hemostatic valve to a second configuration. In some embodiments, the central lumen is open and access to the blood vessel is unsealed when the tensioning mechanism is in the second configuration. The method can include advancing a shaft of a tool through the delivery device until a first end of the tool reaches a desired position within the blood vessel of the patient and a portion of the shaft is positioned within the central lumen of the tubular member. The method can include returning the tensioning mechanism of the hemostatic valve to the first configuration such that the tubular member collapses on the shaft of the tool and seals around the shaft of the tool.

[0017] In some embodiments, the method includes retracting the shaft of the tool from the delivery device. In some embodiments, the tensioning mechanism is maintained in the first configuration during and after the retracting of the shaft of the tool from the delivery device. In some embodiments, the tensioning mechanism is moved to the second configuration during the retracting of the shaft of the tool from the delivery device, and the tensioning mechanism is returned to the first configuration after the shaft of the tool is retracted from the delivery device.

[0018] In some embodiments, the tensioning mechanism can include at least one filament extending at least partially around the tubular member. In some embodiments, the at least one filament collapses the tubular member when the tensioning mechanism is in the first configuration. In some embodiments, the at least one filament circumferentially constricts the tubular member to collapse the tubular member when the tensioning mechanism is in the first configuration. In some embodiments, the hemostatic valve can include a reinforcement structure located between the at least one filament and the tubular member.

[0019] In some embodiments, the at least one filament forms a loop around the elongate member, and moving the tensioning mechanism from the second configuration to the first configuration reduces a size of the loop to thereby constrict the tubular member within the loop. In some embodiments, the filament forms at least one bight around a portion of the elongate member. In some embodiments, the filament can include a first filament and a second filament. In some embodiments, the at least one bight can include a first bight oriented in a first direction and formed by the first filament and a second bight oriented in a second direction and formed by the second filament. In some embodiments, the first and second bights overlap to encircle a portion of the tubular member within a constricting area.

[0020] In some embodiments, moving the tensioning mechanism from the second configuration to the first configuration can include moving the first bight in the first direction and the second bight in the direction to reduce the size of the constricting area and collapse and seal the central lumen of the tubular member. In some embodiments, the tensioning mechanism can include an actuator. In some embodiments, moving the tensioning mechanism to the second configuration can include manipulating the actuator. In some embodiments, the method includes applying a vacuum to the delivery device and/or delivery system to aspirate material through the catheter. In some

embodiments, the central lumen remains sealed during the aspiration. In some embodiments, the tool can include a thrombus extraction device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] Figure 1 is a perspective view of one embodiment of a delivery device.

[0022] Figure 2 is a side-section view of one embodiment of a hemostasis valve in a first configuration.

[0023] Figure 3 is a side-section view of one embodiment of the valve in a second configuration.

[0024] Figure 4 is a side-section view of one embodiment of the valve in the first configuration and with a tool extending through the valve.

[0025] Figure 5 is a side-section view of one embodiment of a single-button hemostasis valve in a first configuration.

[0026] Figure 6 is a perspective view of a filament of a valve forming a loop.

[0027] Figure 7 is a perspective view of two filaments of a valve, each of the filaments forming a loop.

[0028] Figure 8 is a perspective view of two overlapping and interlocked bights in an open configuration.

[0029] Figure 9 is a perspective view of two overlapping and interlocked bights in a closed configuration.

[0030] Figure 10 is a flowchart illustrating one embodiment of a method for sealing a valve and/or catheter.

[0031] Figure 11 is a side view of one embodiment of a thrombectomy system including the delivery device.

[0032] Figure 12 is a side-section view of another embodiment of a hemostasis valve having two-piece caps.

DETAILED DESCRIPTION

[0033] The present disclosure relates to a valve that can be used a hemostasis valve. This valve, also referred to herein as a garrote valve can seal with or without a tool extending through the valve. The garrote valve provides convenient, single-handed operation for a wide range of medical devices including catheters, wires, embolectomy systems, or the like. This single-handed operation of the garrote valve allows the user to easily and quickly swap different tools being used through the valve without compromising hemostasis and therefore simplifying the procedure. Combined with single-handed operation, the garrote valve provides robust sealing either with or without a tool extending through the valve. This robust sealing minimizes leakage in applications with a pressure differential on different sides of the valve. This pressure differential can arise, for example, during the application of vacuum aspiration in a procedure. Even under such conditions, as well as under other conditions, the garrote valve maintains seal integrity and prevents leakage in one or both directions.

[0034] The garrote valve includes a tubular member. The tubular member is a flexible member that defines a central lumen, which can, in some embodiments, define a single lumen, and in some embodiments, defines a plurality of lumens. In some embodiments, each of the plurality of lumens can comprise the same size and shape, and in some embodiments, some or all of the plurality of lumens can comprise different sizes and shapes. In some embodiments, for example, the plurality of lumens can comprise a lumen sized and/or shaped to receive a guide wire and a lumen sized and/or shaped to receive a tool. The tubular member extends at least partially through a constricting mechanism. The constricting mechanism can be moved from a first configuration to a second configuration, and the constricting mechanism can collapse and/or seal the central lumen of the tubular member when the constricting mechanism is in the first configuration. The constricting mechanism creates the above-discussed robust seal of the tubular member and thus of the valve.

[0035] With reference now to **Figure 1**, a perspective view of one embodiment of a delivery system 100, also referred to herein as a delivery device 100, is shown. The delivery system 100 can include a catheter 102 and a garrote valve 104, also referred to herein as valve 104. The catheter 102 can comprise a shaft 106, also referred to herein as an elongate sheath 106, having a proximal end 108, also referred to herein as a first end 108, that can connect to the valve 104 and a distal end 110, also referred to herein as a second end 110. The shaft 106 can define a catheter lumen 112 extending from the proximal end 108 of the shaft 106 to the distal end 110 of the shaft 106. The catheter 102

and specifically the shaft 106 can comprise a variety of shapes and sizes and can be made from a variety of materials. In some embodiments, the catheter 102 can be flexible and/or can be made from a biocompatible material. The elongate sheath 106 can have an outer diameter of at least 4 French, at least 6 French, at least 8 French, at least 10 French, at least 12 French, at least 14 French, at least 18 French, at least 20 French, at least 22 French, between 4 French and 30 French, between 8 French and 24 French, between 12 French and 20 French, and/or any other or intermediate size.

[0036] The valve 104 can include an outer shell 114. The outer shell 114 can comprise a variety of shapes and sizes and can be made from a variety of materials. In some embodiments, the outer shell 114 can be made from one or several polymers or composites. The outer shell 114 can include features that allow interaction with and/or control of the valve 104 to move the valve 104 between the first configuration and the second configuration.

[0037] The outer shell 114 can include a proximal cap 116 located at a proximal end 118 of the outer shell 114 and a distal cap 120 located at a distal end 122 of the shell 114. The proximal cap 116 can include and/or house a proximal aperture 124, also referred to herein as a proximal channel 124, a first channel 124, or a first aperture 124, that extends through the proximal cap 116, and the distal cap 120 can include and/or house a distal aperture 126, also referred to herein as a distal channel 126, a second channel 126, or second aperture 126, that extends through the distal cap 120. As seen in Figure 1, the distal cap 120 connects to the shaft 106 of the catheter 102 at the distal end 122 of the valve 104.

