UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/941,117	07/19/2022	11389310	426/2/12 UTIL	1876

175373 7590 06/29/2022

Aortic Innovations, LLC
4917 Waters Edge Drive, Suite 275
Raleigh, NC 27606

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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 Application Information Retrieval (PAIR) WEB site (http://pair.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 PAIR WEB site http://pair.uspto.gov for additional inventors):

Ali Shahriari, Boca Raton, FL;

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Aortic Innovations, LLC, Boca Raton, FL;

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.

Edwards v. Aortic Innovations
U.S. Patent 11,389,310
Edwards Ex. 1002

UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/941,117	07/28/2020	Ali Shahriari	426/2/12 UTIL	1876

175373 7590 06/20/2022

Aortic Innovations, LLC
4917 Waters Edge Drive, Suite 275
Raleigh, NC 27606

EXAMINER	
SHIPMON, TIFFANY P	

ART UNIT	PAPER NUMBER
3774	

NOTIFICATION DATE	DELIVERY MODE
06/20/2022	ELECTRONIC

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

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

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

usptomail@nkpatentlaw.com

Response to Rule 312 Communication	Application No.	Applicant(s)	
	16/941,117	Shahriari, Ali	
	Examiner	Art Unit	AIA (FITF) Status
	TIFFANY P SHIPMON	3774	No

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

1. ☑ The amendment filed on 06 June 2022 under 37 CFR 1.312 has been considered, and has been:

a) ☑ entered.

b) ☐ entered as directed to matters of form not affecting the scope of the invention.

c) ☐ disapproved because the amendment was filed after the payment of the issue fee.

Any amendment filed after the date the issue fee is paid must be accompanied by a petition under 37 CFR 1.313(c)(1) and the required fee to withdraw the application from issue.

d) ☐ disapproved. See explanation below.

e) ☐ entered in part. See explanation below.

f) ☐ not entered because the supplemental or corrected Application Data sheet (ADS)

☐ was not accompanied by a petition to accept an unintentionally delayed claim under 37 CFR 1.55 or 27 CFR 1.78;

☐ did not identify the information being changed in accordance with 37 CFR 1.76(c)(2);

☐ was not properly signed in accordance with 37 CFR 1.76(e) (or 37 CFR 1.33(b) for applications filed prior to September 16, 2012).

/Jennifer Dieterle/ Supervisory Patent Examiner, Art Unit 3774	/TIFFANY P SHIPMON/ Examiner, Art Unit 3774

OK TO ENTER: /T.P.S/ 06/14/2022

COMMUNICATION TO THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	16/941,117	Confirmation No.:	1876
Applicant	:	Aortic Innovations, LLC		
First Named Inventor	:	Ali Shahriari		
Filing Date	:	July 28, 2020		
TC/A.U.	:	3774		
Examiner	:	Shipmon, Tiffany		
Docket No.	:	426/2/12 UTIL		
Customer No.	:	175373		

Title of Invention: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

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

312 AMENDMENT

Amendments to the Abstract are being offered with this response.

Remarks begin on page 3 of this paper.

Document Description: Issue Fee Payment (PTO-85B)

Issue Fee Transmittal Form

Application Number	Filing Date	First Named Inventor	Atty. Docket No.	Confirmation No.
16941117	28-Jul-2020	Ali Shahriari	426/2/12 UTIL	1876

TITLE OF INVENTION :

DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

Entity Status	Application Type	Art Unit	Class - Subclass	EXAMINER
Small	Utility under 35 USC 111(a)	3774	001200	

Issue Fee Due	Publication Due	Total Fee(s) Due	Date Due	Prev. Paid Fee
$600	$0	$600	06-Sep-2022	$0

1.Change of Correspondence Address and/or Indication Of Fee Address (37 CFR 1.33 & 1.363)

Current Correspondence Address:	Current Indicated Fee Address :
175373 Aortic Innovations, LLC 4917 Waters Edge Drive, Suite 275 Raleigh NC 27606 UNITED STATES 919-348-2194 usptomail@nkpatentlaw.com	
☐ Change of correspondence address requested, system generated AIA/122-EFS form attached	☐ Fee Address indication requested, system generated SB/47-EFS form attached

2.Entity Status

Change in Entity Status

○ Applicant certifying micro entity status; system generated Micro Entity certification form attached. See 37 CFR 1.29.
Note: Absent a valid certification of micro entity status, issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment. If this box is checked, you will be prompted to choose a micro entity status on the gross income basis (37 CFR 1.29(a)) or the institution of higher education basis (37 CFR 1.29(d)), and make the applicable certification online.

◉ 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.

3.The Following Fee(s) Are Submitted:

☒ Issue Fee	☐ I authorize USPTO to apply my previously paid issue fee to the current fees due
☐ Publication Fee	☐ The Director is hereby authorized to apply my previously paid issue fee to the current fee due and to charge deficient fees to Deposit Account Number _____
☐ Advance Order - # of copies _____	☐ If **in addition to** the payment of the issue fee amount submitted with this form, there are any discrepancies in any amount(s) due, the Director is authorized to charge any deficiency, or credit any overpayment, to Deposit Account Number _____ . The **issue fee must be submitted** with this form. **If payment of the issue fee does not accompany this form, checking this box and providing a deposit account number will NOT be effective to satisfy full payment of the fee(s) due.**

4.Firm and/or Attorney Names To Be Printed

NOTE: If no name is listed, no name will be printed
For printing on the patent front page, list to be displayed as entered

1. NK Patent Law
2.
3.

5.Assignee Name(s) and Residence Data To Be Printed

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

Name	City	State	Country	Category
Aortic Innovations, LLC	Hillsboro Beach	FLORIDA	UNITED STATES	other

6.Signature

I certify, in accordance with 37 CFR 1.4(d)(4) that I am an attorney or agent registered to practice before the Patent and Trademark Office who has filed and has been granted power of attorney in this application. I also certify that this Fee(s) Transmittal form is being transmitted to the USPTO via EFS-WEB on the date indicated below.

Signature	/Justin R. Nifong/	**Date**	06-06-2022
Name	Justin Robert Nifong	**Registration Number**	59389

Electronic Patent Application Fee Transmittal	
Application Number:	16941117
Filing Date:	28-Jul-2020
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Filer:	Justin Robert Nifong
Attorney Docket Number:	426/2/12 UTIL
Filed as Small Entity	
Filing Fees for Utility under 35 USC 111(a)	

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY APPL ISSUE FEE	2501	1	600	600
PUBL. FEE- EARLY, VOLUNTARY, OR NORMAL	1504	1	0	0
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**600**

Electronic Acknowledgement Receipt	
EFS ID:	45878319
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	175373
Filer:	Justin Robert Nifong
Filer Authorized By:	
Attorney Docket Number:	426/2/12 UTIL
Receipt Date:	06-JUN-2022
Filing Date:	28-JUL-2020
Time Stamp:	06:32:18
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$600
RAM confirmation Number	E202266732144272
Deposit Account	506191
Authorized User	Justin Nifong
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.20 (Post Issuance fees) 37 CFR 1.21 (Miscellaneous fees and charges)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	Web85b.pdf	62460 c5ee24065f14e93639e95153193435d444896748	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	40337 0986ed3b0cceb6c531365edac5bedc89fb5c839b	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	102797		

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

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

COMMUNICATION TO THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	16/941,117	Confirmation No.:	1876
Applicant	:	Aortic Innovations, LLC		
First Named Inventor	:	Ali Shahriari		
Filing Date	:	July 28, 2020		
TC/A.U.	:	3774		
Examiner	:	Shipmon, Tiffany		
Docket No.	:	426/2/12 UTIL		
Customer No.	:	175373		

Title of Invention: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

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

312 AMENDMENT

Amendments to the Abstract are being offered with this response.

Remarks begin on page 3 of this paper.

Amendments to the Abstract:

Please amend the abstract as shown:

~~A prosthetic component for repair of a patient's aorta includes an uncovered portion spanning the innominate arteries, and a graft material on a proximal end thereof.~~ A transcatheter valve includes an outer seal made of outwardly extending fibers and is configured for transfemoral delivery within a patient.

REMARKS

This 312 amendment is in response to the Notice of Allowance mailed June 6, 2022.

The amendment is presented for purposes of better defining the abstract. No new matter is being added pursuant to this amendment.

DEPOSIT ACCOUNT

The Commissioner is hereby authorized to charge any otherwise unpaid fees associated with the filing of this correspondence to Deposit Account No. **50-6191**.

Respectfully submitted,

Date: June 6, 2022

/Justin R. Nifong/
Justin R. Nifong
Reg. No. 59,389

NK Patent Law
4917 Waters Edge Drive, Suite 275
Raleigh, NC 27606
Telephone: (919) 348-2194
Facsimile: (919) 882-8195

Customer No. 175373

Electronic Acknowledgement Receipt	
EFS ID:	45878316
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	175373
Filer:	Justin Robert Nifong
Filer Authorized By:	
Attorney Docket Number:	426/2/12 UTIL
Receipt Date:	06-JUN-2022
Filing Date:	28-JUL-2020
Time Stamp:	06:29:33
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		426-2-12-UTIL-312-amendment.pdf	130429 9e3b4e106ebda076222688236bfd870448c2e0ad	yes	3

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment after Notice of Allowance (Rule 312)	1	1
	Abstract	2	2
	Applicant Arguments/Remarks Made in an Amendment	3	3
Warnings:			
Information:			
	Total Files Size (in bytes):	130429	

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.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
<u>National Stage of an International Application under 35 U.S.C. 371</u>
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.
<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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NOTICE OF ALLOWANCE AND FEE(S) DUE

175373 7590 06/06/2022

Aortic Innovations, LLC
4917 Waters Edge Drive, Suite 275
Raleigh, NC 27606

EXAMINER	
SHIPMON, TIFFANY P	
ART UNIT	PAPER NUMBER
3774	

DATE MAILED: 06/06/2022

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/941,117	07/28/2020	Ali Shahriari	426/2/12 UTIL	1876

TITLE OF INVENTION: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$600	$0.00	$0.00	$600	09/06/2022

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 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees 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.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

175373 7590 06/06/2022
Aortic Innovations, LLC
4917 Waters Edge Drive, Suite 275
Raleigh, NC 27606

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/941,117	07/28/2020	Ali Shahriari	426/2/12 UTIL	1876

TITLE OF INVENTION: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$600	$0.00	$0.00	$600	09/06/2022

EXAMINER	ART UNIT	CLASS-SUBCLASS
SHIPMON, TIFFANY P	3774	623-001200

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) ❑Advance Order - # of Copies _____

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

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/941,117	07/28/2020	Ali Shahriari	426/2/12 UTIL	1876

175373 7590 06/06/2022

Aortic Innovations, LLC
4917 Waters Edge Drive, Suite 275
Raleigh, NC 27606

EXAMINER	
SHIPMON, TIFFANY P	
ART UNIT	PAPER NUMBER
3774	

DATE MAILED: 06/06/2022

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

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

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

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

Notice of Allowability	Application No. 16/941,117	Applicant(s) Shahriari, Ali	
	Examiner TIFFANY P SHIPMON	Art Unit 3774	AIA (FITF) Status No

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

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to the amendment filed 5/11/2022.
   ☐ 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 31,34 and 36-48 . 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 _____.

/Jennifer Dieterle/ Supervisory Patent Examiner, Art Unit 3774	/TIFFANY P SHIPMON/ Examiner, Art Unit 3774

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application is being examined under the pre-AIA first to invent provisions.

Reasons for Allowance

2. Claims 31, 34 and 36-48 are allowed.

3. The following is an examiner's statement of reasons for allowance: the prior art does not disclose or render obvious wherein the plurality of fibers is in contact with the outer frame along the height of the sealing material when the heart valve assembly is in the radially compressed orientation and the radially expanded orientation in combination with the recited claim features.

4. Additionally, applicant is claiming arcuate 'curved' fibers, which are shown in Fig. 8 of the instant application.

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 TIFFANY P SHIPMON whose telephone number is (571)270-1448. The examiner can normally be reached MONDAY-FRIDAY.

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, Jennifer Dieterle can be reached on 571-270-7872. 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.

/TIFFANY P SHIPMON/
Examiner, Art Unit 3774

/Jennifer Dieterle/
Supervisory Patent Examiner, Art Unit 3774

Notice of References Cited	Application/Control No. 16/941,117	Applicant(s)/Patent Under Reexamination Shahriari, Ali	
	Examiner TIFFANY P SHIPMON	Art Unit 3774	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20130304200-A1	11-2013	McLean; Matt	A61F2/2445	623/2.18
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	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 MM-YYYY format are publication dates. Classifications may be US or foreign.

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/941,117	Shahriari, Ali
	Examiner	**Art Unit**
	TIFFANY P SHIPMON	3774

CPC						
Symbol					**Type**	**Version**
A61F	/	2	/	856	F	2013-01-01
A61F	/	2	/	07	I	2013-01-01
A61F	/	2	/	2418	I	2013-01-01
A61F	/	2	/	962	I	2013-01-01
A61F	/	2	/	82	I	2013-01-01
A61F	/	2002	/	061	A	2013-01-01
A61F	/	2220	/	0025	A	2013-01-01
A61F	/	2230	/	0067	A	2013-01-01
A61F	/	2002	/	067	A	2013-01-01
A61F	/	2220	/	0008	A	2013-01-01
A61F	/	2220	/	0016	A	2013-01-01
A61F	/	2230	/	001	A	2013-01-01
A61F	/	2250	/	0048	A	2013-01-01
A61F	/	2	/	89	A	2013-01-01
A61F	/	2	/	90	A	2013-01-01
A61F	/	2220	/	0058	A	2013-01-01
A61F	/	2220	/	0075	A	2013-01-01
A61F	/	2230	/	0034	A	2013-01-01
A61F	/	2	/	24	A	2013-01-01
A61F	/	2	/	86	A	2013-01-01
A61F	/	2250	/	0069	A	2013-01-01
A61F	/	2210	/	0014	A	2013-01-01
A61F	/	2210	/	0057	A	2013-01-01
A61F	/	2210	/	00	A	2013-01-01

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

/TIFFANY P SHIPMON/ Examiner, Art Unit 3774 (Assistant Examiner)	20 May 2022 (Date)	**Total Claims Allowed:** 15	
/Jennifer Dieterle/ Supervisory Patent Examiner, Art Unit 3774 (Primary Examiner)	20 May 2022 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

U.S. Patent and Trademark Office — Part of Paper No.: 20220515

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/941,117	Shahriari, Ali
	Examiner	**Art Unit**
	TIFFANY P SHIPMON	3774

INTERNATIONAL CLASSIFICATION				
CLAIMED				
A61F	/	2	/	07

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

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

/TIFFANY P SHIPMON/ Examiner, Art Unit 3774	20 May 2022	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	15	
/Jennifer Dieterle/ Supervisory Patent Examiner, Art Unit 3774	20 May 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office — Part of Paper No.: 20220515

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/941,117	Shahriari, Ali
	Examiner	**Art Unit**
	TIFFANY P SHIPMON	3774

☐ 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	31	7	40												
-	32	8	41												
-	33	9	42												
5	34	10	43												
-	35	11	44												
2	36	12	45												
3	37	13	46												
4	38	14	47												
6	39	15	48												

/TIFFANY P SHIPMON/ Examiner, Art Unit 3774 (Assistant Examiner)	20 May 2022 (Date)	**Total Claims Allowed:** 15	
/Jennifer Dieterle/ Supervisory Patent Examiner, Art Unit 3774 (Primary Examiner)	20 May 2022 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

U.S. Patent and Trademark Office Part of Paper No.: 20220515

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/941,117	Shahriari, Ali
	Examiner	Art Unit
	TIFFANY P SHIPMON	3774

CPC - Searched*		
Symbol	Date	Examiner
A61F 2/856,07,2418,82,90, 2210/0014	10/21/2021	T.S.

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.

	/TIFFANY P SHIPMON/ Examiner, Art Unit 3774

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/941,117	Shahriari, Ali
	Examiner	Art Unit
	TIFFANY P SHIPMON	3774

Search Notes		
Search Notes	**Date**	**Examiner**
IPR2021-01527 Reviewed Petition for Inter Partes Review of US Patent No. 10,792,172 on 10/20/2021	10/21/2021	T.S.
EAST Search History	10/21/2021	T.S.
Consulted with Leslie Lopez	11/29/2021	T.S.
Updated EAST Search	12/02/2021	T.S.
Consulted with Leslie Lopez	01/05/2022	T.S.
Updated EAST Search	01/10/2022	T.S.
Updated EAST Search	03/08/2022	T.S.
IPR2022-00556 Reviewed Petition for Inter Partes Review of US Patent No. 10,987,236 on March 8, 2022	03/08/2022	T.S.
IPR2022-00549 Reviewed Petition for Inter Partes Review of US Patent No. 11,129,735 on March 8, 2022	03/08/2022	T.S.
Consulted with Primary Examiner Seema Mathew	03/23/2022	T.S.
Consulted with Primary Examiner Leslie Lopez	05/20/2022	T.S.

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
A61F	2/07	01/10/2022	T.S.

	/TIFFANY P SHIPMON/ Examiner, Art Unit 3774

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. 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	16941117
Filing Date	2020-07-28
First Named Inventor	Ali Shahriari
Art Unit	3774
Examiner Name	SHIPMON, TIFFANY P
Attorney Docket Number	426/2/12 UTIL

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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, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.P.S/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Filing Date	2020-07-28
	First Named Inventor	Ali Shahriari
	Art Unit	3774
	Examiner Name	SHIPMON, TIFFANY P
	Attorney Docket Number	426/2/12 UTIL

	1	Inter Partes Review IPR2021-01584 dated April 1, 2022	
	2	Inter Partes Review IPR2021-01527 dated March 17, 2022	
	3	EP Examination report dated March 11, 2022 for EP Application No. 20172681.7	
	4	Inter Partes Review IPR2022-00034 dated April 1, 2022	
	5	Inter Partes Review IPR2022-00193 dated April 25, 2022	

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature	/TIFFANY P SHIPMON/	Date Considered	05/20/2022

*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.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.P.S/

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	Art Unit	3774
	Examiner Name	SHIPMON, TIFFANY P
	Attorney Docket Number	426/2/12 UTIL

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.

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

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Justin R. Nifong/	Date (YYYY-MM-DD)	2022-05-09
Name/Print	Justin R. Nifong	Registration Number	59389

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

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

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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)).

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.P.S/

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S2	3	(("7799072") or ("8002826") or ("7947074")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2014/06/28 22:05
S3	21	("20120046726" | "7018404" | "7799072" | "8016877" | "20070250146" | "6334868" | "7510574" | "8002826" | "20070276464" | "6752829" | "5102417" | "7947074" | "20070095283" | "20110257731" | "7393360" | "7914569" | "8226710" | "20040210304" | "5397355" | "7780726" | "20050197687" | "20060149351" | "20090198315" | "20100042202" | "7252682" | "20030040771" | "20120089218" | "5716393" | "6254632" | "20090125098" | "6582462" | "7771467" | "8206438" | "20080132999" | "20090099644" | "8425584").PN.	USPAT	OR	OFF	2014/06/28 23:06
S4	36	("20120046726" | "7018404" | "7799072" | "8016877" | "20070250146" | "6334868" | "7510574" | "8002826" | "20070276464" | "6752829" | "5102417" | "7947074" | "20070095283" | "20110257731" | "7393360" | "7914569" | "8226710" | "20040210304" | "5397355" | "7780726" | "20050197687" | "20060149351" | "20090198315" | "20100042202" | "7252682" | "20030040771" | "20120089218" | "5716393" | "6254632" | "20090125098" | "6582462" | "7771467" | "8206438" | "20080132999" | "20090099644" | "8425584").PN.	US-PGPUB; USPAT	OR	OFF	2014/06/28 23:24
S5	317	(623/2.14).CCLS.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	OFF	2014/06/28 23:30

S7	38	a61f2/2418	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/06/28 23:31
S8	59	a61f2/2412	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/06/28 23:31
S9	41	a61f2/2436	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/06/28 23:31
S10	17	a61f2/2433	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/06/28 23:31
S11	11	a61f2/2475	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/06/28 23:31
S12	1	"13706896"	US-PGPUB; USPAT	OR	OFF	2014/06/29 16:46
S13	2,346	623/1.12	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:07
S14	401	S13 and fibers	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:07
S15	3	S13 and ((fibers with collagen) same migration)	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:12
S16	30	S13 and ((fibers with collagen))	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:13
S17	74	623/1.13 and ((fibers with collagen))	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:43
S18	2,377	stent and graft and fibers and migration	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:48
S19	317	(623/2.14).CCLS.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	OFF	2014/06/29 18:49
S20	19	S19 and S18	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:49
S21	21	("20120046726" | "7018404" | "7799072" | "8016877" | "20070250146" | "6334868" | "7510574" | "8002826" | "20070276464" | "6752829" | "5102417" | "7947074" |	USPAT	OR	OFF	2014/06/29 18:52

		"20070095283" | "20110257731" | "7393360" | "7914569" | "8226710" | "20040210304" | "5397355" | "7780726" | "20050197687" | "20060149351" | "20090198315" | "20100042202" | "7252682" | "20030040771" | "20120089218" | "5716393" | "6254632" | "20090125098" | "6582462" | "7771467" | "8206438" | "20080132999" | "20090099644" | "8425584").PN.				
S22	1	S21 and fibers	USPAT	OR	OFF	2014/06/29 18:52
S23	3	S21 and fiber	USPAT	OR	OFF	2014/06/29 18:53
S24	3	S21 and fiber	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	OFF	2014/06/29 18:53
S25	1	("7799072").PN.	USPAT; USOCR	OR	OFF	2014/07/14 09:28
S26	3	meretei.in.	USPAT	OR	OFF	2014/07/14 09:28
S27	14	(("7799072") or ("8002826") or ("7947074")).PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2014/07/14 09:28
S28	0	"13706896"	USPAT	OR	OFF	2014/11/30 19:33
S29	1	"13706896"	US-PGPUB; USPAT; USOCR	OR	OFF	2014/11/30 19:33
S30	7	"7799072"	US-PGPUB; USPAT; USOCR	OR	OFF	2014/11/30 19:34
S31	369	(623/2.14).CCLS.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	OFF	2014/11/30 19:47
S32	2,016	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/11/30 19:59

S33	915	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/11/30 19:59
S34	0	a61f2/2418.cpc	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/11/30 20:38
S35	2,002	(623/1.35-1.36).CCLS.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2014/12/01 10:28
S39	2,556	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2016/02/08 10:24
S40	3,379	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2016/02/08 11:47
S41	2	("13706869").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2016/02/08 11:49
S42	2	("13706896").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2016/02/08 11:51
S46	1	("14614628").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/03/20 19:27
S47	1	("7799072").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/05/15 06:58
S48	2	("7799072").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/05/15 08:28
S49	4	("20080132993" | "20140336749").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/05/15 08:29

S50	2	("7799072").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/05/15 08:29
S51	0	("14445833").PN.	USPAT; USOCR	OR	OFF	2017/05/15 08:32
S52	18	("20050177222" | "20070067014" | "20100268318" | "6152956" | "20060276883" | "20070112411" | "20030220683" | "20040106981" | "20100094409").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2017/05/15 08:33
S53	651	623/2.14	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/05/15 08:35
S54	1	("20070067014").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/09/17 00:05
S55	4,867	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/09/17 00:12
S56	3,429	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/09/17 00:12
S57	2,489	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/09/17 00:13
S58	1,308	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/09/17 00:13
S59	1,182	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/09/17 00:13
S60	1	("14614628").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/09/17 16:01
S61	1	("20070067014").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/09/17 16:11
S62	1	("20080132993").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/09/18 08:47

S63	1,461	carpentier.in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2018/01/11 08:54
S64	61	carpentier.in. and aorta	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2018/01/11 09:32
S65	3	"20050102018"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2018/01/11 09:39
S66	6	(US-20070168013-$ | US-20140172064-$ | US-20140316513-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:13
S67	1	("7799072").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/05 09:42
S68	6,135	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58
S69	4,276	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58
S70	3,295	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58
S71	1,674	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58
S72	1,322	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58
S73	9,150	S68 S69 S70 S71 S72	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58

S74	6,389	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
S75	4,396	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
S76	3,436	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
S77	1,760	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
S78	1,352	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
S79	9,503	S74 S75 S76 S77 S78	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
S80	9,503	S74 S75 S76 S77 S78 S79	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
S81	4,461	S80 and (artery arteries)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/04/15 09:06
S82	1,118	S80 and (artery arteries) and (aortic near arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/04/15 09:09
S83	6,421	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S84	4,413	a61f2/2412.cpc.	US-PGPUB; USPAT;	OR	OFF	2019/04/29 11:05

			EPO; JPO; DERWENT			
S85	3,462	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S86	1,773	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S87	1,354	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S88	9,549	S83 S84 S85 S86 S87	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S89	9,549	S83 S84 S85 S86 S87 S88	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S90	1,126	S89 and (artery arteries) and (aortic near arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/04/29 11:05
S91	1	("20090254172").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/05/14 15:40
S92	9	("20060155366" | "20100049313" | "6258117").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:09
S93	2	("20080262592").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:10
S94	6	("20070168013" | "20140172064" | "20140316513").PN.	US-PGPUB; USPAT; USOCR;	OR	OFF	2019/07/21 10:10

			FPRS; EPO; JPO; DERWENT			
S95	6	("20020177890" | "5976179").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:10
S96	3	"20140316513"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:19
S97	2	"20070168013"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:20
S98	4	"20140172065"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:21
S99	6	"20100049313"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:26
S100	2	"20060155366"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:29
S101	6,666	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S102	4,593	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S103	3,601	a61f2/2436.cpc.	US-PGPUB; USPAT;	OR	OFF	2019/07/21 10:35

			EPO; JPO; DERWENT			
S104	1,864	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S105	1,380	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S106	9,898	S101 S102 S103 S104 S105	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S107	9,898	S101 S102 S103 S104 S105 S106	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S108	1,179	S107 and (artery arteries) and (aortic near arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/07/21 10:35
S109	4	"20070067014"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/07/21 11:44
S110	4	"14614628"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/07/21 12:36
S111	7,098	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S112	4,889	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S113	3,856	a61f2/2436.cpc.	US-PGPUB; USPAT;	OR	OFF	2019/12/08 16:15