[0038] The proximal cap 116 and the distal cap 120 are connected via a housing 128. The housing 128 can be a one-piece housing 128 or a multi-piece housing 128. In the embodiment depicted in Figure 1, the housing comprises a two-piece housing 128. The housing 128 can be configured to receive and couple with each of the proximal cap 116 and the distal cap 120, and as seen in Figure 1, the housing 128 is coupled with each of the proximal cap 116 and the distal cap 120 to secure the relative position of the proximal cap 116 and the distal cap 120 with respect to each other.

[0039] The housing 128 can define an interior channel 130 through which an elongate member 132, also referred to herein as a tubular member 132, a septum 132, or a tubular septum 132, can extend and connect the proximal cap 116 and the distal cap 120. The elongate member 132 can comprise a variety of shapes and sizes and can be made from a variety of materials. In some

embodiments, the elongate member 132 can comprise a compliant tubular structure that can be, for example, a thin-walled compliant tubular structure. The thin-walled structure of the elongate member 132 can facilitate the collapse, and specifically the uniform collapse of the elongate member 132 and the sealing of the elongate member 132. In some embodiments, the elongate member 132 is an elastic, resilient material that may comprise a polymer including either a natural or synthetic polymer. In some embodiments, the elongate member can comprise an elastic, resilient material that may comprise silicone, urethane, ethylene-vinyl acetate, natural or synthetic rubber or other elastomers known in the art. In some embodiments, the elongate member 132 can comprise a silicone tube.

[0040] The elongate member 132 can comprise a proximal end 134, also referred to herein as a first end 134, that can couple to the proximal cap 116, and a distal end 136, also referred to herein as a second end 136, that can couple to the distal cap 120. The elongate member 132 can define a central lumen 138 that can extend from the first end 134 to the second end 136 of the elongate member 132. The elongate member 132 can be coupled to the proximal cap 116 such that the central lumen 138 is fluidly coupled with the proximal aperture 124 of the proximal cap 116, and the elongate member 132 can be coupled to the distal cap 120 such that the central lumen 138, as seen in **Figure 2** and in **Figure 3**, is fluidly coupled with the distal aperture 126 of the distal cap 120.

[0041] The central lumen 138 of the elongate member 132 can be defined by a wall of the elongate member 132 that can have a thickness that is uniform along the length of the elongate member 132 between the first end 134 and the second end 136, or that is non-uniform along the length of the elongate member 132 between the first end 134 and the second end 136. In some embodiments, the wall can have a thickness that is approximately between 0.005 inches and 0.05 inches, and/or approximately between 0.010 inches and 0.030 inches. As used anywhere herein, "approximately" refers to a range of +/- 10% of the value and/or range of values for which "approximately" is used.

[0042] In some embodiments, the elongate member 132 can be cylindrically shaped, and specifically can be circular-cylindrically shaped. In some embodiments, the elongate member 132 can be dog-bone shaped to facilitate, for example, connection to each of the proximal cap 116 and the distal cap 120. In some embodiments, the elongate member 132 can include one or several outward-extending protuberances that engage with all or portions of a constricting mechanism 141, also referred to herein as a tensioning mechanism 141, of the valve 104 to secure a position of all or portions of the constricting mechanism 141 with respect to the elongate member 132. In some

embodiments, the constricting mechanism 141 can be self-adjusting to seal around tools of different sizes extending through the valve 104.

[0043] The constricting mechanism 141 can, in some embodiments, collapse and seal the elongate member 132 via compression and/or constriction, and specifically via constriction with at least one filament 150. The constricting mechanism 141 can comprise: an actuator 142 which can be a manual actuator such as one or several buttons 144; and the at least one filament 150 that can extend at least partially around the elongate member 132. In some embodiments, the use of the constricting mechanism 141 can facilitate sealing of the valve around tools or instruments of a wide range of sizes and/or diameters, and particularly around tools or instruments that fit through the elongate member 132.

[0044] The housing 128 can further include one or several retention features 140. The one or several retention features 140 of the housing can engage with and retain all or portions of the constricting mechanism 141 of the valve 104. In some embodiments, the one or several retention features 140 of the housing 128 can retain the actuator 142 and/or can couple the actuator 142 to the housing 128. The actuator 142 can comprise any desired type of actuator including, for example, a manual actuator and/or an automated actuator such as, for example, an electromechanical actuator including a solenoid-based actuator. In some embodiments, the actuator can comprise one or several buttons 144, and specifically, as depicted in Figure 1, the actuator 142 can comprise a first button 144-A and a second button 144-B. Alternatively, and as depicted in **Figure 5**, the actuator 142 can comprise a single button 144. In such an embodiment, the filament 150 can be coupled to the single button 144 and to a portion of the housing 128 such as, for example, to grip portion 500 of the housing 128 such that the movement of the single button 144 causes the sealing and/or opening of the elongate member 132 and of the valve 104.

[0045] The actuator 142 can be biased towards a configuration such as, for example, biased towards the first configuration or biased towards the second configuration. As depicted in Figure 2, which shows the constricting mechanism 141 in the first configuration, the actuator 142 can be biased towards the first configuration wherein the elongate member 132 is collapsed and/or sealed by a bias feature 146. In this first configuration, the buttons 144 can be in a first position, also referred to herein as an undepressed position. This bias feature 146 can, as shown in Figure 2, include a first spring 148-A configured to bias the first button 144-A towards the first position corresponding to the

first configuration of the constricting mechanism 141, and a second spring 148-B configured to bias the second button 144-B towards a first position corresponding to the first configuration of the constricting mechanism 141. One or both of the first spring 148-A and the second spring 148-B can comprise a tension spring, compression spring, a torsion spring, a coil spring, or any other desired type of spring.

[0046] In some embodiments, one or both of the first spring 148-A and the second spring 148-B can generate sufficient force so as to allow actuation of the actuator 142 with a single hand and so as to collapse and seal the elongate member 132 when the constricting mechanism 141 is in the first configuration. In some embodiments, one or both of the first spring 148-A and the second spring 148-B can generate a force of: at least 0.1 pounds, at least 0.2 pounds, at least 0.3 pounds, at least 0.4 pounds, at least 0.5 pounds, at least 0.6 pounds, at least 0.7 pounds, at least 0.8 pounds, at least 0.9 pounds, at least 1 pound, at least 1.5 pounds, at least 2 pounds, at least 3 pounds, at least 5 pounds, and/or at least 10 pounds and in some embodiments one or both of the first spring 148-A and the second spring 148-B can generate a force approximately between: 0.1 and 10 pounds, 0.1 and 5 pounds, 0.1 and 1.5 pounds, 0.2 and 1 pounds, and/or 0.4 and 0.8 pounds.

[0047] The constricting mechanism 141 can include at least one filament 150 that extends at least partially around the elongate member 132. In some embodiments, the at least one filament 150 can circumferentially constrict the elongate member 132 to collapse and seal the elongate member 132 when the constricting mechanism 141 is in the first configuration. The filament can be made from a variety of materials including, for example, a polymer, a synthetic, and/or a metal. In some embodiments, the filament 150 can be nylon, stainless steel, nitinol, silicone, or the like. In some embodiments, the filament can comprise a single strand such as, for example, a monofilament, and in some embodiments, the filament can comprise a plurality of strands that can be, for example, twisted, woven, grouped, and/or fused to form the filament. In some embodiments, the filament 150 can comprise one or several threads, lines, cords, rope, ribbon, flat wire, sheet, or tape.

[0048] The filament 150 can be coupled to the actuator 142 such that the filament 150 selectively constricts, collapses, and/or seals the elongate member 132, and specifically the central lumen 138 of the elongate member 132 based on the movement and/or position of the actuator 142. In some embodiments, the filament 150 can be connected to one or both of the buttons 144-A, 144-B such that the filament 150 collapses, constricts, and/or seals the elongate member 132 and specifically

the central lumen 138 of the elongate member 132 when the buttons 144-A, 144-B are in the first position, and the filament 150 can be connected to one or both of the buttons 144-A, 144-B such that the elongate member 132 and specifically the central lumen 138 of the elongate member 132 is open and uncollapsed when the buttons 144-A, 144-B are in the second position. In some embodiments in which the actuator 142 comprises a single button 144, as depicted in Figure 5, the filament 150 can be connected to the button 144 and to the housing 128 such that the filament 150 is tightened when the button 144 moves to the first position.

[0049] In some embodiments, the at least one filament 150 can extend along an axis 152 that can be perpendicular to a central axis 154 of the elongate member 132 and/or of the apertures 124, 126. In some embodiments, the axis 152 of the at least one filament 150 can intersect and be perpendicular to the central axis 154 of the elongate member 132 and/or of the apertures 124, 126. In some embodiments, the actuator 142, and specifically the buttons 144-A, 144-B can move along this axis 152 when moved from the first position to the second position.

[0050] In Figure 3, an embodiment of the valve 104 with the constricting mechanism 141 in the second configuration is shown. As specifically shown, both of the first and second buttons 144-A, 144-B are in the second position, depressed into the retention features 140 of the housing 128. In this second position, the filament 150 is loosened, thereby allowing the expansion of the elongate member 132 and the unsealing of the central lumen 138 of the elongate member 132.

[0051] As further seen in Figure 3, the proximal cap 116 has a proximal end 300 and a distal end 302. The proximal cap 116 can include a funnel portion 301 of the proximal aperture 124, which funnel portion 301 can facilitate insertion of a tool into the proximal aperture 124. The distal end 302 of the proximal cap 116 can partially extend into the interior channel 130 of the housing 128. The proximal cap 116 can include a mating feature 304 that can mate with the proximal end 134 of the elongate member 132. In some embodiments, the proximal end 134 of the elongate member 132 can fit over the mating feature 304 of the proximal cap 116. The proximal end 134 of the elongate member 132 can be compressed between the mating feature 304 of the elongate member 132 and a portion of the interior channel 130 of the housing 128 into which the mating feature 304 is inserted to thereby secure the proximal end 134 of the elongate member 132 on the mating feature 304. In some embodiments, the proximal end 134 of the elongate member 132 can be further secured on the mating feature 304 by a proximal O-ring 306 that can be compressed between the housing 128 and the mating

feature 304 of the proximal cap 116 to sealingly couple the elongate member 132 to the proximal cap 116.

[0052] The distal cap 120 has a proximal end 308 and a distal end 310. The distal cap can include a mating feature 312 located on the proximal end 308 of the distal cap 120, which mating feature 312 can mate with the distal end 136 of the elongate member 132. In some embodiments, the distal end 136 of the elongate member 132 can fit over the mating feature 312 of the distal cap 123. The distal end 136 of the elongate member 132 can be compressed between the mating feature 312 of the elongate member 132 and a portion of the interior channel 130 of the housing 128 into which the mating feature 312 is inserted to thereby secure the distal end 136 of the elongate member 132 on the mating feature 312. In some embodiments, the distal end 136 of the elongate member 132 can be further secured on the mating feature 312 by a distal O-ring 314 that can be compressed between the housing 128 and the mating feature 312 of the proximal cap 116 to sealingly couple the elongate member 132 to the distal cap 120.

[0053] The distal cap 120 can, in some embodiments, further include a side port barb 314 that can extend laterally away from the distal cap 120 and specifically away from the distal aperture 126 of the distal cap 120. The side port barb 314 can define a side port channel 316 that can extend through the side port barb 314 and fluidly connect to the distal aperture 126. In some embodiments, the side port barb 314 can include a securement feature 318 such as a barb that can secure coupling of a hose or tube to the side port barb 314.

[0054] In some embodiments, the side barb 314 can be used to apply a vacuum to the portions of the delivery device 100, and particularly to portions of the delivery device 100 that are distal of the axis 152 along which the elongate member 132 seals. This vacuum can be applied to aspirate a material through the delivery device 100, and specifically through the catheter 102 of the delivery device. This aspirated material can be a biological material including, for example, bodily fluids, multi-phase bodily materials that can include, for example, a fluidic portion and at least one solid portion, or the like.

[0055] In some embodiments, due to the narrowing shape of the elongate member 132 when the constricting mechanism 141 is in the first configuration, a vacuum applied to the portions of the delivery device 100 distal to the axis 152 draws the elongate member 132 towards the first configuration and can, in some embodiments, increase the strength, robustness, and/or strength of the

seal of the valve 104. This attribute of the valve 104 can provide benefits over other valve designs in which a vacuum can compromise the seal of the valve, and thus the ability to draw a vacuum and aspirate can be limited.

[0056] In some embodiments, the valve 104 can further include a reinforcement structure 320 that can extend along all or portions of the elongate member 132. The reinforcement structure 320 can facilitate the uniform collapse of the elongate member 132, can prevent the at least one filament 150 from cutting through and/or tearing the elongate member 132, and can assist in guiding one or several tools through the elongate member 132. The reinforcement structure 320 can be tubular, can extend along and around the elongate member 132, and can be positioned so as to be between the elongate member 132 and the at least one filament 150.

[0057] The reinforcement structure 320 can include a proximal end 322 and a distal end 324. In some embodiments, the reinforcement structure 320 extends along and around the elongate member 132, and is positioned such that the proximal end 322 of the reinforcement structure 320 is proximate to the first end 134 of the elongate member 132 and the distal end 324 of the reinforcement structure 320 is proximate to the second end 136 of the elongate member 132.

[0058] The reinforcement structure 320 can be coupled to the elongate member 132. In some embodiments, the reinforcement structure 320 is coupled to the elongate member 132 along the length of the reinforcement structure 320, and in some embodiments, the reinforcement structure 320 is coupled to the elongate member 132 and distinct positions along the length of the elongate member 132 and/or the reinforcement structure 320. In one embodiment, for example, the reinforcement structure 320 can be coupled to the elongate member 132 at one or both of the proximal end 322 of the reinforcement structure 320 and the distal end 324 of the reinforcement structure 320 and/or at one or both of the first end 134 and the second end 136 of the elongate member 132. In some embodiments, the reinforcement structure 320 can be coupled to the elongate member 132 via one or several other components of the valve 104. In some embodiments, the reinforcement structure 320 can be coupled to the elongate member 132 via the compression of the reinforcement structure 320 and the elongate member 132 between the housing 128 and one or both of the proximal 116 and the distal 120.

[0059] In some embodiments, the reinforcement structure 320 can be adhered to the elongate member 132 via, for example, an adhesive such as silicone adhesive. In some embodiments, the

adhesive can be circumferentially applied to the reinforcement structure 320 and/or the elongate member 132 in an adhesive ring that can, for example, a have a length approximately between: 0.010 inches and 0.5 inches; 0.02 and 0.4 inches; 0.050 inches and 0.0250 inches, or any other or intermediate range.