			EPO; JPO; DERWENT			
S114	1,965	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S115	1,422	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S116	10,508	S111 S112 S113 S114 S115	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S117	10,508	S111 S112 S113 S114 S115 S116	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S118	1,256	S117 and (artery arteries) and (aortic near arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/12/08 16:15
S120	7,401	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S121	5,076	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S122	4,040	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S123	2,043	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S124	1,443	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S125	10,919	S120 S121 S122 S123 S124	US-PGPUB; USPAT;	OR	OFF	2020/03/13 11:45

			EPO; JPO; DERWENT			
S126	10,919	S120 S121 S122 S123 S124 S125	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S127	1,305	S126 and (artery arteries) and (aortic near arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/03/13 11:45
S128	7,401	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S129	5,076	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S130	4,040	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S131	2,043	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S132	1,443	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S133	10,919	S128 S129 S130 S131 S132	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S134	10,919	S128 S129 S130 S131 S132 S133	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S135	966	S134 and (stent and artery and seal$4 and arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2020/03/13 14:56

			JPO; DERWENT			
S136	5,500	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S137	24,545	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S138	15,139	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S139	16,719	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S140	3,555	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S141	11,168	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S142	1,881	(S136 S137 S138 S139 S140 S141) and (stent and artery and seal$4 and arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:02
S143	1	("9044311").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/03/13 20:21
S144	25	(US-10034784-$ | US-10065824-$ | US-16788806-$ | US-19857887-$ | US-	US-PGPUB; USPAT	OR	OFF	2020/03/13 21:45

		20010044650-$ | US-20020082684-$ | US-20040249399-$ | US-20070219613-$ | US-20090036977-$ | US-20090099650-$ | US-20100087907-$ | US-20130013050-$ | US-3002816-$ | US-3025694-$ | US-3220613-$ | US-3289282-$ | US-3482228-$ | US-3506622-$ | US-3545549-$ | US-3562673-$ | US-3652198-$ | US-3715337-$ | US-3757263-$ | US-5464721-$ | US-5609627-$ | US-5773457-$ | US-5814752-$).DID.				
S145	0	(DE-10065824-$ | DE-19857887-$ | AI-20010044650-$ | AI-20020082684-$ | AI-20040249399-$ | AI-20070219613-$ | AI-20090036977-$ | AI-20090099650-$ | AI-20100087907-$ | AI-20130013050-$ | NO-2013040663-$ | NO-2013059596-$ | NO-2014072501-$ | BI-3482228-$ | VA-223131450-$).DID.	US-PGPUB; USPAT	OR	OFF	2020/03/13 21:46
S146	0	"16788806"	US-PGPUB; USPAT	OR	OFF	2020/03/13 21:47
S147	1	("20080132993").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/04/11 20:50
S148	4	"20070067014"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 10:30
S149	5	"20080132993"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 11:39
S150	14	"13706896"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 12:11
S151	1	"16788806"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 12:11

S152	15	(US-10478320-$ | US-16788806-$ | US-20050010277-$ | US-20080082159-$ | US-20090264993-$ | US-3226814-$ | US-3402751-$ | US-3408731-$ | US-3574284-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 14:46
S153	13	(US-16788806-$ | US-20040230287-$ | US-20080275548-$ | US-20110257731-$ | US-20120158121-$ | US-3125764-$ | US-3314328-$ | US-3668892-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 14:46
S154	0	(AI-20040230287-$ | AI-20080275548-$ | AI-20110257731-$ | AI-20120158121-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 14:47
S155	3,758	623/1.12	US-PGPUB; USPAT	OR	OFF	2020/06/06 14:43
S156	51	S155 and ((fibers with collagen))	US-PGPUB; USPAT	OR	OFF	2020/06/06 14:43
S157	7,650	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S158	5,220	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S159	4,196	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S160	2,120	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S161	1,463	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S162	11,262	S157 S158 S159 S160 S161	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:44
S163	282	S162 and ((fibers with collagen))	US-PGPUB; USPAT	OR	OFF	2020/06/06 14:44

S164	1	"20040256759"	US-PGPUB; USPAT	OR	OFF	2020/06/06 15:28
S165	119	(US-10028848-$ | US-10034784-$ | US-10065824-$ | US-10321985-$ | US-16808137-$ | US-18153473-$ | US-19857887-$ | US-2858390-$ | US-20010044650-$ | US-20020082684-$ | US-20020177890-$ | US-20030040771-$ | US-20040210304-$ | US-20040249399-$ | US-20050043790-$ | US-20050197687-$ | US-20060149351-$ | US-20060155366-$ | US-20070067014-$ | US-20070095283-$ | US-20070168013-$ | US-20070203559-$ | US-20070219613-$ | US-20070250146-$ | US-20070276464-$ | US-20080132993-$ | US-20080132999-$ | US-20080262592-$ | US-20080275548-$ | US-20090036977-$ | US-20090099644-$ | US-20090099650-$ | US-20090125098-$ | US-20090171456-$ | US-20090198315-$ | US-20090312834-$ | US-20100042202-$ | US-20100049313-$ | US-20100087907-$ | US-20100094409-$ | US-20110257731-$ | US-20120046726-$ | US-20120089218-$ | US-20130013050-$ | US-20130144373-$ | US-20140046428-$ | US-20140172064-$ | US-20140316513-$ | US-20140336749-$ | US-20160022450-$ | US-20160270935-$ | US-20170209254-$ | US-2787925-$ | US-3002816-$ | US-3002826-$ | US-3005270-$ | US-3016877-$ | US-3021408-$ | US-3025694-$ | US-3034007-$ | US-3095343-$ | US-3102417-$ | US-3114001-$ | US-3157174-$ | US-3179931-$ | US-3206438-$ | US-3220613-$ | US-3220899-$ | US-3226710-$ | US-3258117-$ | US-3269739-$ | US-3289282-$ | US-3314324-$ | US-3358140-$ | US-3393021-$ | US-3393136-$ | US-3394119-$ | US-3397355-$ | US-3398701-$ | US-3414635-$ | US-3419788-$ | US-3425584-$ | US-3452070-$ | US-3482228-$ | US-3506622-$ | US-3545549-$ | US-3561102-$ | US-3562673-$ | US-3582462-$ | US-3603156-$ | US-3617234-$ | US-3623067-$ | US-	US-PGPUB; USPAT	OR	OFF	2020/06/06 16:05

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S166	15	(DE-10065824-$ | DN-102014805-$ | DE-19857887-$ | AI-20010044650-$ | AI-20020082684-$ | AI-20020177890-$ | AI-20030040771-$ | AI-20040210304-$ | AI-20040249399-$ | NO-2004089249-$ | AI-20050043790-$ | AI-20050197687-$ | NO-2005087117-$ | AI-20060149351-$ | AI-20060155366-$ | NO-2006127412-$ | AI-20070067014-$ | AI-20070095283-$ | AI-20070168013-$ | AI-20070203559-$ | AI-20070219613-$ | AI-20070250146-$ | AI-20070276464-$ | AI-20080132993-$ | AI-20080132999-$ | AI-20080262592-$ | AI-20080275548-$ | AI-20090036977-$ | AI-20090099644-$ | AI-20090099650-$ | AI-20090125098-$ | AI-20090171456-$ | AI-20090198315-$ | AI-20090312834-$ | AI-20100042202-$ | AI-20100049313-$ | NO-2010006627-$ | AI-20100087907-$ | AI-20100094409-$ | NO-2010031060-$ | NO-2010105195-$ | AI-20110257731-$ | NO-2011035154-$ | JP-2011502628-$ | JP-2011507658-$ | AI-20120046726-$ | AI-20120089218-$ | NO-2012147675-$ | AI-20130013050-$ | AI-20130144373-$ | NO-2013040663-$ | NO-2013059596-$ | NO-2013086132-$ | AI-20140046428-$ | AI-20140172064-$ | AI-20140316513-$ | AI-20140336749-$ | NO-2014072501-$ | AI-20160022450-$ | AI-20160270935-$ | AI-20170209254-$ | EP-2787925-$ | BI-3482228-$ | BI-3582462-$ | BI-	US-PGPUB; USPAT; USOCR; FPRS; EPO; DERWENT	OR	OFF	2020/06/06 16:05

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S167	34	(US-16808137-$ | US-20020052649-$ | US-20040243221-$ | US-20040256759-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20090105805-$ | US-20100204781-$ | US-20120123529-$ | US-20120296418-$ | US-20130090729-$ | US-3370418-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; DERWENT	OR	OFF	2020/06/06 16:07
S168	1	(AI-20020052649-$ | AI-20040243221-$ | AI-20040256759-$ | JP-2005124959-$ | NO-2006005015-$ | AI-20070179591-$ | AI-20070213815-$ | AI-20070219620-$ | AI-20080021547-$ | AI-20090105805-$ | AI-20100204781-$ | AI-20120123529-$ | AI-20120296418-$ | AI-20130090729-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; DERWENT	OR	OFF	2020/06/06 16:07
S169	6	((frame with (inner and outer) same seal$4) same graft) and (heart with valve)	US-PGPUB; USPAT	OR	OFF	2020/06/06 16:53
S170	7	((frame same (inner and outer) same seal$4) same graft) and (heart with valve)	US-PGPUB; USPAT	OR	OFF	2020/06/06 17:50
S171	1	("9370419").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/06 19:30
S172	627	("20010039450" | "20020013571" | "20020026216" | "20020082630" | "20020107565" | "20020123802" | "20020151970" | "20020183835" | "20020183838" | "20020188348" | "20020198594" | "20030023303" | "20030050694" | "20030078652" | "20030130729" | "20030153943" | "20030163194" | "20030167071" | "20030171806" | "20030199975" | "20030229394" | "20030229395" | "20030233142" | "20030236568" | "20030236569" | "20040002719" | "20040003819" | "20040010305" | "20040015230" | "20040015232" | "20040015233" | "20040019374" | "20040019377" | "20040019378" | "20040024447" | "20040024451" | "20040024452" | "20040030321" | "20040030381" | "20040030382" |	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/06 19:31

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S173	171	S172 and fiber$4	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/06 19:32

S174	3,550	a61f2/2409.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 21:44
S175	3,550	a61f2/2409.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/07 10:04
S176	1,905	S175 and (seal$4)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/07 10:04
S180	1	("20130144373").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 09:48
S181	3,557	a61f2/2409.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:52
S182	7,673	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S183	5,229	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S184	4,210	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S185	2,127	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S186	1,467	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S187	11,297	S182 S183 S184 S185 S186	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S188	2,885	S181 and S187	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59

S189	1	("7799072").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 10:48
S190	4	"16736879"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 13:27
S191	1	("20170014228").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 14:00
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		3721676-$ | US-3833341-$ | US-3864808-$ | US-3911490-$ | US-3940040-$ | US-3943427-$ | US-3976179-$ | US-5004346-$ | US-5061275-$ | US-5254632-$ | US-5334868-$ | US-5716393-$ | US-5718159-$ | US-5752829-$ | US-5918925-$ | US-5957974-$ | US-7018404-$ | US-7771467-$ | US-7799072-$ | US-7914569-$).DID.				
S193	0	(AI-20020177890-$ | AI-20030040771-$ | AI-20040210304-$ | NO-2004089249-$ | AI-20050043790-$ | AI-20050197687-$ | AI-20060149351-$ | AI-20060155366-$ | AI-20070067014-$ | AI-20070095283-$ | AI-20070168013-$ | AI-20070203559-$ | AI-20070250146-$ | AI-20070276464-$ | AI-20080132993-$ | AI-20080132999-$ | AI-20080262592-$ | AI-20080275548-$ | AI-20090099644-$ | AI-20090125098-$ | AI-20090171456-$ | AI-20090198315-$ | AI-20090312834-$ | AI-20100042202-$ | AI-20100049313-$ | AI-20100094409-$ | AI-20110257731-$ | AI-20120046726-$ | AI-20120089218-$ | NO-2012147675-$ | AI-20130144373-$ | NO-2013086132-$ | AI-20140046428-$ | AI-20140172064-$ | AI-20140316513-$ | AI-20140336749-$ | AI-20160022450-$ | AI-20160270935-$ | AI-20170209254-$ | BI-3582462-$ | BI-5254632-$ | BI-5334868-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 14:37
S194	6	(US-12854807-$ | US-16735541-$ | US-16736879-$ | US-16743828-$ | US-18153473-$ | US-2858390-$ | US-2787925-$ | US-D187180-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 14:37
S195	10	(CN-102014805-$ | NO-2005087117-$ | NO-2006127412-$ | NO-2010006627-$ | NO-2010031060-$ | NO-2010105195-$ | NO-2011035154-$ | JP-2011502628-$ | JP-2011507658-$ | EP-2787925-$ | JS-2012068165-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 14:37
S196	50	(US-10034784-$ | US-10065824-$ | US-16736879-$ | US-19857887-$ | US-20010044650-$ | US-20020082684-$ | US-20040249399-$ | US-20070219613-	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2020/06/17 14:41

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S197	8	(DE-10065824-$ | DE-19857887-$ | AI-20010044650-$ | AI-20020082684-$ | AI-20040249399-$ | AI-20070219613-$ | AI-20090036977-$ | AI-20090099650-$ | AI-20100087907-$ | AI-20130013050-$ | NO-2013040663-$ | NO-2013059596-$ | NO-2014072501-$ | BI-3482228-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 14:41
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S200	75	(mclean.in.) and stent	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 16:22
S201	108	(vidlund.in.) and stent	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 16:23
S202	1	("20080275548").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 16:47
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S204	1,050	salahieh.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 16:48
S205	516	salahieh.in. and valve	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 16:48
S206	1	("20050137695").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 16:55
S207	7,776	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/07/20 11:59
S208	5,285	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/07/20 11:59
S209	4,260	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/07/20 11:59
S210	2,147	a61f2/2433.cpc.	US-PGPUB; USPAT;	OR	OFF	2020/07/20 11:59

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S211	1,470	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/07/20 11:59
S212	11,433	S207 S208 S209 S210 S211	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/07/20 11:59
S215	56	2006/124649	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 09:23
S216	0	wo2006/124649	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 09:23
S217	0	(2006/124649).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 09:23
S218	0	(2006/0124649).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 09:24
S219	5	("2006124649").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; DERWENT	OR	OFF	2020/07/29 09:24
S220	1	"16808137"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 09:55
S221	4	"20090125098"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 11:29
S222	7	"20030040771"	US-PGPUB; USPAT; USOCR;	OR	OFF	2020/07/29 11:30

			FPRS; EPO; JPO; DERWENT			
S223	1,779	(cuff with (fiber barb))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 11:58
S224	270	("20020036220" | "20030023303" | "20030050694" | "20030130726" | "20040049262" | "20040093075" | "20040102837" | "20040111111" | "20040210304" | "20040260389" | "20050096726" | "20050137682" | "20050137695" | "20050137697" | "20050203605" | "20050256566" | "20060008497" | "20060020327" | "20060025857" | "20060036308" | "20060074484" | "20060122692" | "20060149360" | "20060161249" | "20060173532" | "20060178740" | "20060206202" | "20060241744" | "20060241745" | "20060259120" | "20060259136" | "20060259137" | "20060265056" | "20060276813" | "20060276874" | "20070010876" | "20070027534" | "20070043435" | "20070055358" | "20070067029" | "20070093890" | "20070100435" | "20070118210" | "20070213813" | "20070233228" | "20070244545" | "20070244552" | "20070288087" | "20080021552" | "20080039934" | "20080071369" | "20080082164" | "20080097595" | "20080114452" | "20080125853" | "20080140189" | "20080147183" | "20080154355" | "20080154356" | "20080243245" | "20080255662" | "20080262602" | "20080269879" | "20090099653" | "20090112309" | "20090138079" | "20090276027" | "20100004740" | "20100036484" | "20100049306" | "20100087907" | "20100131055" | "20100168778" | "20100168839" | "20100168844" | "20100185277" | "20100191326" | "20100204781" | "20100204785" | "20100217382" | "20100234940" | "20100249911" | "20100249923" | "20100286768" | "20100298931" | "20110029072" |	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 12:03

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"20140214159" | "20140228946" |
"20140243969" | "20140303719" |
"20140324164" | "20140343671" |
"20140350668" | "20140350669" |
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"4994077" | "5411552" | "5480423" |
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"5935163" | "5961549" | "6045576" |
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"8062355" | "8075611" | "8137398" |
"8142497" | "8182528" | "8221493" |
"8230717" | "8231670").PN. OR
("8252051" | "8308798" | "8313525" |
"8323335" | "8323336" | "8343213" |
"8348995" | "8348996" | "8348998" |
"8366769" | "8403983" | "8408214" |
"8414643" | "8425593" | "8449599" |
"8449604" | "8454686" | "8500798" |

		"8568474" | "8579962" | "8579966" | "8585755" | "8591575" | "8597349" | "8603159" | "8603160" | "8613765" | "8623074" | "8652204" | "8663322" | "8668733" | "8685080" | "8728154" | "8747459" | "8764820" | "8795357" | "8801776" | "8808356" | "8828078" | "8834563" | "8840663" | "8876894" | "8876895" | "8940040" | "8945209" | "8961595" | "8974523" | "8974524" | "D648854" | "D652926" | "D652927" | "D653341" | "D653342" | "D653343" | "D654169" | "D654170" | "D660432" | "D660433" | "D660967" | "RE40816").PN. OR ("10136992").URPN.				
S225	1	(spense.in.) and valve	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 12:22
S226	573	(spence.in.) and valve	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 12:22
S227	10	(US-20070288087-$ | US-20100217382-$ | US-20100249916-$ | US-20120123529-$ | US-20200197199-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/04 10:17
S228	16	(US-3370418-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-7175652-$ | US-7470284-$ | US-7740656-$ | US-7972370-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/04 10:19
S229	34	(US-16910189-$ | US-20020052649-$ | US-20040243221-$ | US-20040256759-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20090105805-$ | US-20100204781-$ | US-20120123529-$ | US-20120296418-$ | US-20130090729-$ | US-3370418-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/04 10:19
S230	5	(AI-20020052649-$ | AI-20040243221-$ | AI-20040256759-$ | JP-2005124959-$ | WO-2006005015-$ | AI-20070179591-$ | AI-20070213815-$ | AI-20070219620-$ | AI-20080021547-$ | AI-20090105805-$ | AI-	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/04 10:20

		20100204781-$ | AI-20120123529-$ | AI-20120296418-$ | AI-20130090729-$ | VA-223131450-$).DID.				
S231	7,889	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S232	5,349	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S233	4,324	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S234	2,182	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S235	1,479	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S236	11,602	S231 S232 S233 S234 S235	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S237	22	S236 and ((fibers with collagen) same migration)	US-PGPUB; USPAT	OR	OFF	2020/08/28 15:54
S238	1,634	S236 and ((fibers))	US-PGPUB; USPAT	OR	OFF	2020/08/28 15:55
S239	1,688	S236 and ((fibers))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:55
S240	332	S236 and ((fibers)) and (frame and graft)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:55
S245	4	(US-10716662-$ | US-16910189-$ | US-20090143855-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2020/09/27 23:02

			JPO; DERWENT			
S246	3	(wO-2001049213-$ | wO-2004032987-$ | AI-20090143855-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/09/27 23:04
S247	361	"4164046"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/09/27 23:09
S248	1	("4164046").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/09/27 23:09
S249	1	("20070142907").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/09/27 23:11
S256	85	(shahriari near ali).in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 14:07
S257	51	"2006124649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 15:17
S258	0	("2006124649").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 15:17
S259	25	"12882605"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:02
S260	0	"12882605.app"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:03

S261	0	"12882605".app.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:03
S262	0	("12882605").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 16:03
S263	0	("2006018514").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 16:03
S264	1	("20060018514").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 16:03
S265	7	"20060018514"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:04
S266	30	"2006018514"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:04
S267	16	(US-10716662-$ | US-17024060-$ | US-20070288087-$ | US-20090143855-$ | US-20100217382-$ | US-20100249916-$ | US-20120123529-$ | US-20200197199-$ | US-3992608-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 19:25
S268	0	("(NO-2001049213-$\|NO-2004032987-$|AI-20070288087-$\|AI-20090143855-$|AI-20100217382-$\|AI-20100249916-$|NO-2011069048-$\|AI-20120123529-$|AI-20200197199-$\|VA-223131450-$).DID.").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 19:25
S269	0	(WO-2001049213-$ | NO-2004032987-$ | AI-20070288087-$ | AI-20090143855-$ | AI-20100217382-$ | AI-20100249916-$ | NO-2011069048-$ | AI-20120123529-$ | AI-20200197199-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 19:26
S272	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/01/16 10:22

			JPO; DERWENT			
S273	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:23
S274	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:24
S275	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:25
S276	5,725	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:26
S277	26,012	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:26
S278	17,240	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:26
S279	17,642	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:26
S280	3,934	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR;	OR	OFF	2021/01/16 10:27

			FPRS; EPO; JPO; DERWENT			
S281	5,886	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S282	7,416	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S283	11,668	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S284	18,724	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S285	5,565	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S286	4,782	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S287	535	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S288	12,232	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/01/16 10:28

			JPO; DERWENT			
S289	1,710	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S290	11,758	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S291	15,314	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S292	32,596	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S293	9,253	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S294	17,878	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S295	3,437	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S296	3,130	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/01/16 10:29

			JPO; DERWENT			
S297	14,644	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S298	1,594	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S299	3,931	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S300	2,511	(S272 S273 S274 S275 S276 S277 S278 S279 S280 S281 S282 S283 S284 S285 S286 S287 S288 S289 S290 S291 S292 S293 S294 S295 S296 S297 S298 S299) and (heart adj3 valve) and (fiber$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:31
S301	1,676	S300 and (seal$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:33
S302	48	((("SHAHRIARI") near3 ("Ali"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2021/01/16 11:48
S303	13	((("AORTIC") near3 ("INNOVATIONS") near3 ("LLC"))).AS,AANM.	USPAT	OR	OFF	2021/01/16 11:49
S304	13	(US-10258464-$ | US-20110218619-$ | US-20110319991-$ | US-3339377-$ | US-3408214-$ | US-3532868-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/26 17:20
S305	2	(US-20120123529-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/01/26 17:21

			JPO; DERWENT			
S306	4	"16910189"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/26 18:34
S307	2	"17060557"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/26 18:35
S309	8	(US-10792172-$ | US-20020052649-$ | US-3333075-$ | US-3370418-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:46
S310	3	(("9333075") or ("7921678") or ("9370418")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/11 17:48
S311	15	(US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:48
S312	0	("(us-20130304196-$).DID.").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/11 17:49
S313	2	(us-20130304196-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:49
S315	1	("20120123529").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/11 17:50
S317	0	(AI-20020052649-$ | AI-20060276813-$ | AI-20080077236-$ | AI-20080188929-$ | AI-20080319521-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:51

S318	10	(US-20020052649-$ | US-20060276813-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:52
S319	2	(US-20110009948-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:54
S320	5	"20060005015"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:55
S321	96	"2006005015"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:55
S322	5	"15876053"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:11
S323	2	("2018/0206982").URPN.	USPAT	OR	OFF	2021/02/13 09:12
S324	0	"20010049555"	USPAT	OR	OFF	2021/02/13 09:14
S325	4	"20010049555"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:14
S326	3	"20070233228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:16
S327	3	"20120296418"	US-PGPUB; USPAT; USOCR;	OR	OFF	2021/02/13 09:16

			FPRS; EPO; JPO; DERWENT			
S328	822	("20010021872" | "20020026094" | "20020032481" | "20020138135" | "20020173842" | "20030050694" | "20030100939" | "20030158597" | "20030212454" | "20040039436" | "20040186563" | "20040186565" | "20050075728" | "20050096736" | "20050188525" | "20050203614" | "20050203617" | "20050234546" | "20060004469" | "20060025857" | "20060058872" | "20060149350" | "20060183383" | "20060229719" | "20060259137" | "20070005131" | "20070010876" | "20070010877" | "20070112422" | "20070162102" | "20070203503" | "20070203575" | "20070203576" | "20070213813" | "20070260305" | "20070265700" | "20080114442" | "20080125853" | "20080154355" | "20080183271" | "20090125118" | "20090157175" | "20090276040" | "20090281619" | "20090299452" | "20090319037" | "20100049313" | "20100168844" | "20100198347" | "20100204781" | "20110015729" | "20110319991" | "20120259409" | "20130023985" | "20130190857" | "20130274873" | "20130310926" | "20130317598" | "20130331929" | "20140194981" | "20140200661" | "20140209238" | "20140277417" | "20140277419" | "20140277424" | "20140330372" | "20140343671" | "20150073545" | "20150073546" | "3409013" | "3548417" | "3587115" | "3657744" | "3671979" | "3714671" | "3755823" | "4035849" | "4056854" | "4106129" | "4222126" | "4265694" | "4297749" | "4339831" | "4343048" | "4345340" | "4373216" | "4406022" | "4441216" | "4470157" | "4535483" | "4574803" | "4592340" | "4605407" | "4612011" | "4643732" | "4655771" | "4692164" | "4733665" | "4759758" | "4762128" | "4777951" | "4787899" | "4787901" | "4796629" | "4820299" | "4829990" | "4851001" | "4856516" | "4878495" | "4878906" | "4883458" | "4922905" |	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:25

		"4966604" | "4979939" | "4986830" | "4994077" | "5007896" | "5026366" | "5032128" | "5037434" | "5047041" | "5059177" | "5080668" | "5085635" | "5089015" | "5152771" | "5163953" | "5167628" | "5192297" | "5266073" | "5282847" | "5295958" | "5332402" | "5360444" | "5370685" | "5397351" | "5411055" | "5411552" | "5443446" | "5480424" | "5500014" | "5545209" | "5545214" | "5549665" | "5554185" | "5558644" | "5571175" | "5584803" | "5591185" | "5591195" | "5607464" | "5609626" | "5628792" | "5639274" | "5665115" | "5716417" | "5728068" | "5749890" | "5756476" | "5769812" | "5800508" | "5840081" | "5855597" | "5855601" | "5855602" | "5925063" | "5957949" | "6027525" | "6132473" | "6168614" | "6171335" | "6174327" | "6210408" | "6217585" | "6221091" | "6231602" | "6245102" | "6299637" | "6302906" | "6350277" | "6352547" | "6425916" | "6440764" | "6454799" | "6458153" | "6461382" | "6468660" | "6482228" | "6488704" | "6527979" | "6569196" | "6582462" | "6605112" | "6652578" | "6689123" | "6716244" | "6730118" | "6733525" | "6767362" | "6769161" | "6783542" | "6830584" | "6878162" | "6893460" | "6908481" | "6936067" | "7018406" | "7018408" | "7096554" | "7225518" | "7276078" | "7276084" | "7318278" | "7374571" | "7393360" | "7462191" | "7510575" | "7563280" | "7585321" | "7618446" | "7618447" | "7655034" | "7785366" | "7959672" | "7993394" | "8029556" | "8167932" | "8291570" | "8449606" | "8454685" | "8652203" | "8747463" | "9078781").PN.				
S329	4	("20130190862" | "20160317305").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:26
S330	4	("20070233228" | "20120296418").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/02/13 09:27