[0060] In one embodiment, each of the proximal end 322 and the distal end 324 of the reinforcement structure 320 can be adhered via an adhesive to the elongate member 132. In such an embodiment, the reinforcement structure 320 may be uncoupled to the elongate member 132 at positions other than the coupling at one or both of the proximal end 322 and the distal end 324 of the reinforcement structure 320, and thus the reinforcement structure 320 is uncoupled to the elongate member 132 at a position between the first end 134 and the second end 136 of the elongate member 134 and/or between the proximal end 322 and the distal end 324 of the reinforcement structure 320.

[0061] The lack of coupling of the reinforcement structure 320 to the elongate member 132 can facilitate and improve the collapse of the elongate member 132 around a tool 400, also referred to herein as instrument 400 or device 400, inserted through the valve 104 as shown in **Figure 4**. The tool 400 can be any device inserted through the valve 104 including, for example, one or several additional catheters, lines, wires, grippers, punches, cutters, or the like. As seen in Figure 4, the tool 400 is inserted through the valve 104 and specifically through the elongate member 132 of the valve. As shown, the constricting mechanism 141 is in the first configuration and the elongate member 132 and the central lumen 138 of the elongate member 132 is collapsed around the tool 400, and specifically around a shaft 402 of the tool 400 to thereby seal the valve 104 around the tool 400 and specifically around the shaft 402 of the tool 400. The constricting mechanism 141 can seal around tools 400 that fit through the elongate member 132, regardless of the size of the tool 400. Thus, the valve can be used with a wide variety of tools.

[0062] The reinforcement structure 320 can comprise a variety of designs, shapes, sizes, and materials. In some embodiments, the reinforcement structure 320 can be sized and shaped so as to receive elongate member 132 and to be positioned between the elongate member 132 and the at least one filament 150. In some embodiments, the reinforcement structure 320 can be made from a material sufficiently strong to prevent the cutting of the at least one filament 150 through the elongate member 132.

[0063] In some embodiments, the reinforcement structure can comprise a coil or a mesh sheath. The mesh sheath can, in some embodiments, comprise a braided mesh. The braided mesh can be made from any desired number of wires in any desired configuration. In some embodiments, the braided mesh can comprise a 4 wire braided mesh, an 8 wire braided mesh, a 12 wire braided mesh, a 16 wire braided mesh, a 20 wire braided mesh, a 24 wire braided mesh, a 32 wire braided mesh, a 48 wire braided mesh, a 64 wire braided mesh, a 72 wire braided mesh, an 80 wire braided mesh, a 96 wire braided mesh, or any other or intermediate braided mesh. In some embodiments, the braided mesh can comprise: a 1x1 configuration. In some embodiments, the wire in the braided mesh can be any desired material including, for example, a metal wire such as a nitinol wire or a stainless steel wire, a polymer wire, or a natural wire. In one embodiment, the braided mesh can comprise a 48 wire mesh in a 1x1 configuration made with a nitinol wire having a diameter of 0.003 inches.

[0064] With reference now to **Figures 6** through **9**, different embodiments and/or configurations of the filament 150 are shown. The filament 150 can comprise a single filament 150 having a first end 600 and a second end 602 as shown in Figure 6. The filament 150, and specifically which first and second ends 600, 602 can be coupled to the actuator 142 to move the filament 150 between the first and second configurations or positions and/or from the first configuration or position to the second configuration or position. In some embodiments, both of the first end 600 and the second end 602 can be coupled to a single button 144, in some embodiments, each of the first end 600 and the second end 602 can be coupled to different buttons 144, and in some embodiments, one of the first end 600 and the second end 602 can be coupled to a button 144 and the other of the first end 600 and the second end 602 can be coupled to the housing 128 or other portion of the valve 104.

[0065] In some embodiments, the filament 150 can comprise multiple filaments, and specifically, as shown in Figures 7 through 9, the filament 150 can comprise a first filament 150-A and a second filament 150-B. In embodiments in which the filament 150 comprises multiple filaments, each of the multiple filaments can have a first end 700 and a second end 702. The first and second filaments 150-A, 150-B can be coupled to the actuator 142. In such embodiments, the first and second ends 700, 702 can be coupled to the actuator 142 to move the filaments 150-A, 150-B between the first and second configurations and/or from the first configuration to the second configuration. In some embodiments, both of the first end 700 and the second end 702 of one or more of the multiple filaments 150 can be coupled to a single button 144, in some embodiments, each of

the first end 700 and the second end 702 of one or more of the multiple filaments 150 can be coupled to different buttons 144, and in some embodiments, one of the first end 700 and the second end 702 of one or more of the multiple filaments 150 can be coupled to one button 144 and the other of the first end 700 and the second end 702 of those one or more filaments 150 can be coupled to the housing 128 or other portion of the valve 104.

[0066] The filament 150 can be arranged in a variety of configurations. In some embodiments, the filament 150 can be configured to form a single loop 604 that can extend around the elongate member 132 and/or through which the elongate member 132 can be received as shown in Figure 6, and in some embodiments, the filament 150 can be configured to form multiple loops, and specifically a first loop 704 and a second loop 706 as shown in Figure 7. The first and second loops 704, 706 can each receive the elongate member 132. In some embodiments, a diameter or size of the loop 604, or of the loops 704, 706 can decrease when the constricting mechanism 141 is moved from the second configuration to the first configuration.

[0067] In some embodiments, the filament 150 can be configured to form a bight 800, which bight 800 can be a single bight or multiple bights. As used herein, a "bight" refers to a U-shaped section between the two ends of the filament 150. As depicted in Figures 8 and 9, the bight 800 can comprise multiple bights, and specifically a first bight 800-A and a second bight 800-B. In some embodiments, the first bight 800-A can extend through the second bight 800-B such that the first and second bights 800-A, 800-B interlock, whereas in other embodiments, the first and second bights 800-A, 800-B can be non-interlocking. Similarly, in embodiments containing the filament 150 having multiple loops, one or several of the multiple loops can be interlocking.

[0068] In some embodiments, the bight 800, and specifically one or both of the first bight 800-A and the second bight 800-B can be formed around a portion of the elongate member 132 and/or can extend around a portion of the elongate member 132. Each bight 800 can define a partially enclosed receiving area 808 wherein the elongate member 132 can be received. Thus, the first bight 800-A can define a first receiving area 808-A and the second bight 800-B can define a second receiving area 808-B.

[0069] As seen in Figures 8 and 9, multiple bights, and specifically the first and the second bights 800-A, 800-B can be positioned and oriented such that the first bight 800-A has a first orientation or first direction as indicated by arrow 810, and the second bight has a second orientation

or second direction as indicated by the arrow 812. In some embodiments, the first orientation is different from the second orientation such that the first and second receiving areas 808-A, 808-B overlap and define an encircled area 814, also referred to herein as a constricting area 814. The elongate member 132 can be received within the encircled area 814. In embodiments in which bights 800-A, 800-B overlap to define the encircled area 814, the movement of the constricting mechanism 141 to the first configuration can result in and/or include the first bight 800-A moving in the direction indicated by the arrow 810 and/or the second bight 800-B moving in the direction indicated by the arrow 812, which movement of the bights 800-A, 800-B decreases the size of the encircled area 814 and constricts, collapses, and/or seals the elongate member 132 extending through the encircled area 814.