			JPO; DERWENT			
S331	835	("20020173842" | "20030100939" | "20040186563" | "20050203617" | "20070162102" | "20080183271" | "20100204781" | "20130274873" | "20140200661" | "20150073546" | "4222126" | "4733665" | "4759758" | "4777951" | "5026366" | "5032128" | "5332402" | "5411055" | "5558644" | "5571175" | "5609626" | "6231602" | "6425916" | "6440764" | "6689123" | "6893460" | "6936067" | "7655034" | "7993394" | "8652203" | "20030212454" | "20050075728" | "20070112422" | "20100168844" | "20100198347" | "4829990" | "5397351" | "5545214" | "5549665" | "5584803" | "5855602" | "6027525" | "6132473" | "6168614" | "6221091" | "6302906" | "6350277" | "6454799" | "6605112" | "6908481" | "7510575" | "7563280" | "20070233228" | "20020138135" | "20050203614" | "20050234546" | "20060149350" | "20070260305" | "3714671" | "4297749" | "4441216" | "4692164" | "4762128" | "4883458" | "4994077" | "5007896" | "5163953" | "5360444" | "5411552" | "5591185" | "5639274" | "5665115" | "5716417" | "5749890" | "5756476" | "5855601" | "6171335" | "6245102" | "6299637" | "6488704" | "6569196" | "6769161" | "7393360" | "7585321" | "7959672" | "8167932" | "8747463" | "9078781" | "20130190862" | "20010049555" | "20040186565" | "20060058872" | "20060229719" | "20070213813" | "20090299452" | "20120259409" | "20130023985" | "20130310926" | "20130317598" | "20130331929" | "20140209238" | "20140277417" | "20140343671" | "4265694" | "4339831" | "4373216" | "4470157" | "4592340" | "4643732" | "4796629" | "4820299" | "4856516" | "4966604" | "5047041" | "5089015" | "5266073" | "5295958" | "5591195" | "5607464" | "5957949" | "6716244" | "6767362" | "7018406" | "7096554" | "7276084" | "7374571" | "8029556" |	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:27

		"20020026094" | "20050096736" | "20060259137" | "20070005131" | "20090125118" | "20090157175" | "20090319037" | "20110319991" | "20140194981" | "20140277424" | "3587115" | "3657744" | "3671979" | "4343048" | "4612011" | "4787899" | "4787901" | "4878495" | "4878906" | "4979939" | "4986830" | "5059177" | "5085635" | "5152771" | "5370685" | "5500014" | "5554185" | "5728068" | "6210408" | "6352547" | "6527979" | "6783542" | "7618446" | "20030050694" | "20030158597" | "20050188525" | "20060004469" | "20070203503" | "20080114442" | "20080154355" | "20100049313" | "20110015729" | "20140277419" | "20150073545" | "3409013" | "3548417" | "4035849" | "4056854" | "4106129" | "4406022" | "4535483" | "4922905" | "5037434" | "5080668" | "5282847" | "5769812" | "5840081" | "5855597" | "6174327" | "6458153" | "6468660" | "6652578" | "6830584" | "6878162" | "7018408" | "7225518" | "7785366" | "8454685" | "20120296418" | "20010021872" | "20040039436" | "20070010877" | "20070265700" | "20080125853" | "20090281619" | "20130190857" | "20140330372" | "4345340" | "4605407" | "5545209" | "5628792" | "6217585" | "6461382" | "6730118" | "7318278" | "7462191" | "7618447" | "8449606" | "20170014229" | "20020032481" | "20060025857" | "20060183383" | "20070010876" | "20070203575" | "20070203576" | "20090276040" | "3755823" | "4574803" | "4655771" | "4851001" | "5167628" | "5192297" | "5443446" | "5480424" | "5800508" | "5925063" | "6482228" | "6582462" | "6733525" | "7276078" | "8291570" | "20160317305").PN.				
S332	11	WO2006124649	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 10:13

S333	53	"2006124649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 10:14
S334	0	"17131869"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 11:12
S335	2	"17060557"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 11:12
S336	13	S328 and (outer$4 with (graft))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 11:49
S337	27	S328 and ((outer$4 exter$4 outsid$$)with (graft))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:00
S338	36,075	l11and ((outer$4 exter$4 outsid$$)with (graft))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:14
S339	27	S331 and ((outer$4 exter$4 outsid$$)with (graft))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:14
S340	13	(US-10258464-$ | US-20110218619-$ | US-20110319991-$ | US-3339377-$ | US-3408214-$ | US-3532868-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:56

S341	12	(US-20020052649-$ | US-20060276813-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-3333075-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:57
S342	4	"20110098802"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 15:10
S343	1	("9333075").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/17 05:33
S344	10	(US-20020052649-$ | US-20060276813-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/17 05:40
S345	70	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17007373-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 12:07
S346	10	"16808137"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 14:38
S347	34	"10555823"	US-PGPUB; USPAT; USOCR;	OR	OFF	2021/03/21 14:50

			FPRS; EPO; JPO; DERWENT			
S348	2	"16983196"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 15:15
S349	1	("10881538").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/03/21 15:20
S350	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S351	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S352	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S353	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S354	5,771	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S355	26,423	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/21 18:03

			JPO; DERWENT			
S356	17,810	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S357	17,863	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S358	4,039	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S359	6,081	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S360	7,540	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S361	11,779	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S362	18,985	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S363	5,683	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/21 18:03

			JPO; DERWENT			
S364	4,850	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S365	554	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S366	12,658	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S367	1,774	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S368	12,050	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S369	15,676	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S370	32,778	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S371	9,317	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/21 18:03

			JPO; DERWENT			
S372	18,227	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S373	3,573	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S374	3,174	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S375	14,799	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S376	1,655	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S377	4,153	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S378	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S379	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/21 21:13

			JPO; DERWENT			
S380	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S381	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S382	5,771	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S383	26,423	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S384	17,810	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S385	17,863	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S386	4,039	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S387	6,081	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR;	OR	OFF	2021/03/21 21:13

			FPRS; EPO; JPO; DERWENT			
S388	7,540	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S389	11,779	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S390	18,985	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S391	5,683	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S392	4,850	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S393	554	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S394	12,658	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S395	1,774	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/21 21:13

			JPO; DERWENT			
S396	12,050	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S397	15,676	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S398	32,778	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S399	9,317	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S400	18,227	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S401	3,573	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S402	3,174	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S403	14,799	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/21 21:13

			JPO; DERWENT			
S404	1,655	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S405	4,153	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S406	2,578	(S378 S379 S380 S381 S382 S383 S384 S385 S386 S387 S388 S389 S390 S391 S392 S393 S394 S395 S396 S397 S398 S399 S400 S401 S402 S403 S404 S405) and (heart adj3 valve) and (fiber$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S407	15	((frame same (inner and outer) same seal$4) same graft) and (heart with valve)	US-PGPUB; USPAT	OR	OFF	2021/03/25 16:13
S408	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S409	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S410	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S411	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13

S412	5,773	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S413	26,431	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S414	17,826	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S415	17,867	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S416	4,044	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S417	6,084	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S418	7,541	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S419	11,784	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13

S420	18,994	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S421	5,686	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S422	4,852	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S423	554	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S424	12,667	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S425	1,775	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S426	12,059	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S427	15,690	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13

S428	32,783	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S429	9,318	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S430	18,235	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S431	3,576	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S432	3,174	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S433	14,804	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S434	1,655	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S435	4,158	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13

S436	2,585	(S408 S409 S410 S411 S412 S413 S414 S415 S416 S417 S418 S419 S420 S421 S422 S423 S424 S425 S426 S427 S428 S429 S430 S431 S432 S433 S434 S435) and (heart adj3 valve) and (fiber$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S438	0	("13706896").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/03/27 09:37
S439	34	"13706896"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 09:37
S440	1	("7799072").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/03/27 09:58
S441	70	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17170957-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:38
S442	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S443	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39

S444	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S445	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S446	5,776	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S447	26,437	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S448	17,841	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S449	17,872	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S450	4,046	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S451	6,089	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39

S452	7,542	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S453	11,785	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S454	18,999	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S455	5,689	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S456	4,854	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S457	555	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S458	12,674	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S459	1,777	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39

S460	12,063	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S461	15,695	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S462	32,786	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S463	9,323	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S464	18,239	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S465	3,579	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S466	3,175	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S467	14,810	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39

S468	1,657	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S469	4,160	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S470	2,587	(S442 S443 S444 S445 S446 S447 S448 S449 S450 S451 S452 S453 S454 S455 S456 S457 S458 S459 S460 S461 S462 S463 S464 S465 S466 S467 S468 S469) and (heart adj3 valve) and (fiber$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S471	0	("16910189").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/04/08 16:49
S472	6	"16910189"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 16:49
S473	11	"16808137"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 17:22
S474	1	("10881538").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/04/08 18:29
S475	2	"16941117"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 18:36
S476	72	(US-10016271-$ | US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17006793-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ |	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 23:48

		US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.				
S477	0	(AI-20020052649-$ | AI-20030153974-$ | AI-20040243221-$ | AI-20040256759-$ | NO-2006005015-$ | AI-20060276813-$ | NO-2006124649-$ | AI-20070179591-$ | AI-20070213815-$ | AI-20070219620-$ | AI-20080021547-$ | AI-20080077236-$ | AI-20080188929-$ | AI-20080319521-$ | AI-20090105805-$ | AI-20100204781-$ | AI-20110009948-$ | AI-20110098802-$ | AI-20110218619-$ | AI-20110319991-$ | AI-20120123529-$ | AI-20120296418-$ | AI-20130304196-$ | NO-3829057-$ | IF-617622-$ | SO-0225223-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 23:48
S478	54	"2006124649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/09 09:42
S479	3	"20060259136"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/09 14:18
S480	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/04/09 16:30

		20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.				
S481	28	S480 and (mitral)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/09 16:37
S482	6	"20020052649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/10 11:44
S483	2	"17170957"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/10 15:48
S484	2	"17170957"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/24 09:59
S485	5	"17060557"	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/04/24 09:59

			JPO; DERWENT			
S486	6	"20020052649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/24 10:57
S487	55	"2006124649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 10:15
S488	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/04/27 10:19
S489	39	S488 and (seal with3 (inflow and outflow))	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/04/27 10:19

			JPO; DERWENT			
S490	41	S488 and (seal$4 with3 (inflow and outflow))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 10:23
S491	21	("2014/0316513").URPN.	USPAT	OR	OFF	2021/04/27 10:28
S492	0	"17006793"	USPAT	OR	OFF	2021/04/27 10:32
S493	1	"16792197"	USPAT	OR	OFF	2021/04/27 10:32
S494	4	"20110098802"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 11:19
S496	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/04/27 19:42

		20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.				
S497	41	S496 and (seal$4 with3 (inflow and outflow))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 19:42
S498	4	"20110098802"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/05/24 12:23
S499	15	((("AORTIC") near3 ("INNOVATIONS") near3 ("LLC"))).AS,AANM.	USPAT	OR	OFF	2021/05/25 08:57
S500	54	((("SHAHRIARI") near3 ("Ali"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2021/05/25 08:57
S503	22	(US-17170957-$ | US-20050240137-$ | US-20060013863-$ | US-20140277424-$ | US-20150148889-$ | US-20150335424-$ | US-20150335429-$ | US-20160022444-$ | US-20190192286-$ | US-20200352707-$ | US-3039757-$ | US-3421098-$ | US-3834552-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/05/30 17:02
S504	74	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17213251-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-20150335429-$ | US-20160022444-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/02 13:20

S505	3	"17007373"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/02 16:13
S506	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/06/03 13:29
S507	15	S506 and (collagen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:29
S508	22	(US-17170957-$ | US-20050240137-$ | US-20060013863-$ | US-20140277424-$ | US-20150148889-$ | US-20150335424-$ | US-20150335429-$ | US-20160022444-$ | US-20190192286-	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:55

		$ | US-20200352707-$ | US-3039757-$ | US-3421098-$ | US-3834552-$).DID.				
S509	74	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17213251-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-20150335429-$ | US-20160022444-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:55
S510	92	S508 S509	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:55
S511	10	S510 and (collagen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:55
S512	232	(collagen same fibers same graft) and (heart and valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 14:01
S513	1	("7921678").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/06/03 14:08
S514	35	(US-17170957-$ | US-20030153974-$ | US-20060025857-$ | US-20060074484-$ | US-20070282436-$ | US-20100036484-$ | US-20110040367-$ | US-20110098802-$ | US-20110125244-$ | US-20110166636-$ | US-	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/18 10:36

		20120022633-$ | US-20120071969-$ | US-20120310328-$ | US-20130018458-$ | US-20130073030-$ | US-20140018915-$ | US-20140155997-$ | US-20170128209-$).DID.				
S518	6	(("20130018458") or ("20110125244") or ("20110166636") or ("20110098802") or ("20060074484") or ("20120310328")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/01 09:32
S520	102	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17327673-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060025857-$ | US-20060074484-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20070282436-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100036484-$ | US-20100204781-$ | US-20110009948-$ | US-20110040367-$ | US-20110098802-$ | US-20110125244-$ | US-20110166636-$ | US-20110218619-$ | US-20110319991-$ | US-20120022633-$ | US-20120071969-$ | US-20120123529-$ | US-20120296418-$ | US-20120310328-$ | US-20130018458-$ | US-20130073030-$ | US-20130304196-$ | US-20140018915-$ | US-20140155997-$ | US-20150335429-$ | US-20160022444-$ | US-20170128209-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/21 16:59
S521	0	(AI-20020052649-$ | AI-20030153974-$ | AI-20040243221-$ | AI-20040256759-$ | AI-20060025857-$ | NO-2006005015-$ | AI-20060074484-$ | AI-20060276813-$ | NO-2006124649-$ | AI-20070179591-$ | AI-20070213815-$ | AI-20070219620-$ | AI-20070282436-$ | AI-20080021547-$ | AI-20080077236-$ | AI-20080188929-$ | AI-20080319521-$ | AI-20090105805-$ | AI-20100036484-$ | AI-20100204781-$ | AI-20110009948-$	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/21 17:17

		| AI-20110040367-$ | AI-20110098802-$ | AI-20110125244-$ | AI-20110166636-$ | AI-20110218619-$ | AI-20110319991-$ | AI-20120022633-$ | AI-20120071969-$ | AI-20120123529-$ | AI-20120296418-$ | AI-20120310328-$ | NO-2012068175-$ | AI-20130018458-$ | AI-20130073030-$ | AI-20130304196-$ | AI-20140018915-$ | AI-20140155997-$ | AI-20150335429-$ | AI-20160022444-$ | AI-20170128209-$ | NO-3829057-$ | SO-0225223-$ | VA-223131450-$).DID.				
S522	0	"17327673"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/22 11:09
S523	4	"17096253"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/22 11:10
S526	17	((("AORTIC") near3 ("INNOVATIONS") near3 ("LLC"))).AS,AANM.	USPAT	OR	OFF	2021/07/22 15:41
S527	58	((("SHAHRIARI") near3 ("Ali"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2021/07/22 15:41
S528	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/07/25 16:50

		or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.				
S529	15	S528 and collagen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/25 16:50
S530	4	"20110098802"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/25 17:00
S531	23	"2005023584"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/25 17:16
S532	12	"20050023584"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/25 17:17
S533	0	("2005023584").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/25 17:18
S534	1	("20050023584").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/25 17:18
S535	1	("20060004442").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/25 17:19
S536	398	("2006/0004442").URPN.	USPAT	OR	OFF	2021/07/25 17:20

S537	1	("20130018458").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/25 17:28
S539	41	"13706896"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/30 11:20
S542	22	"10299917"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/08/23 10:08
S545	234	(collagen same fibers same graft) and (heart and valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/08/25 14:20
S546	3	"20060276813"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/08/26 12:46
S547	25	"2011143263"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/08/26 12:47
S548	0	WO2005115275	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 09:38
S549	19	"2005115275"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 09:38
S550	3	"20050273155"	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/10/19 09:39

			JPO; DERWENT			
S551	17	"2005112821"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 09:39
S552	9	("20030153974" | "20060276813" | "3365728" | "5411552" | "6893460" | "7393360" | "7510575" | "9393110" | "9829057").PN.	US-PGPUB; USPAT	OR	OFF	2021/10/19 09:56
S553	17	("20030153974" | "20060276813" | "3365728" | "5411552" | "6893460" | "7393360" | "7510575" | "9393110" | "9829057" | "10716662" | "20070288087" | "20090143855" | "20100217382" | "20100249916" | "20120123529" | "20200197199" | "8992608").PN.	US-PGPUB; USPAT	OR	OFF	2021/10/19 09:56
S554	8	("20030153974" | "3365728" | "5411552" | "6893460" | "7393360" | "7510575" | "9393110" | "9829057").PN.	US-PGPUB; USPAT	OR	OFF	2021/10/19 10:09
S555	385	"03047468"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 10:52
S556	17	WO03047468	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 10:53
S557	1	("8992608").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/19 11:07
S558	1	("10792172").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/19 11:16
S559	1	("7510575").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/19 12:31
S560	108	"2006005015"	US-PGPUB; USPAT; USOCR;	OR	OFF	2021/10/19 12:32

			FPRS; EPO; JPO; DERWENT			
S561	1	("8992608").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 09:25
S562	6	(("8645300") or ("7827487") or ("6615226") or ("6912505") or ("7865455") or ("6266649")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 10:07
S563	1	("20080235204").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 10:09
S564	1	("8032506").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 10:10
S565	76	(fibers adj (stent frame) same (attach$4 secur$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 11:14
S566	262	(fiber$4 adj (stent frame) same (attach$4 secur$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 11:16
S567	24	"2005023584"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 13:42
S568	12	"20050023584"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 13:42
S569	12	"10883575"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 13:44
S570	0	"35116043"	US-PGPUB; USPAT; USOCR;	OR	OFF	2021/10/20 13:46

			FPRS; EPO; JPO; DERWENT			
S571	0	("35116043").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 13:46
S572	1	("20060004442").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 13:54
S573	17	"1641117"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 16:23
S574	2	"16941117"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 16:23
S575	1	("9393110").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 17:10
S576	2	(("7510575") or ("7510573")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 17:18
S577	58	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/10/23 14:38

		or US-20110208297-$ or US-20050273155-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$ or WO-2006005015-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$ or WO-2005112821-$ or WO-2005115275-$).did.				
S578	17	S577 and (collagen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 14:39
S579	0	(("16808137") or ("16910189") or ("17096253")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/23 16:50
S580	17	"16808137" "16910189" "17096253"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 16:50
S581	58	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/10/23 18:28

		or US-20110208297-$ or US-20050273155-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$ or WO-2006005015-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$ or WO-2005112821-$ or WO-2005115275-$).did.				
S582	1	(non adj2 porous) and S581	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 18:28
S583	97	(non adj2 porous) same graft and (heart with valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 18:29
S584	47	(non adj2 porous) same PET and (heart with valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 18:30
S585	29	(non adj2 porous) same (polyethylene adj2 terephthalate) and (heart with valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 18:31
S587	691,079	(graft wtih non adj2 porous)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 19:06
S588	1	("5152782").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/23 20:03
S589	699	(non$1porous with graft)	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/10/23 20:04

			JPO; DERWENT			
S590	87	(non$1porous with graft) same (seal$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 20:06
S591	14,252	(collagen with (fiber$3 fibril$4)) and graft	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 20:28
S592	1,597	(collagen with (fiber$3 fibril$4)) same graft	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 20:28
S593	1	("5171273").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/23 20:51
S594	178	(collagen with (fiber$3 fibril$4)) same graft and (heart with valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 20:53
S595	17	(collagen with (fiber$3 fibril$4)) same graft and (heart with valve) same seal$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 20:57
S596	12	(collagen adj2 (fiber$3)) same graft and (heart with valve) same seal$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 21:38
S597	1	(porous with nonporous) same graft same (heart adj2 valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 21:48

S598	3	(porous with nonporous) same (graft covering material) same (heart adj2 valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 21:49
S599	0	((polyethylene adj2 terephthalate) with nonporous) same (graft covering material) same (heart adj2 valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 21:50
S600	98	((polyethylene adj2 terephthalate) with nonporous) same (graft covering material)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 21:51
S601	337	((polyethylene adj2 terephthalate) with (nonporous non adj2 porous)) same (graft covering material)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 21:53
S602	75,836	((nonporous non adj2 porous)) same (graft covering material) same (porous)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 22:12
S603	45	((nonporous non adj2 porous)) same (graft covering material) same (porous) same (heart with valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 22:12
S604	12	"16910189"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 22:30
S605	3	"20060084927"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2022/01/10 08:51

S606	46	((nonporous non adj2 porous)) same (graft covering material) same (porous) same (heart with valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2022/01/10 10:01
S608	3	"20120143324"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2022/01/13 09:17
S609	13	("20020052649" | "20030153974" | "20090281619" | "20110098802" | "3365728" | "5411552" | "5957949" | "6730118" | "6893460" | "7393360" | "7510575" | "7585321" | "9393110").PN.	US-PGPUB; USPAT	OR	OFF	2022/01/13 10:37
S610	1	"17469391"	US-PGPUB; USPAT	OR	OFF	2022/01/13 18:52
S612	6	"20120123529"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2022/01/13 22:42
S613	3	"20060084927"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2022/03/23 11:29
S614	3	"20130304200"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2022/05/20 10:00
S615	2	"16941117"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2022/05/20 10:27

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp

S36	1	(endograft and device and prosthetic and frame and conduit).clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 09:57
S37	1	(endograft and device and prosthetic and frame and conduit and balloon and taper).clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 09:59
S38	1	(endograft and device and prosthetic and frame and conduit and balloon and taper and valve).clm.	US-PGPUB; USPAT	OR	ON	2014/12/01 09:59
S43	3	(endograft and stent and frame and valve and expandable).clm.	US-PGPUB; USPAT	OR	ON	2016/03/07 01:15
S44	2	(endograft and stent and frame and valve and expandable and spaced and apart).clm.	US-PGPUB; USPAT	OR	ON	2016/03/07 01:15
S45	2	(endograft and stent and frame and valve and expandable and first and second and aorta).clm.	US-PGPUB; USPAT	OR	ON	2016/03/07 01:16
S119	3	(endograft and stent and frame and valve and expandable and first and second and aorta).clm.	US-PGPUB; USPAT	OR	ON	2019/12/08 16:14
S177	80	(heart and valve and seal and fiber$2).clm.	US-PGPUB; USPAT	OR	ON	2020/06/07 09:57
S178	5	(heart and valve and seal and fiber$2 and frame).clm.	US-PGPUB; USPAT	OR	ON	2020/06/07 09:57
S179	2	(heart and valve and seal and fiber$2 and inner and outer and frame).clm.	US-PGPUB; USPAT	OR	ON	2020/06/07 10:00
S213	1	(stent and cuff and sealing and aorta and ascending).clm.	US-PGPUB; USPAT	OR	OFF	2020/07/20 12:00
S214	1	(stent and cuff and sealing and aorta and ascending and artery).clm.	US-PGPUB; USPAT	OR	OFF	2020/07/20 12:00
S241	0	(heart and valve and outer and frame and inner and graft and covering and fibers).clm.	US-PGPUB; USPAT	OR	OFF	2020/08/28 15:53
S242	0	(heart and valve and outer and frame and inner and graft and fibers).clm.	US-PGPUB; USPAT	OR	OFF	2020/08/28 15:54
S243	0	(heart and valve and outer and frame and inner and graft and fibers and cover).clm.	US-PGPUB; USPAT	OR	OFF	2020/08/28 15:54

S244	0	(heart and valve and outer and frame and inner and graft and fibers and cover and grid$4).clm.	US-PGPUB; USPAT	OR	OFF	2020/08/28 15:54
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S252	1	(heart and valve and outer and frame and graft and cover and grid$4).clm.	US-PGPUB; USPAT	OR	OFF	2020/10/06 17:08
S253	1	(heart and valve and frame and graft and cover and grid$4).clm.	US-PGPUB; USPAT	OR	OFF	2020/10/06 17:08
S254	35	(stent and frame and valve and expandable and first and second and aorta).clm.	US-PGPUB; USPAT	OR	ON	2020/10/07 09:03
S255	12	(stent and graft and valve and housing and proximal).clm.	US-PGPUB; USPAT	OR	ON	2020/10/07 09:48
S270	7,138	(valve and outer and frame open and cell and graft and seals).clm.	US-PGPUB; USPAT	OR	ON	2020/11/19 15:35
S271	1	(valve and outer and frame and open and cell and graft and seals).clm.	US-PGPUB; USPAT	OR	ON	2020/11/19 15:36
S308	3	(valve and outer and frame and open and cell and graft and seal and fibers and balloon and expandable).clm.	US-PGPUB; USPAT	OR	ON	2021/01/27 10:11
S437	2	(valve and outer and inner and frame and gridded and graft and seal and fibers and balloon and expandable).clm.	US-PGPUB; USPAT	OR	ON	2021/03/25 16:06
S495	5	(valve and outer and inner and frame and open and cell and graft and seal and fibers and engage and covering).clm.	US-PGPUB; USPAT	OR	ON	2021/04/27 15:24
S501	0	(valve and outer and frame and open and cell and apices and inner and frame and graft and seal and fiber and uncovered).clm.	US-PGPUB; USPAT	OR	OFF	2021/05/25 09:24
S502	0	(valve and outer and frame and open and cell and apices and inner and frame and graft and seal and fiber).clm.	US-PGPUB; USPAT	OR	OFF	2021/05/25 09:31
S515	0	(valve and outer and frame and open and cell and apices and inner and frame and graft and seal and fiber).clm.	US-PGPUB; USPAT	OR	OFF	2021/06/18 10:09

S516	2	(valve and outer and frame and open and cell and inner and frame and graft and seal and fiber).clm.	US-PGPUB; USPAT	OR	OFF	2021/06/18 10:09
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S540	3	(valve and outer and frame and open and cell and inner and frame and graft and seal and fiber).clm.	US-PGPUB; USPAT	OR	OFF	2021/07/30 13:52
S541	10	(valve and outer and frame and open and cell and inner and frame and graft and sealing and fibers).clm.	US-PGPUB; USPAT	OR	OFF	2021/07/30 13:53
S543	10	(valve and outer and frame and open and cell and inner and frame and graft and sealing and fibers).clm.	US-PGPUB; USPAT	OR	OFF	2021/08/24 17:04
S544	10	(valve and outer and frame and open and cell and inner and frame and graft and sealing and fibers).clm.	US-PGPUB; USPAT	OR	OFF	2021/08/24 17:06
S607	11	(valve and outer and frame and open and cell and inner and frame and graft and sealing and fibers).clm.	US-PGPUB; USPAT	OR	OFF	2022/01/10 09:51
S616	0	(valve and outer and frame and open and cell and inner and frame and graft and sealing and fibers and contact and height).clm.	US-PGPUB; USPAT	OR	OFF	2022/05/20 10:21

5/20/2022 12:05:55 PM
C:\Users\tshipmon\Documents\EAST\Workspaces\16941117.wsp

Bibliographic Data

Application No: 16/941,117

Foreign Priority claimed: ○ Yes ◉ No

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

Verified and Acknowledged: /TIFFANY P SHIPMON/ Examiner's Signature | Initials

Title: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
07/28/2020	623	3774	426/2/12 UTIL
RULE			

APPLICANTS

Aortic Innovations, LLC, Boca Raton, FL, UNITED STATES

INVENTORS

Ali Shahriari, Boca Raton, FL, UNITED STATES

CONTINUING DATA

This application is a CON of 16935261 07/22/2020

16935261 is a CON of 16808137 03/03/2020 PAT 10792172

16808137 is a CON of 16736879 01/08/2020 PAT 10842655

16736879 is a CON of 16042286 07/23/2018 PAT 10555823

16042286 is a CON of 14614628 02/05/2015 PAT 10028848

14614628 is a CON of 14569306 12/12/2014 PAT 9339399

14569306 is a DIV of 13706896 12/06/2012 PAT 8940040

13706896 has PRO of 61723446 11/07/2012

13706896 has PRO of 61567458 12/06/2011

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

08/04/2020

**** SMALL ENTITY ****

STATE OR COUNTRY

UNITED STATES

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UNITED STATES

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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/941,117	07/28/2020	Ali Shahriari	426/2/12 UTIL	1876

175373 7590 05/13/2022

Aortic Innovations, LLC
4917 Waters Edge Drive, Suite 275
Raleigh, NC 27606

EXAMINER	
SHIPMON, TIFFANY P	

ART UNIT	PAPER NUMBER
3774	

NOTIFICATION DATE	DELIVERY MODE
05/13/2022	ELECTRONIC

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

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

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

usptomail@nkpatentlaw.com

Applicant-Initiated Interview Summary	**Application No.** 16/941,117	**Applicant(s)** Shahriari, Ali		
	Examiner TIFFANY P SHIPMON	**Art Unit** 3774	**AIA (First Inventor to File) Status** No	**Page** 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	**Title**	**Type**
TIFFANY P SHIPMON	Examiner	Telephonic
Leslie Lopez	Primary Examiner	
Justin Nifong	Attorney	

Date of Interview: 10 May 2022

Issues Discussed:

Proposed Amendment(s)

Applicant presented proposed amendments. Examiner agreed that the proposed amendments would overcome the current prior art rejection. The newly added limitations define over the Levi et al. reference
.

☑ Attachment

/Leslie Lopez/ Primary Examiner, Art Unit 3774	/TIFFANY P SHIPMON/ Examiner, Art Unit 3774

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.

COMMUNICATION TO THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	16/941,117	Confirmation No.:	1876
Applicant	:	Aortic Innovations, LLC		
First Named Inventor	:	Ali Shahriari		
Filing Date	:	July 28, 2020		
TC/A.U.	:	3774		
Examiner	:	Shipmon, Tiffany		
Docket No.	:	426/2/12 UTIL		
Customer No.	:	175373		

Title of Invention: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

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

NOTES TO EXAMINER RESPONSE TO OFFICE ACTION DATED APRIL 19, 2022

Amendments to the Claims are being offered with this response.

Remarks begin on page 7 of this paper.

Amendments to the Claims:

The claims are not amended, however, the claims are presented herein for review purposes.

Listing of Claims:

Claims 1-30 (Canceled)

31. (Currently Amended) A transcatheter heart valve assembly comprising:

a graft covering housing [[a]] prosthetic heart valve leaflets, wherein the graft covering extends around the prosthetic heart valve leaflets for providing sealing to the heart valve leaflets;

an outer frame formed from a metallic material and defining an open cell configuration, and being secured to the graft covering by a plurality of stitches; and

a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks,

wherein the sealing material is attached to the outer frame,

wherein the sealing material defines a height that extends over at least a first two rows of cells in the outer frame,

wherein the sealing material includes a plurality of radially extending, arcuate fibers that extend outwardly of the outer frame;

wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer,

wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,

wherein the heart valve assembly has a radially compressed and a radially expanded orientation,

wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient,

wherein the sealing material is in contact with the outer frame along the height of the sealing material when the heart valve assembly is in the radially compressed orientation and the radially expanded orientation,

wherein the outer frame extends distally further than the prosthetic heart valve leaflets.

Claims 32-33 (Canceled)

34. (Currently Amended) A transcatheter heart valve assembly comprising:

a graft covering housing [[a]]prosthetic heart valve leaflets, wherein the graft covering extends radially outwardly around the prosthetic heart valve leaflets and radially inwardly of an outer frame for providing sealing to the heart valve leaflets;

wherein the outer frame is formed from a metallic material and defines an open cell configuration, and being secured to the graft covering by a plurality of stitches; and

a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks,

wherein the sealing material is attached to the outer frame,

wherein the sealing material defines a height that extends over at least a first two rows of cells in the outer frame,

wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame,

wherein the graft covering extends beyond a proximal end of the outer frame and over the proximal end thereof to cover the proximal end of the outer frame,

wherein the sealing material includes a plurality of radially extending, arcuate fibers that form a circumferential surface that extends outwardly of the outer frame;

wherein the fibers cover at least two circumferentially extending rows of grids formed in the open cell configuration and the at least two circumferentially extending rows radially overlap with the prosthetic heart valve,

wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer,

wherein the valve assembly is balloon expandable during endovascular deployment,

wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,

wherein expansion of the valve assembly is configured to press the sealing material against native valve leaflets of an aorta of the patient,

wherein the sealing material is in contact with the at least two circumferentially extending rows of grids of the outer frame along the height of the sealing material when the heart valve assembly is in the radially compressed orientation and the radially expanded orientation

~~wherein the sealing material is held against the outer frame as the valve expands from the radially compressed orientation to the radially expanded orientation~~.

35. (Canceled)

36. (Previously Presented) The valve assembly of claim 31, wherein open cells of the open cell configuration are a square shape.

37. (Previously Presented) The valve assembly of claim 31, wherein the graft covering housing a prosthetic heart valve forms an inner frame for supporting the prosthetic heart valve.

38. (Previously Presented) The valve assembly of claim 31, wherein the radially extending fibers are collagen fibers.

39. (Previously Presented) The valve assembly of claim 34, further including a second portion of fibers that extend radially inwardly from the outer frame.

40. (Previously Presented) The valve assembly of claim 34, wherein open cells of the open cell configuration are a square shape.

41. (Previously Presented) The valve assembly of claim 34, wherein the graft covering housing a prosthetic heart valve forms an inner frame for supporting the prosthetic heart valve.

42. (Previously Presented) The valve assembly of claim 34, wherein the radially extending fibers are collagen fibers.

43. (Previously Presented) The valve assembly of claim 34, further including a second portion of fibers that extend radially inwardly from the outer frame.

44. (Currently Amended) A transcatheter aortic heart valve assembly comprising:

a graft covering engaging [[a]]prosthetic heart valve leaflets, wherein the graft covering extends around the prosthetic heart valve leaflets for providing sealing to the heart valve leaflets;

a frame formed from a metallic material and defining an open cell configuration, and being secured to the graft covering by stitching; and

a sealing material positioned externally to the frame for providing sealing between the frame and a patient's anatomical wall to prevent paravalvular leaks,

wherein the sealing material is attached to the frame,

wherein the sealing material defines a height that extends over at least a first two rows of cells in the frame,

wherein the sealing material includes a plurality of outwardly extending, arcuate fibers that extend outwardly of the frame;

wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,

wherein the heart valve assembly has a radially compressed orientation and a radially expanded orientation,

wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the outwardly extending fibers into engagement with native leaflets of the aorta of a patient,

wherein the sealing material is in contact with the frame along the height of the sealing material when the heart valve assembly is in the radially compressed orientation and the radially expanded orientation.

45. (Previously Presented) The valve assembly of claim 44, wherein open cells of the open cell configuration are a square shape.

46. (Previously Presented) The valve assembly of claim 44, wherein the graft covering housing a prosthetic heart valve forms an inner frame for supporting the prosthetic heart valve.

47. (Previously Presented) The valve assembly of claim 44, wherein the outwardly extending fibers are collagen fibers.

48. (Previously Presented) The valve assembly of claim 44, further including a second portion of fibers that extend radially inwardly from the frame.

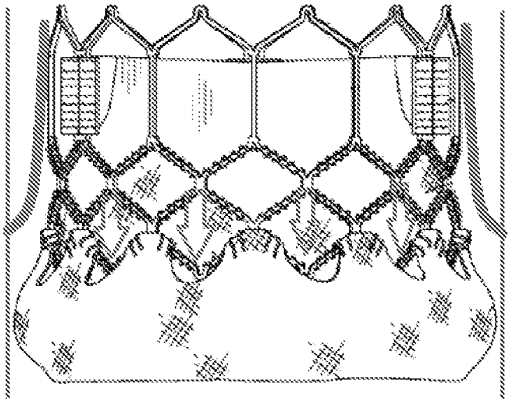
REMARKS

The amended claims are patentable over the references of record because:

1) The amended claim language generally requiring that the sealing material is in contact with the outer frame along the height of the sealing material when the heart valve assembly is in the radially compressed orientation and the radially expanded orientation is not only not disclosed in Levi, but it runs counter to the operability of Levi.
2) The proposed combination by the USPTO still does not teach the limitation that expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the outwardly extending fibers into engagement with native leaflets of the aorta of a patient.
3) If one were to further modify Levi such that the sealing material is in contact with the outer frame along the height of the sealing material when the valve assembly is in the radially expanded orientation, such device would not be able to reach a crimp profile sufficient for transfemoral delivery as claimed because the foreshortening of the frame during crimping and expansion would be restricted by the modified Levi design.

1) REMARKS

Levi functions by billowing of the skirt when retrograde (i.e. downward) blood flow passes through openings formed in an upper surface of the outer skirt. The billowing of the skirt presses the outer surface of the skirt against the aortic annulus. Consider it similar to blowing up a balloon.



(Annotations provided by Applicant)

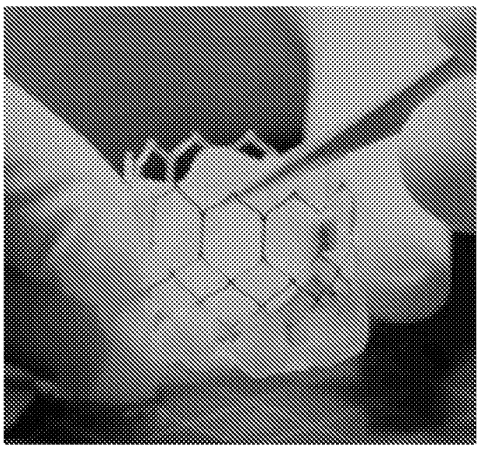
Levi requires a loosely fit outer seal to accomplish both this billowing concept and allowing slack in the outer seal for frame elongation during crimping and subsequent foreshortening during expansion (paragraph [0085] of Levi; *In another advantageous feature, the slack between the lower and upper edges of the outer skirt **18** allows the frame **12** to elongate axially during crimping without any resistance from the outer skirt and the outer skirt does not substantially affect the outer diameter of the prosthetic valve in the crimped condition*).

Levi themselves state:

> *Additionally and/or alternatively, due to the openings along the upper edges of the skirts, retrograde blood can flow into the openings and further open or radially expand the outer skirts with rising back pressure (e.g., diastolic pressure when implanted at the aortic position), similar to the action of a sail, to enhance the sealing of the skirts against the surrounding tissue*[1].

An image of the commercial embodiment of Levi shows this well:

[1] US Patent No. 10,1279,043, which does detail a multi-level sealing member having a plurality of seals in a later filing by Levi, where the seals generally appear the same as the seal in the Levi of record

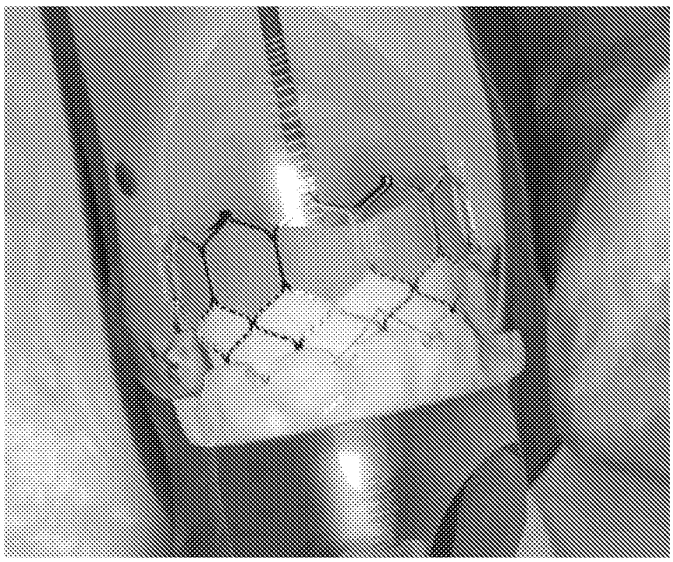


Thus, Levi requires that the graft seal material billows outwardly in response to the retrograde blood flow. It the outer seal of Levi cannot billow outwardly, the seal cannot function as intended. The claim amendment that the sealing material is in contact with the outer frame along the height of the sealing material thus runs counter to the operability of Levi. There is no apparent modification by the USPTO in view of Levi where Levi's billowing outer skirt is still utilized that could meet this limitation.

2) REMARKS

Each of the claims require that expansion from the radially compressed orientation to the radially expanded orientation presses the outwardly extending fibers into engagement with native leaflets of the aorta of the patient.

Levi appears to be silent as to positioning of the valve disclosed therein, and there does not appear to be any images of the Levi device deployed. However, the assignee of Levi displays Levi being deployed subannularly, and a screen shot of this deployment is shown below:



It logically follows that Levi as proposed in 2012 is positioned where the seal is subannular in order to allow blood flow to enter the openings at the top of the seal.[2] The space provided by the reduced diameters pressed outwardly leaflets is less than the aorta itself, and this difference in space provides the need space for billowing of the seal.

Thus, positioning the seal of Levi where the seal engages against the native leaflets, as required by the claims, may thus render Levi inoperable or operating at a lesser level because the openings of Levi would be closed off, and thus unable to receive the retrograde blood flow if the openings are covered by the native leaflets.

3) REMARKS

If one were to further modify Levi so that the sealing material is in contact with the outer frame along the height of the sealing material when the valve assembly is in the radially expanded orientation, Levi's crimping would be significantly restricted by the outer graft without slack (a requirement of Levi to operate as intended during crimping)[3], and such restriction would

[2] Applicant notes that at a time several years after the critical date at issue here, some practitioners began implanting the commercial embodiment of Levi at a higher, intraannular position.

[3] "*When the valve is in the expanded configuration, the intermediate portion of the outer skirt comprises slack in the axial direction between the inflow edge of the outer skirt and the outflow edge of the outer skirt, and when the valve is collapsed to the collapsed configuration, the axial distance between the inflow edge of the outer skirt and the outflow edge of the outer skirt increases, reducing the slack in the outer skirt in the axial direction.*"

impact the crimp profile to the point that the valve frame would not be able to reach an 8F sheath size needed for transfemoral delivery.

The same is true for the other references of record. For example, Spenser and Dehdashtian would not be able to read on the claim limitations and still maintain a small enough profile for transfemoral delivery. If one were to modify the compressible band of Dehdashtian so that it was significantly thinner, the compressible band would still be similar in structure to the proposed Levi plus Dehdashtian fibers combination articulated by the USPTO in the April 19, 2022 Action and would not function for the reasons submitted herewith.

DEPOSIT ACCOUNT

The Commissioner is hereby authorized to charge any otherwise unpaid fees associated with the filing of this correspondence to Deposit Account No. **50-6191**.

Respectfully submitted,

Date: May 10, 2022

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Customer No. 175373

COMMUNICATION TO THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	16/941,117	Confirmation No.:	1876
Applicant	:	Aortic Innovations, LLC		
First Named Inventor	:	Ali Shahriari		
Filing Date	:	July 28, 2020		
TC/A.U.	:	3774		
Examiner	:	Shipmon, Tiffany		
Docket No.	:	426/2/12 UTIL		
Customer No.	:	175373		

Title of Invention: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

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

RESPONSE TO OFFICE ACTION DATED APRIL 19, 2022

Amendments to the Claims are being offered with this response.

Remarks begin on page 7 of this paper.

Amendments to the Claims:

The claims are not amended, however, the claims are presented herein for review purposes.

Listing of Claims:

Claims 1-30 (Canceled)

31. (Currently Amended) A transcatheter heart valve assembly comprising:

a graft covering housing [[a]] prosthetic heart valve leaflets, wherein the graft covering extends around the prosthetic heart valve leaflets for providing sealing to the heart valve leaflets;

an outer frame formed from a metallic material and defining an open cell configuration, and being secured to the graft covering ~~by a plurality of stitches~~; and

a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks,

wherein the sealing material is attached to the outer frame,

wherein the sealing material defines a height that partially extends over at least a first two rows of cells in the outer frame,

wherein the sealing material includes a plurality of radially extending, arcuate fibers that extend outwardly of the outer frame;

wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer,

wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,

wherein the heart valve assembly has a radially compressed and a radially expanded orientation,

wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of [[a]] the patient,

wherein the plurality of fibers is in contact with the outer frame along the height of the sealing material when the heart valve assembly is in the radially compressed orientation and the radially expanded orientation,

wherein the outer frame extends distally further than the prosthetic heart valve leaflets.

Claims 32-33 (Canceled)

34. (Currently Amended) A transcatheter heart valve assembly comprising:

a graft covering housing [[a]] prosthetic heart valve leaflets, wherein the graft covering extends radially outwardly around the prosthetic heart valve leaflets and radially inwardly of an outer frame for providing sealing to the prosthetic heart valve leaflets;

wherein the outer frame is formed from a metallic material and defines an open cell configuration, and being secured to the graft covering ~~by a plurality of stitches~~; and

a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks,

wherein the sealing material is attached to the outer frame,

wherein the sealing material defines a height that partially extends over at least a first two proximal circumferentially extending rows of cells in the outer frame,

wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame,

wherein the radially extending fibers are arcuate,

wherein the graft covering extends beyond a proximal end of the outer frame and over the proximal end thereof to cover the proximal end of the outer frame,

wherein the ~~sealing material includes a~~ plurality of radially extending fibers ~~that~~ form a circumferential surface that extends outwardly of the outer frame;

wherein the fibers ~~cover at least two circumferentially extending rows of grids formed in the open cell configuration and the at least two circumferentially extending rows~~ radially overlap with the prosthetic heart valve leaflets,

wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer,

wherein the valve assembly is ~~balloon~~ expandable during endovascular deployment,

wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,

wherein expansion of the heart valve assembly is configured to press the sealing material against native valve leaflets of an aorta of the patient,

wherein the plurality of fibers is in contact with the at least a first two proximal circumferentially extending rows of cells along the height of the sealing material when the heart valve assembly is in the radially compressed orientation and the radially expanded orientation

~~wherein the sealing material is held against the outer frame as the valve expands from the radially compressed orientation to the radially expanded orientation~~.

35. (Canceled)

36. (Previously Presented) The valve assembly of claim 31, wherein open cells of the open cell configuration are a square shape.

37. (Previously Presented) The valve assembly of claim 31, wherein the graft covering housing a prosthetic heart valve forms an inner frame for supporting the prosthetic heart valve.

38. (Previously Presented) The valve assembly of claim 31, wherein the radially extending fibers are collagen fibers.

39. (Previously Presented) The valve assembly of claim 34, further including a second portion of fibers that extend radially inwardly from the outer frame.

40. (Previously Presented) The valve assembly of claim 34, wherein open cells of the open cell configuration are a square shape.

41. (Previously Presented) The valve assembly of claim 34, wherein the graft covering housing a prosthetic heart valve forms an inner frame for supporting the prosthetic heart valve.

42. (Previously Presented) The valve assembly of claim 34, wherein the radially extending fibers are collagen fibers.

43. (Previously Presented) The valve assembly of claim 34, further including a second portion of fibers that extend radially inwardly from the outer frame.

44. (Currently Amended) A transcatheter aortic heart valve assembly comprising:

a graft covering engaging [[a]] prosthetic heart valve leaflets, wherein the graft covering extends around the prosthetic heart valve leaflets for providing sealing to the prosthetic heart valve leaflets;

a frame formed from a metallic material and defining an open cell configuration, and being secured to the graft covering ~~by stitching~~; and

a sealing material positioned externally to the frame for providing sealing between the frame and a patient's anatomical wall to prevent paravalvular leaks,

wherein the sealing material is attached to the frame,

wherein the sealing material defines a height that extends over at least a first two rows of cells in the frame,

wherein the sealing material includes a plurality of outwardly extending, arcuate fibers that extend outwardly of the frame;

wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,

wherein the heart valve assembly has a radially compressed orientation and a radially expanded orientation,

wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the outwardly extending fibers into engagement with native leaflets of the aorta of [[a]] the patient,

wherein the plurality of fibers is in contact with the frame along the height of the sealing material when the heart valve assembly is in the radially compressed orientation and the radially expanded orientation.

45. (Previously Presented) The valve assembly of claim 44, wherein open cells of the open cell configuration are a square shape.

46. (Previously Presented) The valve assembly of claim 44, wherein the graft covering housing a prosthetic heart valve forms an inner frame for supporting the prosthetic heart valve.

47. (Previously Presented) The valve assembly of claim 44, wherein the outwardly extending fibers are collagen fibers.

48. (Previously Presented) The valve assembly of claim 44, further including a second portion of fibers that extend radially inwardly from the frame.

REMARKS

This is in response to the Office Action mailed April 19, 2022.

Applicant conducted an interview with Examiner Tiffany Shipmon and Examiner Leslie Lopez on May 10, 2022. In that interview, it was agreed that the general claim amendments presented herein, which had also been emailed to Examiner Shipmon beforehand, overcame Levi. It was agreed that a response would be filed so that the matter could be fully considered.

Applicant and Examiner Shipmon also briefly discussed support for the claim amendments, and it was agreed that an initial review of the claims did not present any 35 USC 112 concerns. The amended independent claims are well supported throughout the specification and with particular reference to FIGS. 20-22 as an example. As illustrated, the fibers maintain contact with the frame. An inner graft is provided radially inwardly from the frame. The fibers covers at least two rows of cells in the frame. Paragraph 53 discloses that the valve is delivered transfemorally.

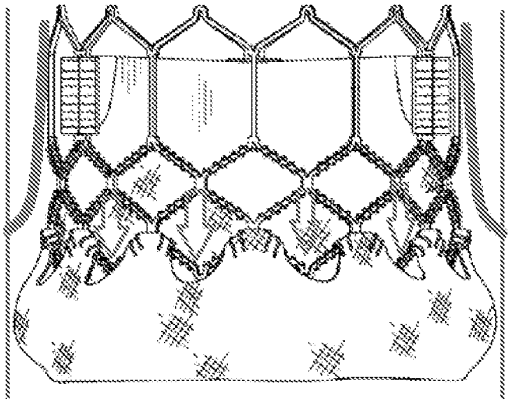
The claims stand rejected under 35 USC 103(a) as being unpatentable over Levi in view of Dehdashtian and further in view of Rankin.

The amended claims are patentable over the references of record because:

1) The amended claim language generally requiring that the plurality of fibers is in contact with the outer frame along the height of the sealing material when the heart valve assembly is in the radially compressed orientation and the radially expanded orientation is not only not disclosed in Levi, but it runs counter to the operability of Levi.
2) The proposed combination by the USPTO still does not teach the limitation that expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the outwardly extending fibers into engagement with native leaflets of the aorta of a patient.
3) If one were to further modify Levi such that the sealing material is in contact with the outer frame along the height of the sealing material when the valve assembly is in the radially expanded orientation, such device would not be able to reach a crimp profile sufficient for transfemoral delivery as claimed because the foreshortening of the frame during crimping and expansion would be restricted by the modified Levi design.

THE AMENDED CLAIM LANGUAGE GENERALLY REQUIRING THAT THE PLURALITY OF FIBERS IS IN CONTACT WITH THE OUTER FRAME ALONG THE HEIGHT OF THE SEALING MATERIAL WHEN THE HEART VALVE ASSEMBLY IS IN THE RADIALLY COMPRESSED ORIENTATION AND THE RADIALLY EXPANDED ORIENTATION IS NOT ONLY NOT DISCLOSED IN LEVI, BUT IT RUNS COUNTER TO THE OPERABILITY OF LEVI

Levi functions by billowing of the skirt when retrograde (i.e. downward) blood flow passes through openings formed in an upper surface of the outer skirt. The billowing of the skirt presses the outer surface of the skirt against the aortic annulus. Consider it similar to blowing up a balloon or wind passing into a sail.



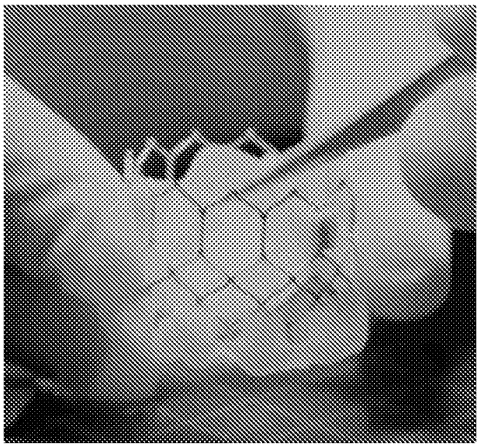
(Annotations provided by Applicant)

Levi requires a loosely fit outer seal to accomplish both this billowing concept and allowing slack in the outer seal for frame elongation during crimping and subsequent foreshortening during expansion (paragraph [0085] of Levi; *In another advantageous feature, the slack between the lower and upper edges of the outer skirt **18** allows the frame **12** to elongate axially during crimping without any resistance from the outer skirt and the outer skirt does not substantially affect the outer diameter of the prosthetic valve in the crimped condition*).