[0070] The filament(s) 150 forming the bights 800 can each apply an arcuate line or narrow longitudinal zone of pressure to the elongate member 132. If the filament(s) are circular in cross-section, the zone of pressure can be very small, and can, in some embodiments, be less than the diameter or thickness of the filament. In some embodiments, the filaments have a diameter or width less than about 2.5mm, less than about 2mm, less than about 1.5mm, less than about 1.25mm, less than about 1mm, less than about 0.75mm, less than about 0.5mm, and/or less than about 0.25mm. In some embodiments, the filaments can have a diameter or width of between about 0.01mm and 2.5mm, between about 0.05mm and 2mm, between about 0.1mm and 1mm, and/or between about 0.125mm and 0.70mm. In some embodiments, the arcuate line or zone of pressure may form two opposing arcs and in other embodiments, the arcuate line of pressure may be a singular substantially circular line or zone that encircles the elongate member at least once. The longitudinal length of the of the line or zone of pressure may be very short compared to other valves known in the art. In some embodiments, the longitudinal length of the zone of pressure applied to the elongate member 132 by the filament(s) 150 may be less than about 2.0mm and in some embodiments less than about 0.5mm. In some embodiments, the filament(s) 150 can have any desired cross-sectional shape including, for example, a circular cross-section, a rectangular cross-section, an oval cross-section, a square cross-section, a polygonal cross-section, a triangular cross-section, or any other desired shape of cross-section.

[0071] With reference now to **Figure 10**, a flowchart illustrating one embodiment of a process 1000 for sealing a valve 104 and/or catheter 102 accessing a body of a patient is shown. The process 1000 can be performed using the valve 104 and/or the delivery system 100. The process 1000 begins

at block 1002, wherein the delivery device 100, and specifically the catheter 102 of the delivery device 100 is inserted into the body of the patient. In some embodiments, this can include inserting the catheter 102 into a portion of the circulator system of the patient such as, for example, a blood vessel including an artery or a venous vessel. In some embodiments, the delivery device 100 can be inserted into the body of the patient directly through an aperture or incision in the patient, and in some embodiments, the delivery device 100 can be inserted into the body of the patient via another catheter or device. In some embodiments, the constricting mechanism 141 can be in the first configuration while the delivery device 100 and/or the catheter 102 is inserted into the patient's body.

[0072] After the delivery device 100 is inserted into the body of the patient, the process 1000 proceeds to block 1004, wherein the constricting mechanism 141 is moved from the first configuration to the second configuration. As described above, the central lumen 138 of the elongate member 132 is unsealed when the constricting mechanism 141 is in the second configuration. In some embodiments, the moving of the constricting mechanism 141 from the first configuration to the second configuration can include the manipulation of the actuator 142 and/or the control of the actuator 142, and specifically the depressing of the one or several buttons 144 to move the filament 150 from the first position to the second position to allow the expansion and opening of the central lumen 138 of the elongate member 132.

[0073] After the constricting mechanism 141 is moved from the first configuration to the second configuration, the process 1000 proceeds to block 1006, wherein the tool 400, and specifically the shaft 402 of the tool 400 is advanced through the delivery device 100 and specifically through the valve 104 until a first end of the tool reaches a desired position within the body of the patient. In some embodiments, a portion of the shaft 402 can be positioned within the central lumen 138 of the elongate member 132 after the advancing of the tool 400 through the delivery device 100. In some embodiments, after the tool 400 is advanced through the delivery device 100, the desired procedure can be performed with the tool.

[0074] After the tool 400 is advanced through the delivery device 100, or while the tool 400 is being advanced through the delivery device 100, the process 1000 proceeds to block 1008, wherein the constricting mechanism 141 is returned to the first configuration. In some embodiments, the returning of the constricting mechanism 141 to the first configuration can include the release of the one or several buttons 144 and/or the control of the actuator 142 to reconfigure the constricting

mechanism 141 to the first configuration. In some embodiments, the return of the constricting mechanism 141 to the first configuration can result in the collapse and/or sealing of the elongate member 132 and specifically the central lumen 138 of the elongate member 132 around the tool 400 and specifically around the shaft 402 of the tool 400. The return of the constricting mechanism 141 to the first configuration, or the movement of the constricting mechanism 141 to the first configuration can include the decreasing of the size and/or diameter of one or several loops formed by the filament 150 and/or the movement of one or several bights 800 such as, for example, the movement of the first bight 800-A in the first direction indicated by arrow 810 and the movement of the second bight 800-B in the second direction indicated by arrow 812 to reduce the size of the constricting area 814. In some embodiments, after the constricting mechanism is returned to the first configuration, the desired procedure can be performed with the tool.

[0075] After the constricting mechanism is returned to the first configuration, the process 1000 proceeds to block 1010, wherein the tool 400, and specifically the shaft 402 of the tool 400 is retracted from the delivery device 100, and more specifically from the valve 104. In some embodiments, the valve 104 can remain sealed during the retracing of the tool 400 and/or the shaft 402 of the tool. In some embodiments, the valve 104 remains sealed during the retracting of the tool 400 and/or the retracting of the shaft 402 of the tool 400 as the constricting mechanism 141 can remain in the first configuration during the retracing of the tool 400 and/or the shaft 402 of the tool 400.

[0076] In some embodiments, the constricting mechanism 141 can be moved to the second configuration to allow the retraction of the tool 400 and/or the shaft 402 of the tool 400 from the valve 104, and the constricting mechanism 141 can be returned to the first configuration when the tool 400 and/or the shaft 402 of the tool 400 is removed from the valve 104. In some embodiments, the retraction of the tool 400 and/or shaft 402 of the tool 400 from the valve 104 can be performed with the constricting mechanism 141 left in the first configuration. In some embodiments, the constricting mechanism 141 can be moved to the second configuration, and then returned to the first configuration via the manipulation and/or control of the actuator 142, which manipulation and/or control of the actuator 142 can include the depressing of the one or several buttons 144 to move the constricting mechanism 141 to the second configuration, and the release of the one or several buttons 144 to return the constricting mechanism 141 to the first configuration. In some embodiments, if the procedure is

complete, the delivery device 100 can then be removed from the body of the patient, and any incision created for the procedure can be closed.

[0077] With reference now to Figure 11, a side view of one embodiment of a thrombectomy system 1100 including the delivery device 100 and a thrombus extraction device 1102 is shown. In some embodiments, the thrombectomy system 1100 can be used to access a blood vessel 1104 to treat and/or extract a thrombus 1106 from the blood vessel 1104. The thrombus extraction device 1102 can include a self-expanding coring element 206 and expandable cylindrical portion 208. In some embodiments, and as shown in Figure 11, the thrombus extraction device 1102 can be the tool 400 that can extend through the valve 104, and in some embodiments, the valve 104 can be a part of the thrombus extraction device 1102. Further details of thrombectomy systems, thrombus extraction devices, and methods of using the same are disclosed in: U.S. Application No. 15/268,296, filed September 16, 2016, and entitled "INTRAVASCULAR TREATMENT OF VASCULAR OCCLUSION AND ASSOCIATED DEVICES, SYSTEMS, AND METHODS"; U.S. Application No. 15/498,320, filed April 26, 2017, and entitled "DEVICES AND METHODS FOR TREATING VASCULAR OCCLUSION"; and U.S. Application No. 15/466,740, filed on March 22, 2017, and entitled "DEVICE AND METHOD FOR TREATING VASCULAR OCCLUSION", the entirety of each of which is hereby incorporated by reference herein.