Levi themselves state:

> *Additionally and/or alternatively, due to the openings along the upper edges of the skirts, retrograde blood can flow into the openings and further open or radially expand the outer skirts with rising back pressure (e.g., diastolic pressure when implanted at the aortic position), similar to the action of a sail, to enhance the sealing of the skirts against the surrounding tissue*[1].

An image of the commercial embodiment of Levi shows this well:



Thus, Levi requires that the graft seal material billows outwardly in response to the retrograde blood flow. It the outer seal of Levi cannot billow outwardly, the seal cannot function as intended. The claim amendment that the plurality of fibers is in contact with the outer frame along the height of the sealing material thus runs counter to the operability of Levi. There is no apparent modification by the USPTO in view of Levi where Levi's billowing outer skirt is still utilized that could meet this limitation.

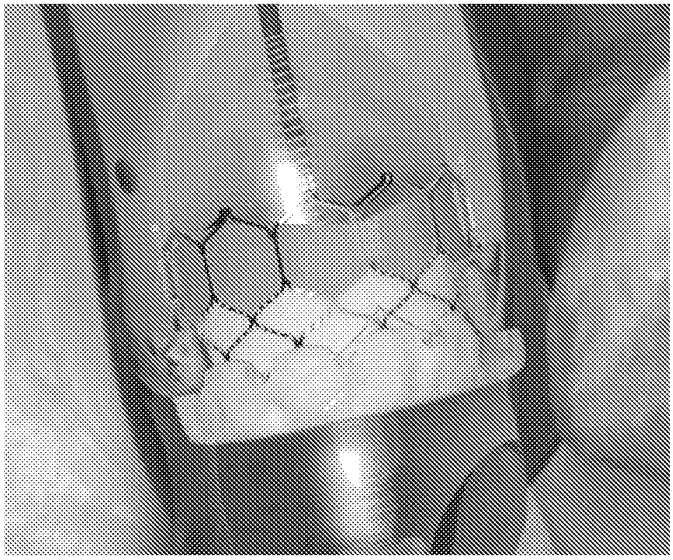
THE PROPOSED COMBINATION BY THE USPTO STILL DOES NOT TEACH THE LIMITATION THAT EXPANSION OF THE HEART VALVE ASSEMBLY FROM THE

[1] US Patent No. 10,1279,043, which does detail a multi-level sealing member having a plurality of seals in a later filing by Levi, where the seals generally appear the same as the seal in the Levi of record. This is a later filing by Levi for a stent having a similar seal design.

RADIALLY COMPRESSED ORIENTATION TO THE RADIALLY EXPANDED ORIENTATION IS CONFIGURED TO PRESS THE OUTWARDLY EXTENDING FIBERS INTO ENGAGEMENT WITH NATIVE LEAFLETS OF THE AORTA OF A PATIENT

Each of the claims require that expansion from the radially compressed orientation to the radially expanded orientation presses the outwardly extending fibers into engagement with native leaflets of the aorta of the patient.

Levi appears to be silent as to positioning of the valve disclosed therein, and there does not appear to be any images of the Levi device deployed in the Levi patent application. However, the commercial embodiment of Levi displays the TAVR being deployed subannularly, and a screen shot of this deployment is shown below:



It logically follows that Levi as proposed in 2012 is positioned where the seal is subannular in order to allow blood flow to enter the openings at the top of the seal.[2] The space

[2] Applicant notes that at a time several years after the critical date at issue here, some practitioners began implanting the commercial embodiment of Levi at a higher, intraannular position.

provided by the reduced diameters pressed outwardly leaflets is less than the aorta itself, and this difference in space provides the need space for billowing of the seal.

Thus, positioning the seal of Levi where the seal engages against the native leaflets, as required by the claims, may thus render Levi inoperable as intended or operating at a lesser level because the openings of Levi would be closed off, and thus unable to receive the retrograde blood flow if the openings are covered by the native leaflets.

IF ONE WERE TO FURTHER MODIFY LEVI SUCH THAT THE SEALING MATERIAL IS IN CONTACT WITH THE OUTER FRAME ALONG THE HEIGHT OF THE SEALING MATERIAL WHEN THE VALVE ASSEMBLY IS IN THE RADIALLY EXPANDED ORIENTATION, SUCH DEVICE WOULD NOT BE ABLE TO REACH A CRIMP PROFILE SUFFICIENT FOR TRANSFEMORAL DELIVERY AS CLAIMED BECAUSE THE FORESHORTENING OF THE FRAME DURING CRIMPING AND EXPANSION WOULD BE RESTRICTED BY THE MODIFIED LEVI DESIGN.

If one were to further modify Levi so that the sealing material is in contact with the outer frame along the height of the sealing material when the valve assembly is in the radially expanded orientation, Levi's crimping would be significantly restricted by the outer graft without slack (a requirement of Levi to operate as intended during crimping)[3], and such restriction would impact the crimp profile to the point that the valve frame would not be able to reach an 8F sheath size needed for transfemoral delivery.

Levi themselves explicitly state that a fabric graft cannot be used on the outside of the frame in a tightly stitched construction:

> *When the metal frame, to which the fabric skirt is secured, is radially compressed, the overall axial length of the frame increases. Unfortunately, a fabric skirt, which inherently*

[3] "*When the valve is in the expanded configuration, the intermediate portion of the outer skirt comprises slack in the axial direction between the inflow edge of the outer skirt and the outflow edge of the outer skirt, and when the valve is collapsed to the collapsed configuration, the axial distance between the inflow edge of the outer skirt and the outflow edge of the outer skirt increases, reducing the slack in the outer skirt in the axial direction.*" [0016]

has limited elasticity, cannot elongate along with the frame and therefore tends to deform the struts of the frame and prevents uniform crimping.
[0066]

The same is true for the other references of record. For example, Spenser and Dehdashtian would not be able to read on the claim limitations and still maintain a small enough profile for transfemoral delivery. If one were to modify the compressible band of Dehdashtian so that it was significantly thinner, the compressible band would still be similar in bulk to the proposed Levi plus Dehdashtian fibers combination articulated by the USPTO in the April 19, 2022 Action and would not function for the reasons submitted herewith.

DEPOSIT ACCOUNT

The Commissioner is hereby authorized to charge any otherwise unpaid fees associated with the filing of this correspondence to Deposit Account No. **50-6191**.

Respectfully submitted,

Date: May 11, 2022

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Customer No. 175373

Electronic Acknowledgement Receipt	
EFS ID:	45683974
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	175373
Filer:	Justin Robert Nifong
Filer Authorized By:	
Attorney Docket Number:	426/2/12 UTIL
Receipt Date:	11-MAY-2022
Filing Date:	28-JUL-2020
Time Stamp:	10:18:06
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		426-2-12-UTIL-response-to-OA-dtd-4-19-2022.pdf	349487 544295a7884a8861c5a3bf07ea792b69835e0708	yes	12

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Request for Reconsideration-After Non-Final Rejection	1	1
	Claims	2	6
	Applicant Arguments/Remarks Made in an Amendment	7	12
Warnings:			
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	Total Files Size (in bytes):	349487	

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National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	16941117
	Filing Date	2020-07-28
	First Named Inventor	Ali Shahriari
	Art Unit	3774
	Examiner Name	SHIPMON, TIFFANY P
	Attorney Docket Number	426/2/12 UTIL

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16941117
	Filing Date	2020-07-28
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	Art Unit	3774
	Examiner Name	SHIPMON, TIFFANY P
	Attorney Docket Number	426/2/12 UTIL

	1	Inter Partes Review IPR2021-01584 dated April 1, 2022	
	2	Inter Partes Review IPR2021-01527 dated March 17, 2022	
	3	EP Examination report dated March 11, 2022 for EP Application No. 20172681.7	
	4	Inter Partes Review IPR2022-00034 dated April 1, 2022	
	5	Inter Partes Review IPR2022-00193 dated April 25, 2022	

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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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16941117
	Filing Date	2020-07-28
	First Named Inventor	Ali Shahriari
	Art Unit	3774
	Examiner Name	SHIPMON, TIFFANY P
	Attorney Docket Number	426/2/12 UTIL

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.

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

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Justin R. Nifong/	Date (YYYY-MM-DD)	2022-05-09
Name/Print	Justin R. Nifong	Registration Number	59389

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

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

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

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

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

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

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

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal	
Application Number:	16941117
Filing Date:	28-Jul-2020
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Filer:	Justin Robert Nifong
Attorney Docket Number:	426/2/12 UTIL
Filed as Small Entity	
Filing Fees for Utility under 35 USC 111(a)	

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	2806	1	130	130
		Total in USD ($)		**130**

Electronic Acknowledgement Receipt	
EFS ID:	45659359
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	175373
Filer:	Justin Robert Nifong
Filer Authorized By:	
Attorney Docket Number:	426/2/12 UTIL
Receipt Date:	09-MAY-2022
Filing Date:	28-JUL-2020
Time Stamp:	06:36:22
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$130
RAM confirmation Number	E202259737294463
Deposit Account	506191
Authorized User	Justin Nifong
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	426-2-12-npl-binder-5-9-2022-printed.pdf	6835387 af9bb927cba06d5acf7e4c29918af978ec056368	no	248
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	426-2-12UTIL-ids-5-9-2022.pdf	1034417 50e4ef81bb2189c77bae89b0ec0578be426f6134	no	4
Warnings:					
Information:					
A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.					
3	Fee Worksheet (SB06)	fee-info.pdf	37953 68863c67972628e340f3ed5cd52b70502857d166	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	7907757		

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New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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.

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

PTO/SB/439 (11-15)

AUTHORIZATION FOR INTERNET COMMUNICATIONS IN A PATENT APPLICATION OR REQUEST TO WITHDRAW AUTHORIZATION FOR INTERNET COMMUNICATIONS		
	Application No.	16941117
	Filing Date	07/28/2020
	First Named Inventor	Ali Shahriari
	Art Unit	3774
	Examiner Name	Shipmon
	Practitioner Docket No.	175373

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

I. To authorize permission for Internet Communications.

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

II. To withdraw authorization for Internet Communications.

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

I am the

☐ applicant.

☒ attorney or agent of record. Registration number 59389.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/Justin R. Nifong/ — Signature

4/19/2022 — Date

Justin R. Nifong — Typed or printed name

919-348-2194 — Telephone Number

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

☐ * Total of _____ forms are submitted.

Privacy Act Statement

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

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	45505855
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	175373
Filer:	Justin Robert Nifong
Filer Authorized By:	
Attorney Docket Number:	426/2/12 UTIL
Receipt Date:	19-APR-2022
Filing Date:	28-JUL-2020
Time Stamp:	12:58:52
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Internet Communications Authorized	sb0439.pdf	196363 e0aac3790bba0fa0714d68f90815390cc8851d7e	no	2

Warnings:

Information:	
Total Files Size (in bytes):	196363

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New Applications Under 35 U.S.C. 111
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New International Application Filed with the USPTO as a Receiving Office
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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/941,117	07/28/2020	Ali Shahriari	426/2/12 UTIL	1876

175373 7590 04/19/2022

Aortic Innovations, LLC
4917 Waters Edge Drive, Suite 275
Raleigh, NC 27606

EXAMINER	
SHIPMON, TIFFANY P	

ART UNIT	PAPER NUMBER
3774	

NOTIFICATION DATE	DELIVERY MODE
04/19/2022	ELECTRONIC

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

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

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

usptomail@nkpatentlaw.com

Office Action Summary	**Application No.** 16/941,117	**Applicant(s)** Shahriari, Ali	
	Examiner TIFFANY P SHIPMON	**Art Unit** 3774	**AIA (FITF) Status** No

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

Period for Reply

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

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

Status

1)☑ Responsive to communication(s) filed on 19 February 2022.

☐ 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) 31,34 and 36-48 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) 31,34 and 36-48 is/are rejected.

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

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

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

Application Papers

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

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

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

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

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

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

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

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

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

Attachment(s)

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

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

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

4) ☐ Other: _____.

Notice of Pre-AIA or AIA Status

1. The present application is being examined under the pre-AIA first to invent provisions.

Response to Arguments

2. Applicant's arguments filed 2/19/2022 have been fully considered but they are not persuasive.

3. Applicant argues the combination of Levi et al. in view of Dehdashtian does not disclose or render obvious the claimed invention. Applicant's affidavit argues the references do not teach an implant that can be delivered through the femoral artery of the patient due to the size of the modified implant. Applicant argues that adding the outer band of Dehdashtian to Levi would render Levi inoperable because the outer skirt of Levi needs to billow and Dehdashtian teaches a band that is tight. Reviewing the wording of the motivation to combine statement in the nonfinal mailed on 2/4/22, the examiner agrees that adding to and/or replacing the band of Levi with that of Dehdashtian appears to change the functionality of Levi.

4. However, the Examiner meant to focus on the "fibers" in Dehdashtian that provide enhanced sealing. The fibers are separate components on the device of Dehdashtian. The Examiner is making this action second nonfinal in order to clearly recite that the modification to Levi et al. is not to add to and/or replace the band in Levi with the band in Dehdashtian, but to utilize the use of fibers from Dehdashtian in the device of Levi in order to aid in engagement with native leaflets of the aorta of a patient and to help with preventing leakage.

5. As noted in the affidavit submitted 2/19/22, it appears that the device of Levi is deployable via a femoral artery of the patient, however, the device with the added band of Dehdashtian is not deployable (paragraph #29 in affidavit). Thus, in the clarified rejection below, the device of Levi is only modified to include the fibers necessary as taught by Dehdashtian to aid in engagement and preventing

leakage. The rejection has been clarified as the entire band of Dehdashtian is not added to the device of Levi.

Claim Rejections - 35 USC § 103

6. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. **Claim 31, 34, 37-39, 41-444, 46-47 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Levi et al. (US 2012/0123529) in view of Dehdashtian (WO 2006/005015) and further in view of Rankin et al. (US 2012/0143324).**

8. Referring to claim 31, Levi et al. discloses a transcatheter heart valve assembly comprising: a graft covering housing a prosthetic heart valve (inner skirt, 16), wherein the graft covering (inner skirt, 16) extends around the prosthetic heart valve (valvular structure, 14) for providing sealing to the heart valve (paragraph 64); an outer frame (12) formed from a metallic material(paragraph 53) and defining an open cell configuration(Figs. 1-3), and being secured to the graft covering by a plurality of stitches (paragraph 74); a sealing material (outer skirt, 18) positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks (paragraph 85), wherein the sealing material is attached to the outer frame(Figs. 1-3), wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a Polymer(PET is a polymer and polyester, paragraph 84), and wherein the heart valve assembly has a

radially compressed and a radially expanded orientation (abstract) wherein the outer frame extends distally further than the prosthetic heart valve (see Figs. 1-3).

9. Levi et al. lacks a detailed description of wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame; and wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient.

10. Dehdashtian discloses a heart valve in the same field of endeavor with a sealing material (256) positioned externally to an outer frame (252) for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks (paragraph 145), wherein the sealing material is attached to the outer frame (Fig. 22), wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame(paragraph 145); wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient (paragraph 145, discloses the compressible material 256, is compressible and expands after deployment).

11. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the sealing material of the heart valve assembly of Levi et al. to include additional fibers as taught by Dehdashtian et al. to be placed externally on the outer frame of the sealing material in order to encourage coagulation of blood to further fill gaps and prevent leakage (pages 36-37).

12. Levi et al. in view of Dehdashtian lacks a detailed description of wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient.

13. Rankin et al. teaches an aortic valve device in the same field of endeavor that comprises a wire frame that can be covered with a fabric that comprises collagen fibers (paragraph 71) and can be

delivered percutaneously(abstract) for the purpose of preventing complicated surgical procedures (paragraph 13). Additionally, it should be noted that the devices of modified Levi et al. in view of Dehdashtian can be collapsed and therefore it can be delivered through the femoral artery.

14. It would have been obvious to a person of ordinary skill in the art to modify the heart valve of Modified Levi et al. to be delivered percutaneously as taught in Rankin et al. in order to prevent complicated surgical procedures.

15. Referring to claim 34, Levi et al. discloses a transcatheter heart valve assembly comprising: a graft covering housing a prosthetic heart valve(inner skirt, 16), wherein the graft covering (inner skirt, 16) extends radially outwardly around the prosthetic heart valve (valvular structure, 14) and radially inwardly of an outer frame for providing sealing to the heart valve(paragraph 64); wherein the outer frame(12) is formed from a metallic material (paragraph 53) and defines an open cell configuration (Figs. 1-3), and being secured to the graft covering by a plurality of stitches (paragraph 74); a sealing material (outer skirt, 18) positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks (paragraph 85), wherein the sealing material is attached to the outer frame(Figs. 1-3), and wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer (PET is a polymer and polyester, paragraph 84), wherein the valve assembly is balloon expandable during endovascular deployment (paragraph 30), wherein expansion of the valve assembly is configured to press the sealing material against native valve leaflets of an aorta of the patient (paragraph 85), wherein the sealing material is held against the outer frame as the valve expands from the radially compressed orientation to the radially expanded orientation (paragraph 85; the sealing material is held against the outer frame, as the sealing material is continuously 'attached' to the outer frame during expansion).

16. Levi et al. discloses the proximal end of the outer frame being covered (See Figs. 42-43). Levi et al. discloses wherein the graft covering extends beyond the proximal end of the outer frame (Levi

discloses a graft covering that extends beyond the proximal end of the outer frame (see Figs. 37-40). However, Levi et al. lacks a detailed description of the proximal end of the outer frame being covered by the graft. However, it would have been obvious to a person of ordinary skill in the art, to modify the graft covering, 16 to cover the proximal end of the outer frame as the graft covering 16 and outer skirt, 18 covers the proximal end of the frame, for the purpose of assisting in forming a good fluid-tight seal between the valve and the native annulus.

17. Levi et al. lacks a detailed description of wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame; wherein the sealing material includes a plurality of radially extending fibers that form a circumferential surface that extends outwardly of the outer frame; wherein the fibers cover at least two circumferentially extending rows of grids formed in the open cell configuration and the at least two circumferentially extending rows radially overlap with the prosthetic leaflets and wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient.

18. Dehdashtian discloses a heart valve in the same Held of endeavor with a sealing material (256) positioned externally to an outer frame (252) for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks (paragraph 145) wherein the sealing material is attached to the outer frame(Fig. 22), wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame(paragraph 145) wherein the sealing material (256) includes a plurality of radially extending fibers that form a circumferential surface that extends outwardly of the outer frame(paragraph 145): wherein the fibers cover at least two circumferentially extending rows of grids farmed in the open cell configuration and the at least two circumferentially extending rows radially overlap with the prosthetic leaflets (Fig. 22, two rows of stent 252 covered) wherein expansion of the heart valve assembly from the radially compressed orientation to the radially

expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient (paragraph 145, discloses the compressible material 256, is compressible and expands after deployment; the material is held against the outer frame).

19. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the sealing material of the heart valve assembly of Levi et al. to include the fibers of Dehdashtian to be placed externally on the outer frame of the sealing material in order to encourage coagulation of blood to further fill gaps and prevent leakage (pages 36-37).

20. Levi et al. lacks a detailed description of wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient.

21. Rankin et al. teaches an aortic valve device in the same field of endeavor that comprises a wire frame that can be covered with a fabric that comprises collagen fibers (paragraph 71} and can be delivered percutaneously (abstract) for the purpose of preventing complicated surgical procedures (paragraph 13}. Additionally, it should be noted that the devices of modified Levi at al. in view of Dehdashtian et al. can be collapsed and therefore it can be delivered through the femoral artery.

22. It would have been obvious to a person of ordinary skill in the art to modify the heart valve of Modified Levi et al. to be delivered percutaneously as taught in Rankin et al. in order to prevent complicated surgical procedures.

23. Referring to claims 37 and 41, as applied to claims 31 and 34 above, Modified Levi et al. discloses wherein the graft covering (inner skirt, 16) housing a prosthetic heart valve (14) forms an inner frame for supporting the prosthetic heart valve (Fig.2).

24. Referring to claim 38 and 42, as applied to claims 31 and 34 above, modified Levi et al. in view of Dehdashtian et al. lacks a detailed description of wherein the radially extending fibers are collagen fibers.

25. Rankin et al. teaches sealing fibers that can be woven collagen in order to cover the surfaces of the wire frame to separate the wire material from the contact with bodily tissues and blood (paragraph 74).

26. It would have been obvious to a person of ordinary skill in the art ta modify the fibers as taught in Modified Levi et al. in view of Dehdashtian to be collagen fibers in order to create a barrier by separating the wire material from having contact with the bodily tissues and blood.

27. Referring to claims 39 and 43, as modified in claims 31 and 34 above, modified Rankin et al. discloses wherein the second plurality of fibers extend radially inwardly from the frame (paragraph 71, discloses the material which contains fibers wrapped around the wire frame, thus the fibers would extend radially inwardly).

28. Referring to claim 44, Levi et al. discloses a transcatheter aortic heart valve assembly comprising: a graft covering engaging a prosthetic heart valve(inner skirt, 16), wherein the graft covering (skirt, 16) extends around the prosthetic heart valve for providing sealing to the heart valve(paragraph 64); a frame formed (12)from a metallic material(paragraph 53) and defining an open cell configuration (Figs. 1-3), and being secured to the graft covering by stitching(paragraph 74); a sealing material (outer skirt, 18) positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks (paragraph 85), wherein the sealing material is attached to the frame (Figs. 1-3), wherein the heart valve assembly has a radially compressed orientation and a radially expanded orientation(abstract).

29. Levi et al. lacks a detailed description of wherein the sealing material includes a plurality of outwardly extending fibers that extend outwardly of the frame; wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the outwardly extending fibers into engagement with native leaflets of the aorta of a patient.

30. Dehdashtian discloses a heart valve in the same field of endeavor wherein the sealing material includes a plurality of outwardly extending fibers that extend outwardly of the frame (paragraph 145); wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the outwardly extending fibers into engagement with native leaflets of the aorta of a patient(paragraph 145, discloses the compressible material 256, is compressible and expands after deployment; the materially is held against the outer frame).

31. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the sealing material of the heart valve assembly of Levi et al. to include the fibers of Dehdashtian et al. to be placed externally on the outer frame of the sealing material in order to encourage coagulation of blood to further fill gaps and prevent leakage (pages 36-37).

32. Levi et al. lacks a detailed description of wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient.

33. Rankin et al. teaches an aortic valve device in the same field of endeavor that comprises a wire frame that can be covered with a fabric that comprises collagen fibers (paragraph 71) and can be delivered percutaneously (abstract) for the purpose of preventing complicated surgical procedures (paragraph 13). Additionally, it should be noted that the devices of modified Levi et al. in view of Dehdashtian et al. can be collapsed and therefore it can be delivered through the femoral artery.

34. It would have been obvious to a person of ordinary skill in the art to modify the heart valve of Modified Levi et al. to be delivered percutaneously as taught in Rankin et al. in order to prevent complicated surgical procedures.

35. Referring to claim 46, as applied to claim 44 above, Modified Levi et al. discloses wherein the graft covering (inner skirt, 16) housing a prosthetic heart valve (14) forms an inner frame for supporting the prosthetic heart valve (Fig.2).

36. Referring to claim 47 as applied to claim 44 above, modified Levi et al. in view of Dehdashtian et al. lacks a detailed description of wherein the radially extending fibers are collagen fibers.

37. Rankin et al. teaches sealing fibers that can be woven collagen in order to cover the surfaces of the wire frame to separate the wire material from the contact with bodily tissues and blood (paragraph 74).

38. It would have been obvious to a person of ordinary skill in the art ta modify the fibers as taught in Modified Levi et al. in view of Dehdashtian et al. to be collagen fibers in order to create a barrier by separating the wire material from having contact with the bodily tissues and blood.

39. Referring to claim 48, as modified in claim 44 above, modified Rankin et al. discloses wherein the second plurality of fibers extend radially inwardly from the frame (paragraph 71, discloses the material which contains fibers wrapped around the wire frame, thus the fibers would extend radially inwardly).

40. Claims 36, 40, and 45 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Levi et al. (US 2012/0123529) in view of Dehdashtian (WO 2006/005015) and Rankin et al. (US 2012/0143324) as applied to claims 31, 34 and 44 above, and further in view of Rowe et al. (US 2006/0287719).

41. Referring to claims 36, 40 and 45, as modified in claims 31, 34 and 44 above, Modified Levi et al. lacks a detailed description of wherein open cells of the open cell configuration are a square shape.

42. Rowe et al. discloses a prosthetic heart valve wherein the open cells of the open configuration are a square shape (Fig. 3).

43. It would have been an obvious matter of design choice to change the shape of the cells to be square, since applicant has not disclosed that square shaped cells solves any stated problem or is for any

particular purpose and it appears that the invention would perform equally well with square shaped cells.

Conclusion

44. Any inquiry concerning this communication or earlier communications from the examiner should be directed to TIFFANY P SHIPMON whose telephone number is (571)270-1448. The examiner can normally be reached MONDAY-FRIDAY.

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, Jennifer Dieterle can be reached on 571-270-7872. 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.

/TIFFANY P SHIPMON/
Examiner, Art Unit 3774
/Jennifer Dieterle/
Supervisory Patent Examiner, Art Unit 3774

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/941,117	Shahriari, Ali
	Examiner	Art Unit
	TIFFANY P SHIPMON	3774

CPC - Searched*		
Symbol	Date	Examiner
A61F 2/856,07,2418,82,90, 2210/0014	10/21/2021	T.S.

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.

	/TIFFANY P SHIPMON/ Examiner, Art Unit 3774

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/941,117	Shahriari, Ali
	Examiner	Art Unit
	TIFFANY P SHIPMON	3774

Search Notes		
Search Notes	**Date**	**Examiner**
IPR2021-01527 Reviewed Petition for Inter Partes Review of US Patent No. 10,792,172 on 10/20/2021	10/21/2021	T.S.
EAST Search History	10/21/2021	T.S.
Consulted with Leslie Lopez	11/29/2021	T.S.
Updated EAST Search	12/02/2021	T.S.
Consulted with Leslie Lopez	01/05/2022	T.S.
Updated EAST Search	01/10/2022	T.S.
Updated EAST Search	03/08/2022	T.S.
IPR2022-00556 Reviewed Petition for Inter Partes Review of US Patent No. 10,987,236 on March 8, 2022	03/08/2022	T.S.
IPR2022-00549 Reviewed Petition for Inter Partes Review of US Patent No. 11,129,735 on March 8, 2022	03/08/2022	T.S.
Consulted with Primary Examiner Seema Mathew	03/23/2022	T.S.

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
A61F	2/07	01/10/2022	T.S.

	/TIFFANY P SHIPMON/ Examiner, Art Unit 3774

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
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S8	59	a61f2/2412	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/06/28 23:31
S9	41	a61f2/2436	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/06/28 23:31
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			EPO; JPO; DERWENT			
S104	1,864	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S105	1,380	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S106	9,898	S101 S102 S103 S104 S105	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S107	9,898	S101 S102 S103 S104 S105 S106	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S108	1,179	S107 and (artery arteries) and (aortic near arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/07/21 10:35
S109	4	"20070067014"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/07/21 11:44
S110	4	"14614628"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/07/21 12:36
S111	7,098	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S112	4,889	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S113	3,856	a61f2/2436.cpc.	US-PGPUB; USPAT;	OR	OFF	2019/12/08 16:15

			EPO; JPO; DERWENT			
S114	1,965	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S115	1,422	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S116	10,508	S111 S112 S113 S114 S115	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S117	10,508	S111 S112 S113 S114 S115 S116	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S118	1,256	S117 and (artery arteries) and (aortic near arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/12/08 16:15
S120	7,401	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S121	5,076	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S122	4,040	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S123	2,043	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S124	1,443	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S125	10,919	S120 S121 S122 S123 S124	US-PGPUB; USPAT;	OR	OFF	2020/03/13 11:45

			EPO; JPO; DERWENT			
S126	10,919	S120 S121 S122 S123 S124 S125	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S127	1,305	S126 and (artery arteries) and (aortic near arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/03/13 11:45
S128	7,401	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S129	5,076	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S130	4,040	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S131	2,043	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S132	1,443	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S133	10,919	S128 S129 S130 S131 S132	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S134	10,919	S128 S129 S130 S131 S132 S133	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S135	966	S134 and (stent and artery and seal$4 and arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2020/03/13 14:56

			JPO; DERWENT			
S136	5,500	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S137	24,545	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S138	15,139	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S139	16,719	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S140	3,555	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S141	11,168	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S142	1,881	(S136 S137 S138 S139 S140 S141) and (stent and artery and seal$4 and arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:02
S143	1	("9044311").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/03/13 20:21
S144	25	(US-10034784-$ | US-10065824-$ | US-16788806-$ | US-19857887-$ | US-	US-PGPUB; USPAT	OR	OFF	2020/03/13 21:45

		20010044650-$ | US-20020082684-$ | US-20040249399-$ | US-20070219613-$ | US-20090036977-$ | US-20090099650-$ | US-20100087907-$ | US-20130013050-$ | US-3002816-$ | US-3025694-$ | US-3220613-$ | US-3289282-$ | US-3482228-$ | US-3506622-$ | US-3545549-$ | US-3562673-$ | US-3652198-$ | US-3715337-$ | US-3757263-$ | US-5464721-$ | US-5609627-$ | US-5773457-$ | US-5814752-$).DID.				
S145	0	(DE-10065824-$ | DE-19857887-$ | AI-20010044650-$ | AI-20020082684-$ | AI-20040249399-$ | AI-20070219613-$ | AI-20090036977-$ | AI-20090099650-$ | AI-20100087907-$ | AI-20130013050-$ | NO-2013040663-$ | NO-2013059596-$ | NO-2014072501-$ | BI-3482228-$ | VA-223131450-$).DID.	US-PGPUB; USPAT	OR	OFF	2020/03/13 21:46
S146	0	"16788806"	US-PGPUB; USPAT	OR	OFF	2020/03/13 21:47
S147	1	("20080132993").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/04/11 20:50
S148	4	"20070067014"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 10:30
S149	5	"20080132993"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 11:39
S150	14	"13706896"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 12:11
S151	1	"16788806"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 12:11

S152	15	(US-10478320-$ | US-16788806-$ | US-20050010277-$ | US-20080082159-$ | US-20090264993-$ | US-3226814-$ | US-3402751-$ | US-3408731-$ | US-3574284-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 14:46
S153	13	(US-16788806-$ | US-20040230287-$ | US-20080275548-$ | US-20110257731-$ | US-20120158121-$ | US-3125764-$ | US-3314328-$ | US-3668892-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 14:46
S154	0	(AI-20040230287-$ | AI-20080275548-$ | AI-20110257731-$ | AI-20120158121-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 14:47
S155	3,758	623/1.12	US-PGPUB; USPAT	OR	OFF	2020/06/06 14:43
S156	51	S155 and ((fibers with collagen))	US-PGPUB; USPAT	OR	OFF	2020/06/06 14:43
S157	7,650	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S158	5,220	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S159	4,196	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S160	2,120	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S161	1,463	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S162	11,262	S157 S158 S159 S160 S161	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:44
S163	282	S162 and ((fibers with collagen))	US-PGPUB; USPAT	OR	OFF	2020/06/06 14:44

S164	1	"20040256759"	US-PGPUB; USPAT	OR	OFF	2020/06/06 15:28
S165	119	(US-10028848-$ | US-10034784-$ | US-10065824-$ | US-10321985-$ | US-16808137-$ | US-18153473-$ | US-19857887-$ | US-2858390-$ | US-20010044650-$ | US-20020082684-$ | US-20020177890-$ | US-20030040771-$ | US-20040210304-$ | US-20040249399-$ | US-20050043790-$ | US-20050197687-$ | US-20060149351-$ | US-20060155366-$ | US-20070067014-$ | US-20070095283-$ | US-20070168013-$ | US-20070203559-$ | US-20070219613-$ | US-20070250146-$ | US-20070276464-$ | US-20080132993-$ | US-20080132999-$ | US-20080262592-$ | US-20080275548-$ | US-20090036977-$ | US-20090099644-$ | US-20090099650-$ | US-20090125098-$ | US-20090171456-$ | US-20090198315-$ | US-20090312834-$ | US-20100042202-$ | US-20100049313-$ | US-20100087907-$ | US-20100094409-$ | US-20110257731-$ | US-20120046726-$ | US-20120089218-$ | US-20130013050-$ | US-20130144373-$ | US-20140046428-$ | US-20140172064-$ | US-20140316513-$ | US-20140336749-$ | US-20160022450-$ | US-20160270935-$ | US-20170209254-$ | US-2787925-$ | US-3002816-$ | US-3002826-$ | US-3005270-$ | US-3016877-$ | US-3021408-$ | US-3025694-$ | US-3034007-$ | US-3095343-$ | US-3102417-$ | US-3114001-$ | US-3157174-$ | US-3179931-$ | US-3206438-$ | US-3220613-$ | US-3220899-$ | US-3226710-$ | US-3258117-$ | US-3269739-$ | US-3289282-$ | US-3314324-$ | US-3358140-$ | US-3393021-$ | US-3393136-$ | US-3394119-$ | US-3397355-$ | US-3398701-$ | US-3414635-$ | US-3419788-$ | US-3425584-$ | US-3452070-$ | US-3482228-$ | US-3506622-$ | US-3545549-$ | US-3561102-$ | US-3562673-$ | US-3582462-$ | US-3603156-$ | US-3617234-$ | US-3623067-$ | US-	US-PGPUB; USPAT	OR	OFF	2020/06/06 16:05

		3629739-$ | US-3652198-$ | US-3715317-$ | US-3715337-$ | US-3721676-$ | US-3757263-$ | US-3833341-$ | US-3864808-$ | US-3911490-$ | US-3940040-$ | US-3943427-$ | US-3976179-$ | US-5004346-$ | US-5061275-$ | US-5254632-$ | US-5334868-$ | US-5464721-$ | US-5609627-$ | US-5716393-$ | US-5718159-$ | US-5752829-$ | US-5773457-$ | US-5814752-$ | US-5918925-$ | US-5957974-$ | US-7018404-$ | US-7771467-$ | US-7799072-$ | US-7914569-$ | US-D187180-$).DID.				
S166	15	(DE-10065824-$ | DN-102014805-$ | DE-19857887-$ | AI-20010044650-$ | AI-20020082684-$ | AI-20020177890-$ | AI-20030040771-$ | AI-20040210304-$ | AI-20040249399-$ | NO-2004089249-$ | AI-20050043790-$ | AI-20050197687-$ | NO-2005087117-$ | AI-20060149351-$ | AI-20060155366-$ | NO-2006127412-$ | AI-20070067014-$ | AI-20070095283-$ | AI-20070168013-$ | AI-20070203559-$ | AI-20070219613-$ | AI-20070250146-$ | AI-20070276464-$ | AI-20080132993-$ | AI-20080132999-$ | AI-20080262592-$ | AI-20080275548-$ | AI-20090036977-$ | AI-20090099644-$ | AI-20090099650-$ | AI-20090125098-$ | AI-20090171456-$ | AI-20090198315-$ | AI-20090312834-$ | AI-20100042202-$ | AI-20100049313-$ | NO-2010006627-$ | AI-20100087907-$ | AI-20100094409-$ | NO-2010031060-$ | NO-2010105195-$ | AI-20110257731-$ | NO-2011035154-$ | JP-2011502628-$ | JP-2011507658-$ | AI-20120046726-$ | AI-20120089218-$ | NO-2012147675-$ | AI-20130013050-$ | AI-20130144373-$ | NO-2013040663-$ | NO-2013059596-$ | NO-2013086132-$ | AI-20140046428-$ | AI-20140172064-$ | AI-20140316513-$ | AI-20140336749-$ | NO-2014072501-$ | AI-20160022450-$ | AI-20160270935-$ | AI-20170209254-$ | EP-2787925-$ | BI-3482228-$ | BI-3582462-$ | BI-	US-PGPUB; USPAT; USOCR; FPRS; EPO; DERWENT	OR	OFF	2020/06/06 16:05

		5254632-$ | BI-5334868-$ | JS-2012068165-$).DID.				
S167	34	(US-16808137-$ | US-20020052649-$ | US-20040243221-$ | US-20040256759-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20090105805-$ | US-20100204781-$ | US-20120123529-$ | US-20120296418-$ | US-20130090729-$ | US-3370418-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; DERWENT	OR	OFF	2020/06/06 16:07
S168	1	(AI-20020052649-$ | AI-20040243221-$ | AI-20040256759-$ | JP-2005124959-$ | NO-2006005015-$ | AI-20070179591-$ | AI-20070213815-$ | AI-20070219620-$ | AI-20080021547-$ | AI-20090105805-$ | AI-20100204781-$ | AI-20120123529-$ | AI-20120296418-$ | AI-20130090729-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; DERWENT	OR	OFF	2020/06/06 16:07
S169	6	((frame with (inner and outer) same seal$4) same graft) and (heart with valve)	US-PGPUB; USPAT	OR	OFF	2020/06/06 16:53
S170	7	((frame same (inner and outer) same seal$4) same graft) and (heart with valve)	US-PGPUB; USPAT	OR	OFF	2020/06/06 17:50
S171	1	("9370419").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/06 19:30
S172	627	("20010039450" | "20020013571" | "20020026216" | "20020082630" | "20020107565" | "20020123802" | "20020151970" | "20020183835" | "20020183838" | "20020188348" | "20020198594" | "20030023303" | "20030050694" | "20030078652" | "20030130729" | "20030153943" | "20030163194" | "20030167071" | "20030171806" | "20030199975" | "20030229394" | "20030229395" | "20030233142" | "20030236568" | "20030236569" | "20040002719" | "20040003819" | "20040010305" | "20040015230" | "20040015232" | "20040015233" | "20040019374" | "20040019377" | "20040019378" | "20040024447" | "20040024451" | "20040024452" | "20040030321" | "20040030381" | "20040030382" |	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/06 19:31

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S195	10	(CN-102014805-$ | NO-2005087117-$ | NO-2006127412-$ | NO-2010006627-$ | NO-2010031060-$ | NO-2010105195-$ | NO-2011035154-$ | JP-2011502628-$ | JP-2011507658-$ | EP-2787925-$ | JS-2012068165-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 14:37
S196	50	(US-10034784-$ | US-10065824-$ | US-16736879-$ | US-19857887-$ | US-20010044650-$ | US-20020082684-$ | US-20040249399-$ | US-20070219613-	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2020/06/17 14:41

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S200	75	(mclean.in.) and stent	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 16:22
S201	108	(vidlund.in.) and stent	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 16:23
S202	1	("20080275548").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 16:47
S203	1	("20120283820").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 16:48
S204	1,050	salahieh.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 16:48
S205	516	salahieh.in. and valve	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 16:48
S206	1	("20050137695").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 16:55
S207	7,776	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/07/20 11:59
S208	5,285	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/07/20 11:59
S209	4,260	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/07/20 11:59
S210	2,147	a61f2/2433.cpc.	US-PGPUB; USPAT;	OR	OFF	2020/07/20 11:59

			EPO; JPO; DERWENT			
S211	1,470	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/07/20 11:59
S212	11,433	S207 S208 S209 S210 S211	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/07/20 11:59
S215	56	2006/124649	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 09:23
S216	0	wo2006/124649	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 09:23
S217	0	(2006/124649).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 09:23
S218	0	(2006/0124649).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 09:24
S219	5	("2006124649").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; DERWENT	OR	OFF	2020/07/29 09:24
S220	1	"16808137"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 09:55
S221	4	"20090125098"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 11:29
S222	7	"20030040771"	US-PGPUB; USPAT; USOCR;	OR	OFF	2020/07/29 11:30

			FPRS; EPO; JPO; DERWENT			
S223	1,779	(cuff with (fiber barb))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 11:58
S224	270	("20020036220" | "20030023303" | "20030050694" | "20030130726" | "20040049262" | "20040093075" | "20040102837" | "20040111111" | "20040210304" | "20040260389" | "20050096726" | "20050137682" | "20050137695" | "20050137697" | "20050203605" | "20050256566" | "20060008497" | "20060020327" | "20060025857" | "20060036308" | "20060074484" | "20060122692" | "20060149360" | "20060161249" | "20060173532" | "20060178740" | "20060206202" | "20060241744" | "20060241745" | "20060259120" | "20060259136" | "20060259137" | "20060265056" | "20060276813" | "20060276874" | "20070010876" | "20070027534" | "20070043435" | "20070055358" | "20070067029" | "20070093890" | "20070100435" | "20070118210" | "20070213813" | "20070233228" | "20070244545" | "20070244552" | "20070288087" | "20080021552" | "20080039934" | "20080071369" | "20080082164" | "20080097595" | "20080114452" | "20080125853" | "20080140189" | "20080147183" | "20080154355" | "20080154356" | "20080243245" | "20080255662" | "20080262602" | "20080269879" | "20090099653" | "20090112309" | "20090138079" | "20090276027" | "20100004740" | "20100036484" | "20100049306" | "20100087907" | "20100131055" | "20100168778" | "20100168839" | "20100168844" | "20100185277" | "20100191326" | "20100204781" | "20100204785" | "20100217382" | "20100234940" | "20100249911" | "20100249923" | "20100286768" | "20100298931" | "20110029072" |	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 12:03

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S225	1	(spense.in.) and valve	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 12:22
S226	573	(spence.in.) and valve	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 12:22
S227	10	(US-20070288087-$ | US-20100217382-$ | US-20100249916-$ | US-20120123529-$ | US-20200197199-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/04 10:17
S228	16	(US-3370418-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-7175652-$ | US-7470284-$ | US-7740656-$ | US-7972370-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/04 10:19
S229	34	(US-16910189-$ | US-20020052649-$ | US-20040243221-$ | US-20040256759-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20090105805-$ | US-20100204781-$ | US-20120123529-$ | US-20120296418-$ | US-20130090729-$ | US-3370418-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/04 10:19
S230	5	(AI-20020052649-$ | AI-20040243221-$ | AI-20040256759-$ | JP-2005124959-$ | WO-2006005015-$ | AI-20070179591-$ | AI-20070213815-$ | AI-20070219620-$ | AI-20080021547-$ | AI-20090105805-$ | AI-	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/04 10:20

		20100204781-$ | AI-20120123529-$ | AI-20120296418-$ | AI-20130090729-$ | VA-223131450-$).DID.				
S231	7,889	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S232	5,349	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S233	4,324	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S234	2,182	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S235	1,479	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S236	11,602	S231 S232 S233 S234 S235	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S237	22	S236 and ((fibers with collagen) same migration)	US-PGPUB; USPAT	OR	OFF	2020/08/28 15:54
S238	1,634	S236 and ((fibers))	US-PGPUB; USPAT	OR	OFF	2020/08/28 15:55
S239	1,688	S236 and ((fibers))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:55
S240	332	S236 and ((fibers)) and (frame and graft)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:55
S245	4	(US-10716662-$ | US-16910189-$ | US-20090143855-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2020/09/27 23:02

			JPO; DERWENT			
S246	3	(wO-2001049213-$ | wO-2004032987-$ | AI-20090143855-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/09/27 23:04
S247	361	"4164046"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/09/27 23:09
S248	1	("4164046").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/09/27 23:09
S249	1	("20070142907").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/09/27 23:11
S256	85	(shahriari near ali).in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 14:07
S257	51	"2006124649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 15:17
S258	0	("2006124649").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 15:17
S259	25	"12882605"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:02
S260	0	"12882605.app"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:03

S261	0	"12882605".app.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:03
S262	0	("12882605").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 16:03
S263	0	("2006018514").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 16:03
S264	1	("20060018514").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 16:03
S265	7	"20060018514"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:04
S266	30	"2006018514"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:04
S267	16	(US-10716662-$ | US-17024060-$ | US-20070288087-$ | US-20090143855-$ | US-20100217382-$ | US-20100249916-$ | US-20120123529-$ | US-20200197199-$ | US-3992608-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 19:25
S268	0	("(NO-2001049213-$\|NO-2004032987-$|AI-20070288087-$\|AI-20090143855-$|AI-20100217382-$\|AI-20100249916-$|NO-2011069048-$\|AI-20120123529-$|AI-20200197199-$\|VA-223131450-$).DID.").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 19:25
S269	0	(WO-2001049213-$ | NO-2004032987-$ | AI-20070288087-$ | AI-20090143855-$ | AI-20100217382-$ | AI-20100249916-$ | NO-2011069048-$ | AI-20120123529-$ | AI-20200197199-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 19:26
S272	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/01/16 10:22

			JPO; DERWENT			
S273	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:23
S274	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:24
S275	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:25
S276	5,725	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:26
S277	26,012	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:26
S278	17,240	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:26
S279	17,642	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:26
S280	3,934	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR;	OR	OFF	2021/01/16 10:27

			FPRS; EPO; JPO; DERWENT			
S281	5,886	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S282	7,416	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S283	11,668	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S284	18,724	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S285	5,565	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S286	4,782	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S287	535	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S288	12,232	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/01/16 10:28

			JPO; DERWENT			
S289	1,710	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S290	11,758	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S291	15,314	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S292	32,596	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S293	9,253	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S294	17,878	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S295	3,437	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S296	3,130	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/01/16 10:29

			JPO; DERWENT			
S297	14,644	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S298	1,594	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S299	3,931	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S300	2,511	(S272 S273 S274 S275 S276 S277 S278 S279 S280 S281 S282 S283 S284 S285 S286 S287 S288 S289 S290 S291 S292 S293 S294 S295 S296 S297 S298 S299) and (heart adj3 valve) and (fiber$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:31
S301	1,676	S300 and (seal$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:33
S302	48	((("SHAHRIARI") near3 ("Ali"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2021/01/16 11:48
S303	13	((("AORTIC") near3 ("INNOVATIONS") near3 ("LLC"))).AS,AANM.	USPAT	OR	OFF	2021/01/16 11:49
S304	13	(US-10258464-$ | US-20110218619-$ | US-20110319991-$ | US-3339377-$ | US-3408214-$ | US-3532868-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/26 17:20
S305	2	(US-20120123529-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/01/26 17:21

			JPO; DERWENT			
S306	4	"16910189"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/26 18:34
S307	2	"17060557"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/26 18:35
S309	8	(US-10792172-$ | US-20020052649-$ | US-3333075-$ | US-3370418-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:46
S310	3	(("9333075") or ("7921678") or ("9370418")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/11 17:48
S311	15	(US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:48
S312	0	("(us-20130304196-$).DID.").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/11 17:49
S313	2	(us-20130304196-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:49
S315	1	("20120123529").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/11 17:50
S317	0	(AI-20020052649-$ | AI-20060276813-$ | AI-20080077236-$ | AI-20080188929-$ | AI-20080319521-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:51

S318	10	(US-20020052649-$ | US-20060276813-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:52
S319	2	(US-20110009948-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:54
S320	5	"20060005015"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:55
S321	96	"2006005015"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:55
S322	5	"15876053"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:11
S323	2	("2018/0206982").URPN.	USPAT	OR	OFF	2021/02/13 09:12
S324	0	"20010049555"	USPAT	OR	OFF	2021/02/13 09:14
S325	4	"20010049555"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:14
S326	3	"20070233228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:16
S327	3	"20120296418"	US-PGPUB; USPAT; USOCR;	OR	OFF	2021/02/13 09:16

			FPRS; EPO; JPO; DERWENT			
S328	822	("20010021872" | "20020026094" | "20020032481" | "20020138135" | "20020173842" | "20030050694" | "20030100939" | "20030158597" | "20030212454" | "20040039436" | "20040186563" | "20040186565" | "20050075728" | "20050096736" | "20050188525" | "20050203614" | "20050203617" | "20050234546" | "20060004469" | "20060025857" | "20060058872" | "20060149350" | "20060183383" | "20060229719" | "20060259137" | "20070005131" | "20070010876" | "20070010877" | "20070112422" | "20070162102" | "20070203503" | "20070203575" | "20070203576" | "20070213813" | "20070260305" | "20070265700" | "20080114442" | "20080125853" | "20080154355" | "20080183271" | "20090125118" | "20090157175" | "20090276040" | "20090281619" | "20090299452" | "20090319037" | "20100049313" | "20100168844" | "20100198347" | "20100204781" | "20110015729" | "20110319991" | "20120259409" | "20130023985" | "20130190857" | "20130274873" | "20130310926" | "20130317598" | "20130331929" | "20140194981" | "20140200661" | "20140209238" | "20140277417" | "20140277419" | "20140277424" | "20140330372" | "20140343671" | "20150073545" | "20150073546" | "3409013" | "3548417" | "3587115" | "3657744" | "3671979" | "3714671" | "3755823" | "4035849" | "4056854" | "4106129" | "4222126" | "4265694" | "4297749" | "4339831" | "4343048" | "4345340" | "4373216" | "4406022" | "4441216" | "4470157" | "4535483" | "4574803" | "4592340" | "4605407" | "4612011" | "4643732" | "4655771" | "4692164" | "4733665" | "4759758" | "4762128" | "4777951" | "4787899" | "4787901" | "4796629" | "4820299" | "4829990" | "4851001" | "4856516" | "4878495" | "4878906" | "4883458" | "4922905" |	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:25

		"4966604" | "4979939" | "4986830" | "4994077" | "5007896" | "5026366" | "5032128" | "5037434" | "5047041" | "5059177" | "5080668" | "5085635" | "5089015" | "5152771" | "5163953" | "5167628" | "5192297" | "5266073" | "5282847" | "5295958" | "5332402" | "5360444" | "5370685" | "5397351" | "5411055" | "5411552" | "5443446" | "5480424" | "5500014" | "5545209" | "5545214" | "5549665" | "5554185" | "5558644" | "5571175" | "5584803" | "5591185" | "5591195" | "5607464" | "5609626" | "5628792" | "5639274" | "5665115" | "5716417" | "5728068" | "5749890" | "5756476" | "5769812" | "5800508" | "5840081" | "5855597" | "5855601" | "5855602" | "5925063" | "5957949" | "6027525" | "6132473" | "6168614" | "6171335" | "6174327" | "6210408" | "6217585" | "6221091" | "6231602" | "6245102" | "6299637" | "6302906" | "6350277" | "6352547" | "6425916" | "6440764" | "6454799" | "6458153" | "6461382" | "6468660" | "6482228" | "6488704" | "6527979" | "6569196" | "6582462" | "6605112" | "6652578" | "6689123" | "6716244" | "6730118" | "6733525" | "6767362" | "6769161" | "6783542" | "6830584" | "6878162" | "6893460" | "6908481" | "6936067" | "7018406" | "7018408" | "7096554" | "7225518" | "7276078" | "7276084" | "7318278" | "7374571" | "7393360" | "7462191" | "7510575" | "7563280" | "7585321" | "7618446" | "7618447" | "7655034" | "7785366" | "7959672" | "7993394" | "8029556" | "8167932" | "8291570" | "8449606" | "8454685" | "8652203" | "8747463" | "9078781").PN.				
S329	4	("20130190862" | "20160317305").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:26
S330	4	("20070233228" | "20120296418").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/02/13 09:27

			JPO; DERWENT			
S331	835	("20020173842" | "20030100939" | "20040186563" | "20050203617" | "20070162102" | "20080183271" | "20100204781" | "20130274873" | "20140200661" | "20150073546" | "4222126" | "4733665" | "4759758" | "4777951" | "5026366" | "5032128" | "5332402" | "5411055" | "5558644" | "5571175" | "5609626" | "6231602" | "6425916" | "6440764" | "6689123" | "6893460" | "6936067" | "7655034" | "7993394" | "8652203" | "20030212454" | "20050075728" | "20070112422" | "20100168844" | "20100198347" | "4829990" | "5397351" | "5545214" | "5549665" | "5584803" | "5855602" | "6027525" | "6132473" | "6168614" | "6221091" | "6302906" | "6350277" | "6454799" | "6605112" | "6908481" | "7510575" | "7563280" | "20070233228" | "20020138135" | "20050203614" | "20050234546" | "20060149350" | "20070260305" | "3714671" | "4297749" | "4441216" | "4692164" | "4762128" | "4883458" | "4994077" | "5007896" | "5163953" | "5360444" | "5411552" | "5591185" | "5639274" | "5665115" | "5716417" | "5749890" | "5756476" | "5855601" | "6171335" | "6245102" | "6299637" | "6488704" | "6569196" | "6769161" | "7393360" | "7585321" | "7959672" | "8167932" | "8747463" | "9078781" | "20130190862" | "20010049555" | "20040186565" | "20060058872" | "20060229719" | "20070213813" | "20090299452" | "20120259409" | "20130023985" | "20130310926" | "20130317598" | "20130331929" | "20140209238" | "20140277417" | "20140343671" | "4265694" | "4339831" | "4373216" | "4470157" | "4592340" | "4643732" | "4796629" | "4820299" | "4856516" | "4966604" | "5047041" | "5089015" | "5266073" | "5295958" | "5591195" | "5607464" | "5957949" | "6716244" | "6767362" | "7018406" | "7096554" | "7276084" | "7374571" | "8029556" |	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:27