[0078] With reference now to Figure 12, a side-section view of another embodiment of the hemostasis valve 104 having two piece caps 116, 120 is shown. The valve 104 can include a housing 128 defining an interior channel 130 through which the tubular member 132 can extend. The valve 104 can include the proximal cap 116 and the distal cap 120. In some embodiments, the proximal cap 116 can comprise a two piece cap and can include a proximal exterior member 1200 and a proximal channel member 1202. In some embodiments, the distal cap 120 can comprise a two-piece cap and can include a distal exterior member 1204 and a distal channel member 1206. In some embodiments, this coupling between the proximal exterior member 1200 and the proximal channel member 1202 and/or the coupling between the distal exterior member 1204 and the distal channel member 1206 can be a sealed coupling so as to prevent the leakage of material including fluid or gas between the respective ones of the proximal exterior member 1200 and the proximal channel member 1202 and/or the distal exterior member 1204 and the distal channel member 1206. In some embodiments, this sealing coupling can be achieved and/or maintained via a seal such as an O-ring

1208 that can be positioned between the proximal exterior member 1200 and the proximal channel member 1202 and/or between the distal exterior member 1204 and the distal channel member 1206.

[0079] In some embodiments, the proximal exterior member 1200 can be coupled, and in some embodiments, rotatingly coupled to the proximal channel member 1202 in a manner to allow the rotation of the proximal exterior member 1200 without rotating the proximal channel member 1202. Similarly, in some embodiments, the distal exterior member 1204 can be rotatingly coupled to the distal channel member 1206 in a manner to allow the rotation of the distal exterior member 1204 without the rotating of the distal channel member 1206. In some such embodiments, the channel members 1202, 1206 can be non-rotatable with respect to the housing 128 and/or the tubular member 132, and one or both of the exterior members 1200, 1204 can be rotatable with respect to the housing 128 and/or the tubular member 132. In such an embodiment, the maintaining of the rotational position of the channel members 1202, 1206 with respect to the housing 128 and/or the tubular member 132 can prevent the twisting of the tubular member 132 which can result in the sealing of the tubular member 132 regardless of the configuration of the constructing mechanism 141.

[0080] The exterior members 1200, 1204 can comprise a variety of shapes and sizes and can include a variety of features. In some embodiments, one or both of the exterior members 1200, 1204 can be coupled to, for example, a shaft similar to the shaft 106 shown in figure 1. In some embodiments, for example, the distal exterior member 1204 can be coupled to a shaft 106, including, for example, can be non-detachably coupled to the shaft 106. In some embodiments, one or both of the exterior members can include one or several features configured to facilitate coupling with the valve 104. These one or several features can include, for example, one or several male or female: connectors; couplers; attachment mechanisms; or the like. In some embodiments, these one or several features can facilitate use of the valve with other existing components, instruments, tools, or the like. In some embodiments, for example, one or both of the exterior members 1200, 1204 can comprise either a male or female luer fitting, and specifically as shown in Figure 12, the distal exterior member 1204 can comprise a male luer fitting 1210.

[0081] Several aspects of the present technology are set forth in the following examples.

1. A hemostatic valve for sealing a medical device, the hemostatic valve comprising:

an elongate member having a first end, a second end, and a central lumen extending therebetween, wherein the elongate member is pliable;

a reinforcement structure extending along at least a portion of the elongate member, wherein the reinforcement structure is coupled to the elongate member; and

an active tensioning mechanism coupled to the elongate member, wherein the tensioning mechanism is moveable between a first configuration wherein the central lumen is constricted and sealed and a second configuration wherein the central lumen is open.

2. The hemostatic valve of example 1, wherein the elongate member comprises a compliant polymer tube.

3. The hemostatic valve of example 1 or 2, wherein the tensioning mechanism comprises at least one filament extending at least partially around the elongate member.

4. The hemostatic valve of example 3, wherein the reinforcement structure is positioned between the at least one filament and the elongate member.

5. The hemostatic valve of example 4, wherein the reinforcement structure comprises a braided mesh.

6. The hemostatic valve of example 4 or 5, wherein the reinforcement structure is coupled to the elongate member at a position proximate to the first end of the elongate member and at a position proximate to the second end of the elongate member.

7. The hemostatic valve of example 6, wherein the reinforcement structure is not coupled to the elongate member at a position between the first end of the elongate member and the second end of the elongate member.

8. The hemostatic valve of any one of examples 3–7, wherein the tensioning mechanism comprises an actuator coupled to the at least one filament, wherein the actuator is moveable to control

movement of the at least one filament from a first position wherein the central lumen is constricted and sealed to a second position wherein the central lumen is open, wherein the at least one filament is in the first position when the tensioning mechanism is in the first configuration.

9. The hemostatic valve of example 8, wherein the actuator is biased towards the first position.

10. The hemostatic valve of example 8 or 9, wherein the actuator is biased toward the second position.

11. The hemostatic valve of any one of examples 8–10, wherein the actuator comprises a manual actuator.

12. The hemostatic valve of any one of examples 8–11, wherein the at least one filament forms a loop around the elongate member.

13. The hemostatic valve of any one of examples 8–12, wherein the at least one filament forms a bight around a portion of the elongate member.

14. The hemostatic valve of any one of examples 8–13, wherein the at least one filament comprises a first filament and a second filament, wherein each of the first filament and the second filament are coupled to the actuator, and wherein the first filament and the second filament are moveable from the first position to the second position.

15. The hemostatic valve of example 14, wherein each of the first filament and the second filament form a loop around the elongate member.

16. The hemostatic valve of example 14 or 15, wherein the first filament forms a first bight around a first portion of the elongate member, and wherein the second filament forms a second bight around a second portion of the elongate member.

17. The hemostatic valve of example 16, wherein the first bight extends through the second bight.

18. The hemostatic valve of any one of examples 1–17, further comprising a shell defining a first aperture and a second aperture, wherein the elongate member extends from the first aperture to the second aperture and fluidly couples the first aperture and the second aperture.

19. The hemostatic valve of any one of examples 1–18, wherein the tensioning mechanism is self-adjustable to seal around tools of different sizes extending through the hemostatic valve.

20. The hemostatic valve of any one of examples 1–19, wherein the central lumen comprises a single lumen.

21. The hemostatic valve of any one of examples 1–20, wherein the central lumen comprises a plurality of lumens.

22. A delivery system for intravascular access of a blood vessel within a patient's body, the delivery system comprising:

a catheter having a first end, a second end, and a catheter lumen extending therebetween;

a hemostatic valve coupled to the first end of the catheter, the hemostatic valve comprising:

a tubular member having a first end, a second end, and a central lumen extending therebetween, wherein the central lumen of the tubular member is fluidly coupled with the catheter lumen; and

an active tensioning mechanism coupled to the tubular member, the tensioning mechanism moveable between a first configuration wherein the tensioning mechanism constricts on the central lumen and the central lumen is sealed and a second configuration wherein the central lumen is open.

23. The delivery system of example 22, wherein the hemostatic valve further comprises a reinforcement structure extending along at least a portion of the tubular member.

24. The delivery system of example 22 or 23, wherein the reinforcement structure is located between the tensioning mechanism and the tubular member.

25. The delivery system of example 24, wherein the reinforcement structure comprises a braided mesh.

26. The delivery system of example 24 or 25, wherein the reinforcement structure is coupled to the tubular member at a position proximate to the first end of the tubular member and at a position proximate to the second end of the tubular member.

27. The delivery system of example 26, wherein the reinforcement structure is adhered to the tubular member at the first end of the tubular member and at the second end of the tubular member.

28. The delivery system of example 27, wherein the reinforcement structure is uncoupled to the tubular member between the first end of the tubular member and the second end of the tubular member.

29. The delivery system of any one of examples 22–28, wherein the tensioning mechanism comprises at least one filament extending at least partially around the tubular member.

30. The delivery system of example 29, wherein the tensioning mechanism comprises an actuator coupled to the at least one filament, wherein moving the tensioning mechanism from the first configuration to the second configuration comprises moving the actuator and the thereto coupled at least one filament from a first position to a second position, wherein the filament constricts and seals the central lumen of the tubular member when the filament is in the first position.

31. The delivery system of example 30, wherein the actuator comprises a manual actuator.

32. The delivery system of example 31, wherein the actuator comprises a pair of opposing and depressable buttons, wherein the buttons are biased towards an undepressed position.

33. The delivery system of example 31 or 32, wherein the central lumen is sealed when the buttons are in the undepressed position.

34. The delivery system of any one of examples 30–33, wherein the filament comprises a monofilament.

35. The delivery system of any one of examples 30–34, wherein the filament comprises at least one of: a polymer filament; or a metallic filament.

36. The delivery system of any one of examples 22–35, wherein the catheter comprises a thrombus extraction device.

37. A method of sealing a delivery device accessing a blood vessel of a patient, the method comprising:

inserting the delivery device comprising a catheter and a hemostatic valve into the blood vessel of the patient, the catheter having a first end, a second end, and a catheter lumen extending therethrough, and the hemostatic valve coupled to the first end and having a tubular member defining a central lumen fluidly coupled with the catheter lumen and a tensioning mechanism coupled with the tubular member, wherein the tensioning mechanism collapses and seals the central lumen in a first configuration and thereby seals access to the blood vessel;

moving the tensioning mechanism of the hemostatic valve to a second configuration, wherein the central lumen is open and access to the blood vessel is unsealed when the tensioning mechanism is in the second configuration;

advancing a shaft of a tool through the delivery device until a first end of the tool reaches a desired position within the blood vessel of the patient and a portion of the shaft is positioned within the central lumen of the tubular member; and

returning the tensioning mechanism of the hemostatic valve to the first configuration such that the tubular member collapses on the shaft of the tool and seals around the shaft of the tool.

38. The method of example 37, further comprising retracting the shaft of the tool from the delivery device.

39. The method of example 38, wherein the tensioning mechanism is maintained in the first configuration during and after the retracting of the shaft of the tool from the delivery device.

40. The method of example 38 or 39, wherein the tensioning mechanism is moved to the second configuration during the retracting of the shaft of the tool from the delivery device, and wherein the tensioning mechanism is returned to the first configuration after the shaft of the tool is retracted from the delivery device.

41. The method of any one of examples 37–40, wherein the tensioning mechanism comprises at least one filament extending at least partially around the tubular member, wherein the at least one filament collapses the tubular member when the tensioning mechanism is in the first configuration.

42. The method of example 41, wherein the at least one filament circumferentially constricts the tubular member to collapse the tubular member when the tensioning mechanism is in the first configuration.

43. The method of example 41 or 42, wherein the hemostatic valve comprises a reinforcement structure located between the at least one filament and the tubular member.

44. The method of any one of examples 41–43, wherein the at least one filament forms a loop around the elongate member, and wherein moving the tensioning mechanism from the second configuration to the first configuration reduces a size of the loop to thereby constrict the tubular member within the loop.

45. The method of any one of examples 41–44, wherein the filament forms at least one bight around a portion of the elongate member.

46. The method of example 45, wherein the filament comprises a first filament and a second filament, and wherein the at least one bight comprises a first bight oriented in a first direction and formed by the first filament and a second bight oriented in a second direction and formed by the second filament, wherein the first and second bights overlap to encircle a portion of the tubular member within an constricting area.

47. The method of example 46, wherein moving the tensioning mechanism from the second configuration to the first configuration comprises moving the first bight in the first direction and the second bight in the direction to reduce the size of the constricting area and collapse and seal the central lumen of the tubular member.

48. The method of any one of examples 37–47, wherein the tensioning mechanism comprises an actuator, and wherein moving the tensioning mechanism to the second configuration comprises manipulating the actuator.

49. The method of any one of examples 37–48, further comprising applying a vacuum to the delivery device to aspirate material through the catheter, wherein the central lumen remains sealed during the aspiration.

50. The method of any one of examples 37–49, wherein the tool comprises a thrombus extraction device.

51. A hemostatic valve for sealing a medical device, the hemostatic valve comprising:

an elongate member having a first end, a second end, and a central lumen comprising a plurality of lumens extending therebetween, wherein the elongate member is pliable; and

an active tensioning mechanism coupled to the elongate member, wherein the tensioning mechanism is moveable between a first configuration wherein the central lumen is constricted and sealed and a second configuration wherein the central lumen is open.

[0082] Other variations are within the spirit of the present invention. Thus, while the invention is susceptible to various modifications and alternative constructions, certain illustrated embodiments thereof are shown in the drawings and have been described above in detail. It should be understood, however, that there is no intention to limit the invention to the specific form or forms disclosed, but on the contrary, the intention is to cover all modifications, alternative constructions, and equivalents falling within the spirit and scope of the invention, as defined in the appended claims.

[0083] In the previous description, various embodiments of the present invention are described. For purposes of explanation, specific configurations and details are set forth in order to provide a thorough understanding of the embodiments. However, it will also be apparent to one skilled in the art that the present invention may be practiced without the specific details. Furthermore, well-known features may be omitted or simplified in order not to obscure the embodiment being described.

[0084] The use of the terms "a" and "an" and "the" and similar referents in the context of describing the invention (especially in the context of the following claims) are to be construed to cover both the singular and the plural, unless otherwise indicated herein or clearly contradicted by context. The terms "comprising," "having," "including," and "containing" are to be construed as open-ended terms (i.e., meaning "including, but not limited to,") unless otherwise noted. The term "connected" is to be construed as partly or wholly contained within, attached to, or joined together, even if there is something intervening. Recitation of ranges of values herein are merely intended to serve as a shorthand method of referring individually to each separate value falling within the range, unless otherwise indicated herein, and each separate value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g., "such as") provided herein, is intended merely to better illuminate embodiments of the invention and does not pose a limitation on the scope of the invention unless otherwise claimed. No language in the specification should be construed as indicating any non-claimed element as essential to the practice of the invention.

[0085] Preferred embodiments of this invention are described herein, including the best mode known to the inventors for carrying out the invention. Variations of those preferred embodiments may become apparent to those of ordinary skill in the art upon reading the foregoing description. The inventors expect skilled artisans to employ such variations as appropriate, and the inventors intend

for the invention to be practiced otherwise than as specifically described herein. Accordingly, this invention includes all modifications and equivalents of the subject matter recited in the claims appended hereto as permitted by applicable law. Moreover, any combination of the above-described elements in all possible variations thereof is encompassed by the invention unless otherwise indicated herein or otherwise clearly contradicted by context.

[0086] All references, including publications, patent applications, and patents, cited herein are hereby incorporated by reference to the same extent as if each reference were individually and specifically indicated to be incorporated by reference and were set forth in its entirety herein.