		"20020026094" | "20050096736" | "20060259137" | "20070005131" | "20090125118" | "20090157175" | "20090319037" | "20110319991" | "20140194981" | "20140277424" | "3587115" | "3657744" | "3671979" | "4343048" | "4612011" | "4787899" | "4787901" | "4878495" | "4878906" | "4979939" | "4986830" | "5059177" | "5085635" | "5152771" | "5370685" | "5500014" | "5554185" | "5728068" | "6210408" | "6352547" | "6527979" | "6783542" | "7618446" | "20030050694" | "20030158597" | "20050188525" | "20060004469" | "20070203503" | "20080114442" | "20080154355" | "20100049313" | "20110015729" | "20140277419" | "20150073545" | "3409013" | "3548417" | "4035849" | "4056854" | "4106129" | "4406022" | "4535483" | "4922905" | "5037434" | "5080668" | "5282847" | "5769812" | "5840081" | "5855597" | "6174327" | "6458153" | "6468660" | "6652578" | "6830584" | "6878162" | "7018408" | "7225518" | "7785366" | "8454685" | "20120296418" | "20010021872" | "20040039436" | "20070010877" | "20070265700" | "20080125853" | "20090281619" | "20130190857" | "20140330372" | "4345340" | "4605407" | "5545209" | "5628792" | "6217585" | "6461382" | "6730118" | "7318278" | "7462191" | "7618447" | "8449606" | "20170014229" | "20020032481" | "20060025857" | "20060183383" | "20070010876" | "20070203575" | "20070203576" | "20090276040" | "3755823" | "4574803" | "4655771" | "4851001" | "5167628" | "5192297" | "5443446" | "5480424" | "5800508" | "5925063" | "6482228" | "6582462" | "6733525" | "7276078" | "8291570" | "20160317305").PN.				
S332	11	WO2006124649	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 10:13

S333	53	"2006124649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 10:14
S334	0	"17131869"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 11:12
S335	2	"17060557"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 11:12
S336	13	S328 and (outer$4 with (graft))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 11:49
S337	27	S328 and ((outer$4 exter$4 outsid$$)with (graft))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:00
S338	36,075	l11and ((outer$4 exter$4 outsid$$)with (graft))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:14
S339	27	S331 and ((outer$4 exter$4 outsid$$)with (graft))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:14
S340	13	(US-10258464-$ | US-20110218619-$ | US-20110319991-$ | US-3339377-$ | US-3408214-$ | US-3532868-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:56

S341	12	(US-20020052649-$ | US-20060276813-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-3333075-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:57
S342	4	"20110098802"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 15:10
S343	1	("9333075").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/17 05:33
S344	10	(US-20020052649-$ | US-20060276813-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/17 05:40
S345	70	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17007373-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 12:07
S346	10	"16808137"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 14:38
S347	34	"10555823"	US-PGPUB; USPAT; USOCR;	OR	OFF	2021/03/21 14:50

			FPRS; EPO; JPO; DERWENT			
S348	2	"16983196"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 15:15
S349	1	("10881538").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/03/21 15:20
S350	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S351	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S352	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S353	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S354	5,771	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S355	26,423	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/21 18:03

			JPO; DERWENT			
S356	17,810	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S357	17,863	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S358	4,039	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S359	6,081	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S360	7,540	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S361	11,779	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S362	18,985	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S363	5,683	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/21 18:03

			JPO; DERWENT			
S364	4,850	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S365	554	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S366	12,658	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S367	1,774	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S368	12,050	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S369	15,676	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S370	32,778	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S371	9,317	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/21 18:03

			JPO; DERWENT			
S372	18,227	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S373	3,573	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S374	3,174	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S375	14,799	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S376	1,655	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S377	4,153	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S378	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S379	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/21 21:13

			JPO; DERWENT			
S380	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S381	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S382	5,771	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S383	26,423	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S384	17,810	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S385	17,863	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S386	4,039	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S387	6,081	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR;	OR	OFF	2021/03/21 21:13

			FPRS; EPO; JPO; DERWENT			
S388	7,540	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S389	11,779	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S390	18,985	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S391	5,683	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S392	4,850	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S393	554	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S394	12,658	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S395	1,774	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/21 21:13

			JPO; DERWENT			
S396	12,050	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S397	15,676	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S398	32,778	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S399	9,317	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S400	18,227	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S401	3,573	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S402	3,174	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S403	14,799	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/21 21:13

			JPO; DERWENT			
S404	1,655	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S405	4,153	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S406	2,578	(S378 S379 S380 S381 S382 S383 S384 S385 S386 S387 S388 S389 S390 S391 S392 S393 S394 S395 S396 S397 S398 S399 S400 S401 S402 S403 S404 S405) and (heart adj3 valve) and (fiber$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S407	15	((frame same (inner and outer) same seal$4) same graft) and (heart with valve)	US-PGPUB; USPAT	OR	OFF	2021/03/25 16:13
S408	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S409	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S410	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S411	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13

S412	5,773	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S413	26,431	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S414	17,826	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S415	17,867	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S416	4,044	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S417	6,084	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S418	7,541	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S419	11,784	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13

S420	18,994	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S421	5,686	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S422	4,852	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S423	554	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S424	12,667	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S425	1,775	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S426	12,059	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S427	15,690	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13

S428	32,783	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S429	9,318	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S430	18,235	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S431	3,576	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S432	3,174	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S433	14,804	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S434	1,655	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S435	4,158	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13

S436	2,585	(S408 S409 S410 S411 S412 S413 S414 S415 S416 S417 S418 S419 S420 S421 S422 S423 S424 S425 S426 S427 S428 S429 S430 S431 S432 S433 S434 S435) and (heart adj3 valve) and (fiber$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S438	0	("13706896").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/03/27 09:37
S439	34	"13706896"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 09:37
S440	1	("7799072").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/03/27 09:58
S441	70	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17170957-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:38
S442	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S443	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39

S444	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S445	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S446	5,776	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S447	26,437	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S448	17,841	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S449	17,872	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S450	4,046	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S451	6,089	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39

S452	7,542	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S453	11,785	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S454	18,999	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S455	5,689	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S456	4,854	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S457	555	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S458	12,674	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S459	1,777	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39

S460	12,063	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S461	15,695	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S462	32,786	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S463	9,323	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S464	18,239	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S465	3,579	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S466	3,175	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S467	14,810	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39

S468	1,657	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S469	4,160	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S470	2,587	(S442 S443 S444 S445 S446 S447 S448 S449 S450 S451 S452 S453 S454 S455 S456 S457 S458 S459 S460 S461 S462 S463 S464 S465 S466 S467 S468 S469) and (heart adj3 valve) and (fiber$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S471	0	("16910189").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/04/08 16:49
S472	6	"16910189"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 16:49
S473	11	"16808137"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 17:22
S474	1	("10881538").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/04/08 18:29
S475	2	"16941117"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 18:36
S476	72	(US-10016271-$ | US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17006793-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ |	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 23:48

		US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.				
S477	0	(AI-20020052649-$ | AI-20030153974-$ | AI-20040243221-$ | AI-20040256759-$ | NO-2006005015-$ | AI-20060276813-$ | NO-2006124649-$ | AI-20070179591-$ | AI-20070213815-$ | AI-20070219620-$ | AI-20080021547-$ | AI-20080077236-$ | AI-20080188929-$ | AI-20080319521-$ | AI-20090105805-$ | AI-20100204781-$ | AI-20110009948-$ | AI-20110098802-$ | AI-20110218619-$ | AI-20110319991-$ | AI-20120123529-$ | AI-20120296418-$ | AI-20130304196-$ | NO-3829057-$ | IF-617622-$ | SO-0225223-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 23:48
S478	54	"2006124649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/09 09:42
S479	3	"20060259136"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/09 14:18
S480	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/04/09 16:30

		20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.				
S481	28	S480 and (mitral)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/09 16:37
S482	6	"20020052649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/10 11:44
S483	2	"17170957"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/10 15:48
S484	2	"17170957"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/24 09:59
S485	5	"17060557"	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/04/24 09:59

			JPO; DERWENT			
S486	6	"20020052649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/24 10:57
S487	55	"2006124649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 10:15
S488	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/04/27 10:19
S489	39	S488 and (seal with3 (inflow and outflow))	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/04/27 10:19

			JPO; DERWENT			
S490	41	S488 and (seal$4 with3 (inflow and outflow))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 10:23
S491	21	("2014/0316513").URPN.	USPAT	OR	OFF	2021/04/27 10:28
S492	0	"17006793"	USPAT	OR	OFF	2021/04/27 10:32
S493	1	"16792197"	USPAT	OR	OFF	2021/04/27 10:32
S494	4	"20110098802"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 11:19
S496	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/04/27 19:42

		20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.				
S497	41	S496 and (seal$4 with3 (inflow and outflow))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 19:42
S498	4	"20110098802"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/05/24 12:23
S499	15	((("AORTIC") near3 ("INNOVATIONS") near3 ("LLC"))).AS,AANM.	USPAT	OR	OFF	2021/05/25 08:57
S500	54	((("SHAHRIARI") near3 ("Ali"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2021/05/25 08:57
S503	22	(US-17170957-$ | US-20050240137-$ | US-20060013863-$ | US-20140277424-$ | US-20150148889-$ | US-20150335424-$ | US-20150335429-$ | US-20160022444-$ | US-20190192286-$ | US-20200352707-$ | US-3039757-$ | US-3421098-$ | US-3834552-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/05/30 17:02
S504	74	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17213251-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-20150335429-$ | US-20160022444-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/02 13:20

S505	3	"17007373"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/02 16:13
S506	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/06/03 13:29
S507	15	S506 and (collagen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:29
S508	22	(US-17170957-$ | US-20050240137-$ | US-20060013863-$ | US-20140277424-$ | US-20150148889-$ | US-20150335424-$ | US-20150335429-$ | US-20160022444-$ | US-20190192286-	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:55

		$ | US-20200352707-$ | US-3039757-$ | US-3421098-$ | US-3834552-$).DID.				
S509	74	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17213251-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-20150335429-$ | US-20160022444-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:55
S510	92	S508 S509	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:55
S511	10	S510 and (collagen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:55
S512	232	(collagen same fibers same graft) and (heart and valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 14:01
S513	1	("7921678").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/06/03 14:08
S514	35	(US-17170957-$ | US-20030153974-$ | US-20060025857-$ | US-20060074484-$ | US-20070282436-$ | US-20100036484-$ | US-20110040367-$ | US-20110098802-$ | US-20110125244-$ | US-20110166636-$ | US-	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/18 10:36

		20120022633-$ | US-20120071969-$ | US-20120310328-$ | US-20130018458-$ | US-20130073030-$ | US-20140018915-$ | US-20140155997-$ | US-20170128209-$).DID.				
S518	6	(("20130018458") or ("20110125244") or ("20110166636") or ("20110098802") or ("20060074484") or ("20120310328")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/01 09:32
S520	102	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17327673-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060025857-$ | US-20060074484-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20070282436-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100036484-$ | US-20100204781-$ | US-20110009948-$ | US-20110040367-$ | US-20110098802-$ | US-20110125244-$ | US-20110166636-$ | US-20110218619-$ | US-20110319991-$ | US-20120022633-$ | US-20120071969-$ | US-20120123529-$ | US-20120296418-$ | US-20120310328-$ | US-20130018458-$ | US-20130073030-$ | US-20130304196-$ | US-20140018915-$ | US-20140155997-$ | US-20150335429-$ | US-20160022444-$ | US-20170128209-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/21 16:59
S521	0	(AI-20020052649-$ | AI-20030153974-$ | AI-20040243221-$ | AI-20040256759-$ | AI-20060025857-$ | NO-2006005015-$ | AI-20060074484-$ | AI-20060276813-$ | NO-2006124649-$ | AI-20070179591-$ | AI-20070213815-$ | AI-20070219620-$ | AI-20070282436-$ | AI-20080021547-$ | AI-20080077236-$ | AI-20080188929-$ | AI-20080319521-$ | AI-20090105805-$ | AI-20100036484-$ | AI-20100204781-$ | AI-20110009948-$	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/21 17:17

		| AI-20110040367-$ | AI-20110098802-$ | AI-20110125244-$ | AI-20110166636-$ | AI-20110218619-$ | AI-20110319991-$ | AI-20120022633-$ | AI-20120071969-$ | AI-20120123529-$ | AI-20120296418-$ | AI-20120310328-$ | NO-2012068175-$ | AI-20130018458-$ | AI-20130073030-$ | AI-20130304196-$ | AI-20140018915-$ | AI-20140155997-$ | AI-20150335429-$ | AI-20160022444-$ | AI-20170128209-$ | NO-3829057-$ | SO-0225223-$ | VA-223131450-$).DID.				
S522	0	"17327673"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/22 11:09
S523	4	"17096253"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/22 11:10
S526	17	((("AORTIC") near3 ("INNOVATIONS") near3 ("LLC"))).AS,AANM.	USPAT	OR	OFF	2021/07/22 15:41
S527	58	((("SHAHRIARI") near3 ("Ali"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2021/07/22 15:41
S528	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/07/25 16:50

		or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.				
S529	15	S528 and collagen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/25 16:50
S530	4	"20110098802"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/25 17:00
S531	23	"2005023584"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/25 17:16
S532	12	"20050023584"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/25 17:17
S533	0	("2005023584").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/25 17:18
S534	1	("20050023584").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/25 17:18
S535	1	("20060004442").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/25 17:19
S536	398	("2006/0004442").URPN.	USPAT	OR	OFF	2021/07/25 17:20

S537	1	("20130018458").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/25 17:28
S539	41	"13706896"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/30 11:20
S542	22	"10299917"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/08/23 10:08
S545	234	(collagen same fibers same graft) and (heart and valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/08/25 14:20
S546	3	"20060276813"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/08/26 12:46
S547	25	"2011143263"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/08/26 12:47
S548	0	WO2005115275	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 09:38
S549	19	"2005115275"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 09:38
S550	3	"20050273155"	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/10/19 09:39

			JPO; DERWENT			
S551	17	"2005112821"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 09:39
S552	9	("20030153974" | "20060276813" | "3365728" | "5411552" | "6893460" | "7393360" | "7510575" | "9393110" | "9829057").PN.	US-PGPUB; USPAT	OR	OFF	2021/10/19 09:56
S553	17	("20030153974" | "20060276813" | "3365728" | "5411552" | "6893460" | "7393360" | "7510575" | "9393110" | "9829057" | "10716662" | "20070288087" | "20090143855" | "20100217382" | "20100249916" | "20120123529" | "20200197199" | "8992608").PN.	US-PGPUB; USPAT	OR	OFF	2021/10/19 09:56
S554	8	("20030153974" | "3365728" | "5411552" | "6893460" | "7393360" | "7510575" | "9393110" | "9829057").PN.	US-PGPUB; USPAT	OR	OFF	2021/10/19 10:09
S555	385	"03047468"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 10:52
S556	17	WO03047468	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 10:53
S557	1	("8992608").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/19 11:07
S558	1	("10792172").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/19 11:16
S559	1	("7510575").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/19 12:31
S560	108	"2006005015"	US-PGPUB; USPAT; USOCR;	OR	OFF	2021/10/19 12:32

			FPRS; EPO; JPO; DERWENT			
S561	1	("8992608").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 09:25
S562	6	(("8645300") or ("7827487") or ("6615226") or ("6912505") or ("7865455") or ("6266649")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 10:07
S563	1	("20080235204").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 10:09
S564	1	("8032506").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 10:10
S565	76	(fibers adj (stent frame) same (attach$4 secur$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 11:14
S566	262	(fiber$4 adj (stent frame) same (attach$4 secur$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 11:16
S567	24	"2005023584"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 13:42
S568	12	"20050023584"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 13:42
S569	12	"10883575"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 13:44
S570	0	"35116043"	US-PGPUB; USPAT; USOCR;	OR	OFF	2021/10/20 13:46

			FPRS; EPO; JPO; DERWENT			
S571	0	("35116043").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 13:46
S572	1	("20060004442").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 13:54
S573	17	"1641117"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 16:23
S574	2	"16941117"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 16:23
S575	1	("9393110").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 17:10
S576	2	(("7510575") or ("7510573")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 17:18
S577	58	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/10/23 14:38

		or US-20110208297-$ or US-20050273155-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$ or WO-2006005015-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$ or WO-2005112821-$ or WO-2005115275-$).did.				
S578	17	S577 and (collagen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 14:39
S579	0	(("16808137") or ("16910189") or ("17096253")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/23 16:50
S580	17	"16808137" "16910189" "17096253"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 16:50
S581	58	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/10/23 18:28

		or US-20110208297-$ or US-20050273155-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$ or WO-2006005015-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$ or WO-2005112821-$ or WO-2005115275-$).did.				
S582	1	(non adj2 porous) and S581	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 18:28
S583	97	(non adj2 porous) same graft and (heart with valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 18:29
S584	47	(non adj2 porous) same PET and (heart with valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 18:30
S585	29	(non adj2 porous) same (polyethylene adj2 terephthalate) and (heart with valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 18:31
S587	691,079	(graft wtih non adj2 porous)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 19:06
S588	1	("5152782").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/23 20:03
S589	699	(non$1porous with graft)	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/10/23 20:04

			JPO; DERWENT			
S590	87	(non$1porous with graft) same (seal$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 20:06
S591	14,252	(collagen with (fiber$3 fibril$4)) and graft	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 20:28
S592	1,597	(collagen with (fiber$3 fibril$4)) same graft	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 20:28
S593	1	("5171273").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/23 20:51
S594	178	(collagen with (fiber$3 fibril$4)) same graft and (heart with valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 20:53
S595	17	(collagen with (fiber$3 fibril$4)) same graft and (heart with valve) same seal$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 20:57
S596	12	(collagen adj2 (fiber$3)) same graft and (heart with valve) same seal$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 21:38
S597	1	(porous with nonporous) same graft same (heart adj2 valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 21:48

S598	3	(porous with nonporous) same (graft covering material) same (heart adj2 valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 21:49
S599	0	((polyethylene adj2 terephthalate) with nonporous) same (graft covering material) same (heart adj2 valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 21:50
S600	98	((polyethylene adj2 terephthalate) with nonporous) same (graft covering material)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 21:51
S601	337	((polyethylene adj2 terephthalate) with (nonporous non adj2 porous)) same (graft covering material)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 21:53
S602	75,836	((nonporous non adj2 porous)) same (graft covering material) same (porous)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 22:12
S603	45	((nonporous non adj2 porous)) same (graft covering material) same (porous) same (heart with valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 22:12
S604	12	"16910189"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 22:30
S605	3	"20060084927"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2022/01/10 08:51

S606	46	((nonporous non adj2 porous)) same (graft covering material) same (porous) same (heart with valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2022/01/10 10:01
S608	3	"20120143324"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2022/01/13 09:17
S609	13	("20020052649" | "20030153974" | "20090281619" | "20110098802" | "3365728" | "5411552" | "5957949" | "6730118" | "6893460" | "7393360" | "7510575" | "7585321" | "9393110").PN.	US-PGPUB; USPAT	OR	OFF	2022/01/13 10:37
S610	1	"17469391"	US-PGPUB; USPAT	OR	OFF	2022/01/13 18:52
S612	6	"20120123529"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2022/01/13 22:42

3/8/2022 8:10:10 PM
C:\Users\tshipmon\Documents\EAST\Workspaces\16941117.wsp

Bibliographic Data

Application No: 16/941,117

Foreign Priority claimed: ○ Yes ◉ No

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

Verified and Acknowledged: /TIFFANY P SHIPMON/ Examiner's Signature | Initials

Title: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
07/28/2020	623	3774	426/2/12 UTIL
RULE			

APPLICANTS

Aortic Innovations, LLC, Boca Raton, FL, UNITED STATES

INVENTORS

Ali Shahriari, Boca Raton, FL, UNITED STATES

CONTINUING DATA

This application is a CON of 16935261 07/22/2020

16935261 is a CON of 16808137 03/03/2020 PAT 10792172

16808137 is a CON of 16736879 01/08/2020 PAT 10842655

16736879 is a CON of 16042286 07/23/2018 PAT 10555823

16042286 is a CON of 14614628 02/05/2015 PAT 10028848

14614628 is a CON of 14569306 12/12/2014 PAT 9339399

14569306 is a DIV of 13706896 12/06/2012 PAT 8940040

13706896 has PRO of 61723446 11/07/2012

13706896 has PRO of 61567458 12/06/2011

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Raleigh, NC 27606

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Doc code: IDS
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(Not for submission under 37 CFR 1.99)

Application Number	16941117
Filing Date	2020-07-28
First Named Inventor	Ali Shahriari
Art Unit	3774
Examiner Name	-
Attorney Docket Number	426/2/12 UTIL

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	1	20090125098		2009-05-14	Chuter	
	2	20050137682		2005-06-23	Justino	

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	Application Number	16941117
	Filing Date	2020-07-28
	First Named Inventor	Ali Shahriari
	Art Unit	3774
	Examiner Name	-
	Attorney Docket Number	426/2/12 UTIL

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, pages(s), volume-issue number(s), publisher, city and/or country where published.	T5
	1	Russel, Open Atrial Transcatheter Mitral Valve Replacement in Patients With Mitral Annular Calcification, https://www.sciencedirect.com/science/article/pii/S0735109718357231, September 25, 2018	
	2	Inter Partes Review 2022-00549 of US Patent No. 11,129,735, and supporting declaration of Nigel Buller	
	3	Inter Partes Review 2022-00556 of US Patent No. 10,987,236, and supporting declaration of Nigel Buller	
	4	BARD 007976, https://www.westcmr.com/007976-wb10-007976, accessed 2/19/2022	
	5	Walther-Dehdashtian, Trans-catheter valve-in-valve implantation: in vitro hydrodynamic performance of the SAPIEN + cloth trans-catheter heart valve in the Carpentier-Edwards Perimount valves, https://academic.oup.com/ejcts/article/40/5/1120/446481, November 1, 2011	
	6	Walther-Kempfert, https://www.annalscts.com/article/view/499/904, Transapical vs. transfemoral aortic valve implantation: Which approach for which patient, from a surgeon's standpoint, July 19, 2012	
	7	Buller, Nigel, Declaration in IPR 2017-00060 for US Patent No. 8,992,860, June 15, 2017	
	8	Green, Michael, Canadian Patent Office Examiner Requisition, November 25, 2021	

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Examiner Signature	/TIFFANY P SHIPMON/	Date Considered	03/08/2022

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

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	Attorney Docket Number	426/2/12 UTIL

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	First Named Inventor	Ali Shahriari
	Art Unit	3774
	Examiner Name	-
	Attorney Docket Number	426/2/12 UTIL

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).

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☐ 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.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Justin R. Nifong/	Date (YYYY-MM-DD)	2022-02-19
Name/Print	Justin R. Nifong	Registration Number	59389

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
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	Filing Date	2020-07-28
	First Named Inventor	Ali Shahriari
	Art Unit	3774
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	Attorney Docket Number	426/2/12 UTIL

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	1	20090125098		2009-05-14	Chuter	
	2	20050137682		2005-06-23	Justino	

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	Examiner Name	-
	Attorney Docket Number	426/2/12 UTIL

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, pages(s), volume-issue number(s), publisher, city and/or country where published.	T5
	1	Russel, Open Atrial Transcatheter Mitral Valve Replacement in Patients With Mitral Annular Calcification, https://www.sciencedirect.com/science/article/pii/S0735109718357231, September 25, 2018	
	2	Inter Partes Review 2022-00549 of US Patent No. 11,129,735, and supporting declaration of Nigel Buller	
	3	Inter Partes Review 2022-00556 of US Patent No. 10,987,236, and supporting declaration of Nigel Buller	
	4	BARD 007976, https://www.westcmr.com/007976-wb10-007976, accessed 2/19/2022	
	5	Walther-Dehdashtian, Trans-catheter valve-in-valve implantation: in vitro hydrodynamic performance of the SAPIEN + cloth trans-catheter heart valve in the Carpentier-Edwards Perimount valves, https://academic.oup.com/ejcts/article/40/5/1120/446481, November 1, 2011	
	6	Walther-Kempfert, https://www.annalscts.com/article/view/499/904, Transapical vs. transfemoral aortic valve implantation: Which approach for which patient, from a surgeon's standpoint, July 19, 2012	
	7	Buller, Nigel, Declaration in IPR 2017-00060 for US Patent No. 8,992,860, June 15, 2017	
	8	Green, Michael, Canadian Patent Office Examiner Requisition, November 25, 2021	

If you wish to add additional non-patent literature document citation information please click the Add button Add

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.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16941117
	Filing Date	2020-07-28
	First Named Inventor	Ali Shahriari
	Art Unit	3774
	Examiner Name	-
	Attorney Docket Number	426/2/12 UTIL

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16941117
	Filing Date	2020-07-28
	First Named Inventor	Ali Shahriari
	Art Unit	3774
	Examiner Name	-
	Attorney Docket Number	426/2/12 UTIL

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.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Justin R. Nifong/	Date (YYYY-MM-DD)	2022-02-19
Name/Print	Justin R. Nifong	Registration Number	59389

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

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

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

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

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	16/941,117	Confirmation No.:	1876
Applicant	:	Aortic Innovations, LLC		
First Named Inventor	:	Ali Shahriari		
Filing Date	:	July 28, 2020		
TC/A.U.	:	3774		
Examiner	:	Shipmon, Tiffany		
Docket No.	:	426/2/12 UTIL		
Customer No.	:	175373		

Title of Invention: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

DECLARATION OF DR. STEPHEN J.D. BRECKER
PURSUANT TO 37 C.F.R. § 1.131

1. My name is Stephen J.D. Brecker. I have been retained by Aortic Innovations LLC ("Aortic Innovations"), the Applicant of this patent application, to review this matter. I am also engaged by Aortic Innovations to review various Inter Partes Review requests filed on Patents previously granted to Aortic Innovations.