WHAT IS CLAIMED IS:

1. A valve assembly, comprising:

a tubular member defining a lumen;

a first filament extending in a first loop around the tubular member, wherein the first filament is flexible;

a second filament extending in a second loop around the tubular member, wherein the second filament is flexible;

a pair of actuators movable from a first position to a second position, wherein—

the first filament includes a first portion operably acted upon by a first one of the actuators and a second portion operably acted upon by a second one of the actuators;

the second filament includes a first portion operably acted upon by the first one of the actuators and a second portion operably acted upon by the second one of the actuators;

in the first position, the actuators are positioned to tension the first filament and the second filament thereby decreasing a dimension of the first loop and a dimension of the second loop to constrict the lumen of the tubular member;

in the second position, the actuators are positioned to loosen the first filament and the second filament thereby permitting the tubular member to expand against the first loop and the second loop to increase the dimension of the first loop and the dimension of the second loop to at least partially open the lumen of the tubular member; and

the actuators are biased to the first position.

2. The valve assembly of claim 1 wherein the first loop extends completely around the tubular member, and wherein the second loop extends completely around the tubular member.

3. The valve assembly of claim 1 wherein the first portion of the first filament is a first end portion of the first filament, wherein the second portion of the first filament is a second end portion of the first filament, wherein the first portion of the second filament is a first end portion of

the second filament, and wherein the second portion of the second filament is a second end portion of the second filament.

4. The valve assembly of claim 3 wherein the first end portion of first filament is directly attached to the first one of the actuators, wherein the second end portion of the first filament is directly attached to the second one of the actuators, wherein the first end portion of the second filament is directly attached to the first one of the actuators, and wherein the second end portion of the second filament is directly attached to the second one of the actuators.

5. The valve assembly of claim 1 wherein the tubular member extends along a longitudinal axis, and wherein the first loop is proximate to the second loop along the longitudinal axis.

6. The valve assembly of claim 1 wherein the first filament and the second filament each comprise a plurality of strands woven together.

7. The valve assembly of claim 1 wherein the tubular member is elastically deformable.

8. The valve assembly of claim 1 wherein the tubular member is configured to resiliently expand.

9. The valve assembly of claim 1, further comprising a rigid housing, wherein the tubular member, the first filament, and the second filament are positioned within the housing, and wherein the actuators are movably coupled to the housing.

10. The valve assembly of claim 1 wherein the actuators are depressed toward one another in the second position, and wherein the actuators are moved away from one another in the first position.

11. The valve assembly of claim 1 wherein, in the second position, the tubular member has a diameter of at least 14 French.

12. The valve assembly of claim 1 wherein, in the second position, the tubular member has a diameter of at least 16 French.

13. The valve assembly of claim 1 wherein, in the second position, the tubular member has a diameter of at least 20 French.

14. The valve assembly of claim 1 wherein, in the second position, the tubular member has a diameter of at least 24 French.

15. A valve assembly, comprising:

a tubular member defining a lumen, wherein the tubular member is elastically deformable from a first position in which the lumen is constricted to a second position in which the lumen is at least partially open;

a first actuator;

a second actuator;

a first filament configured in a first loop completely around the tubular member and having a first portion extending from the first loop toward the first actuator and a second portion extending from the first loop toward the second actuator; and

a second filament configured in a second loop completely around the tubular member and having a first portion extending from the second loop toward the first actuator and a second portion extending from the second loop toward the second actuator;

wherein—

the first actuator and the second actuator are biased away from one another to elastically deform the tubular member to the first position by (a) increasing a tension in the first filament to decrease a dimension of the first loop and (b) increasing a tension in the second filament to decrease a dimension of the second loop; and

the first actuator and the second actuator are movable toward one another to permit the tubular member to return to the second position by (a) decreasing the tension in the first filament and (b) decreasing the tension in the second filament.

16. The valve assembly of claim 15 wherein the first actuator and the second actuator each comprise a button.

17. The valve assembly of claim 15 wherein the first filament is flexible, and wherein the second filament is flexible.

18. The valve assembly of claim 15 wherein the first portion of first filament is directly attached to the first actuator, wherein the second portion of the first filament is directly attached to the second actuator, wherein the first portion of the second filament is directly attached to the first actuator, and wherein the second portion of the second filament is directly attached to the second actuator.

19. The valve assembly of claim 15 wherein the tubular member extends along a longitudinal axis, wherein the first portion of the first filament extends toward the first actuator along a first axis extending generally orthogonal to the longitudinal axis proximate the tubular member, wherein the second portion of the first filament extends toward the second actuator along a second axis extending generally orthogonal to the longitudinal axis proximate the tubular member, wherein the first portion of the second filament extends toward the first actuator along a third axis extending generally orthogonal to the longitudinal axis proximate the tubular member, wherein the second portion of the second filament extends toward the second actuator along a fourth axis extending generally orthogonal to the longitudinal axis proximate the tubular member, wherein the second axis is positioned between the first axis and the fourth axis, and wherein the fourth axis is positioned between the second axis and the third axis.

20. The valve assembly of claim 15 wherein, in the second position, the tubular member has a diameter of at least 16 French.

21. The valve assembly of claim 15 wherein, in the second position, the tubular member has a diameter of at least 20 French.

22. The valve assembly of claim 15 wherein, in the second position, the tubular member has a diameter of at least 24 French.

23. A valve assembly, comprising:

a tubular member defining a lumen;

a first filament extending in a first loop around the tubular member;

a second filament extending in a second loop around the tubular member; and

a pair of actuators biased to circumferentially constrict the first loop and the second loop to elastically deform the tubular member to a first position in which the lumen is constricted, wherein at least one the actuators is movable to decrease a level of tension in the first filament and a level of tension in the second filament to permit the tubular member to expand against the first loop and the second loop to a second position in which the lumen of the tubular member is at least partially open.

24. The valve assembly of claim 23 wherein the actuators each comprise a button.

25. The valve assembly of claim 23 wherein the first filament includes a first portion operably coupled to a first one of the actuators and a second portion operably coupled to a second one of the actuators, and wherein the second filament includes a first portion operably coupled to the first one of the actuators and a second portion operably coupled to the second one of the actuators.

26. The valve assembly of claim 25 wherein the first portion of first filament is directly attached to the first one of the actuators, wherein the second portion of the first filament is directly attached to the second one of the actuators, wherein the first portion of the second filament is directly attached to the first one of the actuators, and wherein the second portion of the second filament is directly attached to the second one of the actuators.

27. The valve assembly of claim 23 wherein the first filament is flexible, and wherein the second filament is flexible.

28. The valve assembly of claim 23 wherein, in the second position, the tubular member has a diameter of at least 16 French.

29. The valve assembly of claim 23 wherein, in the second position, the tubular member has a diameter of at least 20 French.

30. The valve assembly of claim 23 wherein, in the second position, the tubular member has a diameter of at least 24 French.

ABSTRACT OF THE DISCLOSURE

Devices, systems, and methods for sealing medical devices, particularly during intravascular access, are disclosed herein. Some aspects relate to a hemostatic valve for sealing a wide range of medical devices, such as catheters, wires, embolectomy systems. The valve can include an elongate member having a first end, a second end, and a central lumen extending therebetween. A reinforcement structure extends along at least a portion of the elongate member and is coupled to the elongate member. A shell defining a first aperture and a second aperture may be included, which first and second apertures can be fluidly coupled by the elongate member. A tensioning mechanism is coupled to the shell and to the elongate member, the tensioning mechanism can be moveable between a first configuration wherein the tensioning mechanism is collapsed and the central lumen is sealed and a second configuration wherein the central lumen is open.