2. I am being compensated for my time spent working in connection with this application. My compensation is in no way related to the outcome of this application.

3. I am not a legal expert and offer no opinions on the law. However, I have been informed by Applicant's representative of the various legal standards that apply, and I have applied those standards in arriving at my conclusions.

4. This subject application is directed towards a Transcatheter Aortic Valve ("TAVR") that has an outer seal with radially extending fibers. The fibers are configured for treating paravalvular leakage ("PVL") a condition that occurs when blood flow leaks between native tissue of a patient and the implanted TAVR. The TAVR as claimed is deployed endovascularly through the femoral artery (referred to as "transfemoral"), which means it is implanted through the femoral artery of the patient and without requiring open surgery. Transfemoral delivery is the preferred delivery approach when it is available.

QUALIFICATIONS

5. I am an interventional cardiologist with a special interest in adult structural heart disease and valvular intervention. I have over 25 years of medical experience as a practicing interventional cardiologist. I am a Consultant Cardiologist at St. George's University Hospitals in London, U.K. and Professor of Cardiology at St. George's University of London. I have recently completed a six-year term as Chief of Cardiology at these institutions. I have performed over thirteen hundred TAVR procedures.

6. I have proctored over 600 TAVR procedures in which I assist and teach other physicians how to perform TAVR. I have been and remain a Global proctor for Medtronic since 2010 at approximately 80 centers worldwide, including over 50 medical centers in the USA for the US Pivotal Trial of the Corevalve product. I have also proctored the TAVR procedure in the UK, Denmark, Belgium, Japan, India, Israel, Holland, Austria, Greece, Thailand, Vietnam, Singapore, Sri Lanka and South Korea.

7. I have been active in the field of TAVR as a clinician, researcher, teacher, and innovator, and I have been performing TAVR procedures since 2007.

8. I have been a practicing cardiologist since 1996 and I am aware of the technological advances since then.

9. I am the author or co-author of four books, 16 book chapters, and more than 130 peer-reviewed articles

10. In my professional experience, I have become familiar with many problems faced by cardiologists, surgeons, and medical device engineers, in transcatheter aortic valve replacement and related topics.

11. My opinions in this declaration are based on the understandings of a person of ordinary skill in the art, which I understand is sometimes referred to as an "ordinary artisan" or by the acronyms "POSITA" or "PHOSITA," as of the time of the invention. I have used a November 7, 2012 date for consideration in this declaration, the date set forth by the USPTO in the February 4, 2022 Office Action. I understand that the person of ordinary skill in the art is a hypothetical person who is presumed to have known the relevant art at the time of the invention.

12. I understand that factual indicators of the level of ordinary skill in the art include the various prior art approaches employed, the types of problems encountered in the art, the rapidity with which innovations are made, the sophistication of the technology involved, and the educational background of those actively working in the field. I understand that, in assessing the level of skill of a person of ordinary skill in the art, one should consider the type of problems encountered in the art, the prior solutions to those problems found in the prior art references, the rapidity with which innovations are made, the sophistication of the technology, the level of education of active workers in the field, and my own experience working with those of skill in the art at the time of the invention.

13. I understand that an obviousness analysis involves comparing a claim to the prior art to determine whether the claimed invention would have been obvious to a person of ordinary skill in the art at the time of the invention in view of the prior art and in light of the general knowledge in the art as a whole. I also understand that obviousness is ultimately a legal conclusion based on underlying facts of four general types, all of which must be considered: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) any objective indicia of non-obviousness, including any praise of the invention.

14. I also understand that obviousness may be established under certain circumstances by combining or modifying the teachings of the prior art. Specific teachings, suggestions, or motivations to combine any first prior art reference with a second prior art reference can be

explicit or implicit, but must have existed before the date of purported invention. I understand that prior art references themselves may be one source of a specific teaching or suggestion to combine features of the prior art, but that such suggestions or motivations to combine art may come from the knowledge that a person of ordinary skill in the art would have had.

15. I have reviewed the Office Action dated February 4, 2022 for the US Patent Application No. 16/941,117.

16. In that Office Action, Specifically, claims 31, 34, and 44 are rejected under 35 USC 103(a) as being unpatentable over Levi (USPN 9,393,110) in view of Dehdashtian (WO 2006/005015) and further in view of Rankin (US Publication No. 2012/0143324).

17. I understand that a reference may be relied upon for all that it teaches, including uses beyond its primary purpose, but also including teachings that lead away from the invention. I understand that a reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, although the mere disclosure of alternative designs does not teach away.

18. I further understand that whether there is a reasonable expectation of success in combining references in a particular way is also relevant to the analysis.

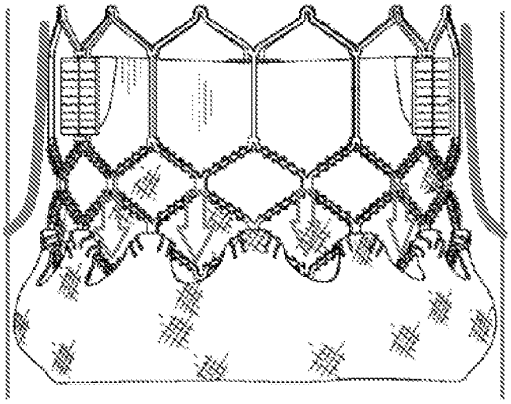
19. I understand that the primary reference relied upon in the rejection is Levi.

20. I also understand that the USPTO has proposed adding the outer band of Dehdashtian to the Levi device.

21. Finally, I also understand that the USPTO has further modified the proposed Levi-Dehdashtian combination in view of Rankin because Rankin expressly discloses that the Rankin valve can be delivered percutaneously. Additionally, Rankin discloses uses of a sewing ring for a surgical valve that has a collagen fiber covering.

22. I am familiar with and have reviewed the Levi patent application. It appears that the inventors believed that the TAVR functions *because "excess material of the outer skirt 18 can fill in gaps between the frame 12 and the surrounding native annulus to assist informing a good fluid-tight seal between the valve and the native annulus. The outer skirt 18 therefore cooperates with the inner skirt 16 to avoid perivalvular leakage after implantation of the valve 10.*" A POSITA (cardiologist) would understand that this must imply that this skirt somehow "fills in gaps" and the design suggests it would function by expanding with retrograde flow of

blood. The billowing of the skirt presses the outer surface of the skirt against the aortic annulus. Consider it similar to the expansion of a balloon, or wind filling a sail.



(Annotations provided by Applicant)

23. Levi requires a loosely fit outer seal to accomplish both this billowing concept and allowing slack in the outer seal for frame foreshortening during crimping (paragraph [0085] of Levi; *In another advantageous feature, the slack between the lower and upper edges of the outer skirt **18** allows the frame **12** to elongate axially during crimping without any resistance from the outer skirt and the outer skirt does not substantially affect the outer diameter of the prosthetic valve in the crimped condition*).

24. Dehdashtian teaches a compressible outer band that appears to be secured to the frame. The band as illustrated appears dense and tightly held against the frame. It is my opinion that adding the tightly held outer band of Dehdashtian would thus not allow for the billowing concept, or the slack concept as required by Levi for sealing and crimping. The band would need sufficient flexibility for transfemoral delivery in order to accommodate lengthening and foreshortening of the valve frame when being expanded from the crimped position. This is even more pronounced with Levi, which appears to have a significant amount of stent foreshortening.

25. It is thus my opinion that modifying Levi in the manner suggested by the USPTO to include the band of Dehdashtian, which is shown in Dehdashtian being tightly held against the frame, would frustrate the advantageous features taught by Levi; namely the billow of the outer skirt to *"fill in gaps"* to treat PVL and the slack in the outer skirt to allow for stent foreshorting during expansion.

26. The further proposed combination of adding Rankin does not change this analysis at all. Rankin does not teach an outer seal at all, and it is not clear why Rankin was added because it does not appear to disclose anything more relevant than does Levi.

27. I also understand that the claims require that the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient.

28. I have reviewed the computational analysis provided in Applicant's response filed on December 14, 2021, starting and mostly contained on page 13. That computational analysis relates to the size constraints of adding the band of Dehdashtian to Levi and whether the then-proposed combination of Levi-Dehdashtian could be deployed endovascularly through a femoral artery of the patient. I find the analysis to be sound.

29. I have considered the possibility of further modifying the Levi-Dehdashtian combination in view of Rankin to consider whether that modification would be capable of endovascularly delivery through a femoral artery of the patient. I do not consider this combination to be possible to arrive at the claimed invention. Rankin does not provide any disclosure that would enable the combination of Levi in view of Dehdashtian; As I have previously mentioned, I do not believe Levi can be modified to include the band of Dehdashtian in a manner where the combination could be deployed endovascularly transfemorally.
It is generally accepted that a 24F catheter is the maximal size of a catheter that can be inserted into the femoral artery (and even then only around 50% of patients would be suitable for 24F transfemoral delivery). The proposed combinations by the USPTO all appear to be too large to delivered endovascularly.

30. I have reviewed certain publications from around 2012 that have been provided in the prosecution of this application. For example, the Walther-Dehdashtian publication, available at https://academic.oup.com/ejcts/article/40/5/1120/446481, was directed towards a valve design similar to Dehdashtian. In that publication, co-author Walther states: "*I think it will be an advantage, at least for the trans-apical approach, where tight crimping is not an issue. You need a slightly larger sheath, but you have a valve that could better seal off against irregular calcifications, even primary aortic valve implantations.*"

31. Thus, Walther-Dehdashtian seems to acknowledge that a seal similar to Dehdashtian is not capable of reaching a crimp profile for transfemoral delivery, and is only

available for the much larger access route of transapical. In fact, the disclosed profile in Walther-Dehdashtian is a much too large 33F.

32. Similarly, the Walther-Kempfert publication, available at https://www.annalscts.com/article/view/499/904, was directed towards a comparison between the various delivery access routes available for TAVR deployment. In that publication, Walther-Kempfert states

> *Overall, when considering the various aspects in* Table 1, *the TA access may offer some potential advantages, despite the current drawback of requiring a minithoracotomy. Larger sheath diameters can be used with the TA access, thus leading to less need for crimping of the valves which may translate into better longevity. Solutions for improving paravalvular leakage may also be implemented into clinical practice through the TA approach (theoretically these solutions require the larger diameters afforded by the TA route). Additionally, clinical trials assessing percutaneous access and closure systems are soon to be underway, hopefully leading to further improvement and reliance on the TA antegrade technique.*
> (underlining added)

33. Thus, Dehdashtian-Kempfert seems to acknowledge that a seal used for addressing PVL at the time of publication would be implemented through the transapical approach (as opposed to the transfemoral approach).

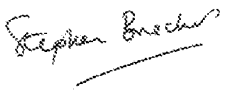
34. Levi presented an innovative approach to adding a seal to the outside of the frame for treating PVL. However, this was through use of a thin graft material that could fit within a reduced diameter portion on the proximal end of the frame without substantially impacting crimp profile. The dense band of Dehdashtian as modified combined with Levi is not capable of accomplishing a combination without enlarging the crimp profile to be so large as to not be used transfemorally. The proposed combination of Levi-Dehdashtian-Rankin may be sufficiently small for transapical deployment, however, it is my opinion that the proposed combination would be significantly too large for transfemoral deployment.

35. Levi was combined with a seal similar to Dehdashtian in the publication by Russell, https://www.sciencedirect.com/science/article/pii/S0735109718357231. The Russell

publication taught a surgical implantation of a mitral valve design. The crimp profile is illustrated within Russell as very large, and clearly too large for transfemoral delivery.

36. Finally, the crimp profile impacts not only the delivery route, but could also affect the ability to cross the native leaflets of the aorta for deployment. The large crimp profile of these valve assemblies would present challenges in the safe passage of these bulky valve designs through the native valve leaflets in a retrograde fashion as the transfemoral approach dictates. This shortcoming would not apply when using the antegrade transapical approach which these designs were intended for. It is my opinion that the valve assemblies with the dense outer band as disclosed in Dehdashtian, Walther-Dehdashtian, and Russell were never implanted in the native stenotic leaflets. These valve assemblies with a large crimp profile likely required the removal of the native leaflets through a surgical procedure for their successful implantation.

37. The undersigned declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 001 of Title 18 of the United States Code and that such willful false statements jeopardize the validity of the application or any patent issuing thereon.



Dr. Stephen J.D. Brecker

Executed this 19th day of February 2022

COMMUNICATION TO THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	16/941,117	Confirmation No.:	1876
Applicant	:	Aortic Innovations, LLC		
First Named Inventor	:	Ali Shahriari		
Filing Date	:	July 28, 2020		
TC/A.U.	:	3774		
Examiner	:	Shipmon, Tiffany		
Docket No.	:	426/2/12 UTIL		
Customer No.	:	175373		

Title of Invention: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

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

RESPONSE TO OFFICE ACTION DATED FEBRUARY 4, 2022

Amendments to the Claims are not being offered with this response.

Remarks begin on page 6 of this paper.

Amendments to the Claims:

The claims are not amended, however, the claims are presented herein for review purposes.

Listing of Claims:

Claims 1-30 (Canceled)

31. (Previously Presented) A transcatheter heart valve assembly comprising:

a graft covering housing a prosthetic heart valve, wherein the graft covering extends around the prosthetic heart valve for providing sealing to the heart valve;

an outer frame formed from a metallic material and defining an open cell configuration, and being secured to the graft covering by a plurality of stitches; and

a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks,

wherein the sealing material is attached to the outer frame,

wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame;

wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer,

wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,

wherein the heart valve assembly has a radially compressed and a radially expanded orientation,

wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient,

wherein the outer frame extends distally further than the prosthetic heart valve.

Claims 32-33 (Canceled)

34. (Previously Presented) A transcatheter heart valve assembly comprising:

a graft covering housing a prosthetic heart valve, wherein the graft covering extends radially outwardly around the prosthetic heart valve and radially inwardly of an outer frame for providing sealing to the heart valve;

wherein the outer frame is formed from a metallic material and defines an open cell configuration, and being secured to the graft covering by a plurality of stitches; and

a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks,

wherein the sealing material is attached to the outer frame,

wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame,

wherein the graft covering extends beyond a proximal end of the outer frame and over the proximal end thereof to cover the proximal end of the outer frame,

wherein the sealing material includes a plurality of radially extending fibers that form a circumferential surface that extends outwardly of the outer frame;

wherein the fibers cover at least two circumferentially extending rows of grids formed in the open cell configuration and the at least two circumferentially extending rows radially overlap with the prosthetic heart valve,

wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer,

wherein the valve assembly is balloon expandable during endovascular deployment,

wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,

wherein expansion of the valve assembly is configured to press the sealing material against native valve leaflets of an aorta of the patient,

wherein the sealing material is held against the outer frame as the valve expands from the radially compressed orientation to the radially expanded orientation.

35. (Canceled)

36. (Previously Presented) The valve assembly of claim 31, wherein open cells of the open cell configuration are a square shape.

37. (Previously Presented) The valve assembly of claim 31, wherein the graft covering housing a prosthetic heart valve forms an inner frame for supporting the prosthetic heart valve.

38. (Previously Presented) The valve assembly of claim 31, wherein the radially extending fibers are collagen fibers.

39. (Previously Presented) The valve assembly of claim 34, further including a second portion of fibers that extend radially inwardly from the outer frame.

40. (Previously Presented) The valve assembly of claim 34, wherein open cells of the open cell configuration are a square shape.

41. (Previously Presented) The valve assembly of claim 34, wherein the graft covering housing a prosthetic heart valve forms an inner frame for supporting the prosthetic heart valve.

42. (Previously Presented) The valve assembly of claim 34, wherein the radially extending fibers are collagen fibers.

43. (Previously Presented) The valve assembly of claim 34, further including a second portion of fibers that extend radially inwardly from the outer frame.

44. (Previously Presented) A transcatheter aortic heart valve assembly comprising:

a graft covering engaging a prosthetic heart valve, wherein the graft covering extends around the prosthetic heart valve for providing sealing to the heart valve;

a frame formed from a metallic material and defining an open cell configuration, and being secured to the graft covering by stitching; and

a sealing material positioned externally to the frame for providing sealing between the frame and a patient's anatomical wall to prevent paravalvular leaks,

wherein the sealing material is attached to the frame,

wherein the sealing material includes a plurality of outwardly extending fibers that extend outwardly of the frame;

wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,

wherein the heart valve assembly has a radially compressed orientation and a radially expanded orientation,

wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the outwardly extending fibers into engagement with native leaflets of the aorta of a patient.

45. (Previously Presented) The valve assembly of claim 44, wherein open cells of the open cell configuration are a square shape.

46. (Previously Presented) The valve assembly of claim 44, wherein the graft covering housing a prosthetic heart valve forms an inner frame for supporting the prosthetic heart valve.

47. (Previously Presented) The valve assembly of claim 44, wherein the outwardly extending fibers are collagen fibers.

48. (Previously Presented) The valve assembly of claim 44, further including a second portion of fibers that extend radially inwardly from the frame.

REMARKS

This is in response to the Office Action mailed February 4, 2022.

Applicant requests entry of the remarks and evidence herein in response to the Office Action. Should the Examiner have any questions about the evidence, the Examiner is encouraged to reach out to Applicant's representative.

In the November 4, 2021 reply, Applicant made certain arguments relating to the combinations of Levi (USPN 9,393,110) in view of Dehdashtian (WO 2006/005015) and how the proposed combination could not be used to arrive at the claimed invention, namely, related to a limitation that the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient.

It appears as if those arguments were persuasive, and a new ground of rejection under 35 USC 103(a) is being entered. Specifically, claims 31, 34, and 44 are rejected under 35 USC 103(a) as being unpatentable over Levi (USPN 9,393,110) in view of Dehdashtian (WO 2006/005015) and further in view of Rankin (US Publication No. 2012/0143324).

Applicant submits that the claims as previously presented are patentable. Thus, no claim amendments to the previously submitted claims are presented herein.

A declaration in support of the arguments presented herein is provided by Dr. Stephen J.D. Brecker. In that declaration, Dr. Brecker provides his expert opinion that the proposed combinations made by the USPTO in the February 4, 2022 Office Action would not be made for purposes of addressing the solutions of the claimed invention, and even if they were, the combinations would not be suitable for deployment endovascularly through a femoral artery of the patient as claimed.

PRIOR ART REJECTION OF CLAIMS 31, 34, AND 44

Claim 31 is representative and recites:

A transcatheter heart valve assembly comprising:

a graft covering housing a prosthetic heart valve, wherein the graft covering extends around the prosthetic heart valve for providing sealing to the heart valve;

an outer frame formed from a metallic material and defining an open cell configuration, and being secured to the graft covering by a plurality of stitches; and

a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks,

wherein the sealing material is attached to the outer frame,

wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame;

wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer,

wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,

wherein the heart valve assembly has a radially compressed and a radially expanded orientation,

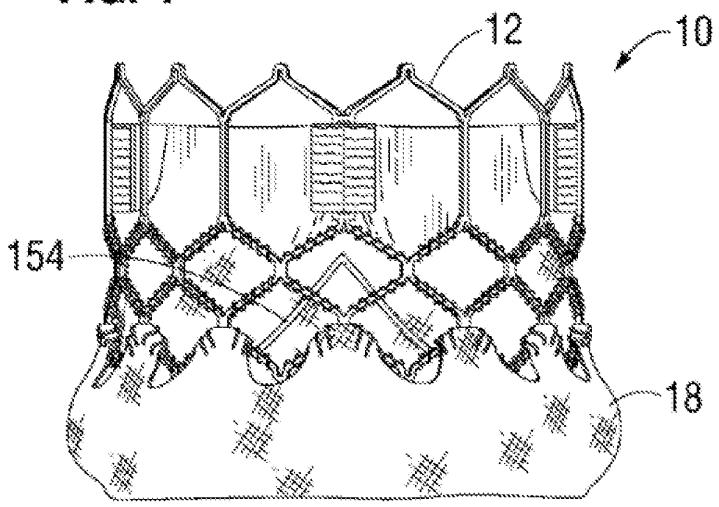
wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient,

wherein the outer frame extends distally further than the prosthetic heart valve.

(emphasis added)

The USPTO relies on FIGS. 1-3 of Levi in forming the prior art rejections. FIG. 1 is representative and is illustrated below:

FIG. 1



And FIG. 22 of Dehdashtian:

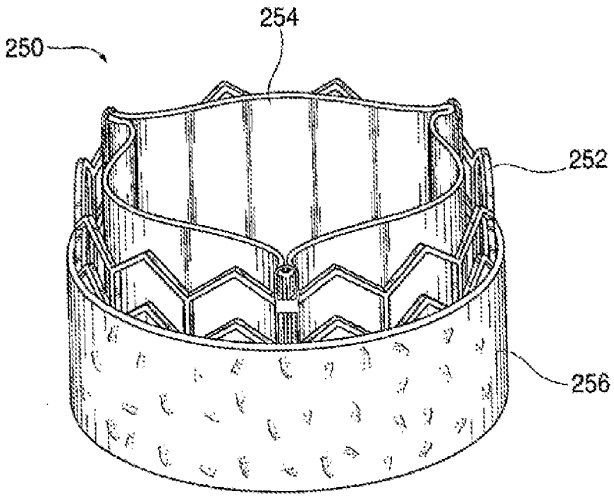


FIG. 22

The USPTO proposes a combination of Levi plus Spenser and further in view of Rankin to arrive at the claimed invention. According to the USPTO:

12. Levi et al. in view of Dehdashtian et al. lacks a detailed description of wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient.

13. Rankin et al. teaches an aortic valve device in the same field of endeavor that comprises a wire frame that can be covered with a fabric that comprises collagen fibers (paragraph 71) and can be delivered percutaneously(abstract) for the purpose of preventing complicated surgical procedures (paragraph 13). Additionally, it should be noted that the devices of modified Levi et al. in view of Dehdashtian et al. can be collapsed and therefore it can be delivered through the femoral artery.

14. It would have been obvious to a person of ordinary skill in the art to modify the heart valve of Modified Levi et al. to be delivered percutaneously as taught in Rankin et al. in order to prevent complicated surgical procedures.

The USPTO seems to acknowledge that the prior art has made clear, such as in US Patent Publication No. 2003/0153974 ("Spenser,") that a 24F catheter is the maximal size of a catheter inserted into the femoral artery. Spenser discloses:

> *A typical size of an aortic prosthetic valve is from about 19 to about 25 mm in diameter.* ***A maximal size of a catheter inserted into the femoral artery should be no more than 8 mm in diameter****. The present invention introduces a device, which has the ability to change its diameter from about 4 mm to about 25 mm. Artificial valves are not new; however, artificial valves in accordance with the present invention posses the ability to change shape and size for the purpose of delivery and as such are novel. These newly designed valves require new manufacturing methods and technical inventions and improvements, some of which were described herein.*
>
> (Emphasis added)

Valve crimp profile is of significant importance in transcatheter valves as Spenser and Levi recognize. The crimp profile impacts not only the delivery route, but the ability to cross the native leaflets of the aorta for deployment. And each of the claims require some general limitation of endovascular deployment through the femoral artery.

The USPTO tries to remedy the size issues presented by Levi in view of Spenser by further teaching use of Rankin. The USPTO relies on the fact that Rankin discloses "collagen fibers (paragraph 71) and can be delivered percutaneously (abstract) for the purpose of preventing complicated surgical procedures (paragraph 13)." As set forth herein, that confuses highly distinct embodiments within Rankin.

THE COMBINATION OF LEVI-DEHDASHTIAN-RANKIN IS STILL NOT CAPABLE OF MEETING THE CLAIMED LIMITATION OF DEPLOYED ENDOVASCULARLY THROUGH THE FEMORAL ARTERY

It is bedrock analysis that if the proposed combination from the USPTO is incapable of meeting the claim limitations (in this instance, endovascular deployment through the femoral artery), then the proposed combination is not proper for rejecting the claims under 35 USC 103. Catheter size is typically expressed in terms of French numbers, where each millimeter of catheter

diameter equates to a 3F increase in French size. Thus, an 8.00 mm diameter catheter would be expressed as a 24F system. Spenser states that an 8.00 mm diameter catheter is the maximal for femoral access, and thus a 24F catheter would be the maximum as well.

Just as the prior rejection of Spenser in view of Dehdashtian was overcome by showing that the combination could not be delivered endovascularly through the femoral artery, Applicant submits that the combination of Levi in view of Dehdashtian suffers from the same shortcoming. As previously discussed, the inventors in Dehdashtian recognized a 24F catheter size at the maximal size.

Levi recognized the significance of crimp profile. Indeed, the background of Levi states:

> *An important design parameter of a transcatheter heart valve is the diameter of the folded or crimped profile. The diameter of the crimped profile is important because it directly influences the physician's ability to advance the transcatheter heart valve through the femoral artery or vein. More particularly, a smaller profile allows for treatment of a wider population of patients, with enhanced safety.*

As previously discussed, adding an outer seal to a valve structure is not trivial, and the results are not necessarily expected because of the aforementioned crimp profile concerns. Crimping of the valve necessarily creates "bunching" on the outside of the valve. This is well-illustrated in FIG. 5 of US Patent No. 5,855,601 to Bessler.

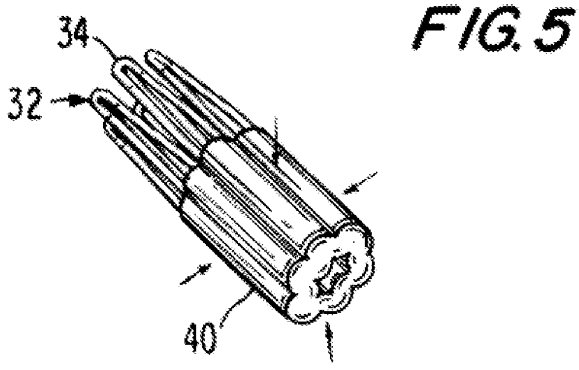


FIG. 5

As illustrated, addition of an outer seal necessarily adds significantly to the crimp profile, and may further restrict full crimping of the valve. This is even more pronounced with the proposed combination by the USPTO, where adding the outer "band" of Dehdashtian is likely to significantly add to crimped profile such that the crimped profile will exceed the "maximal size [of]….. 8 mm in diameter."

Levi understands this is an issue, as the bulging is shown in the outer seal 18 in FIG. 18 of Levi:

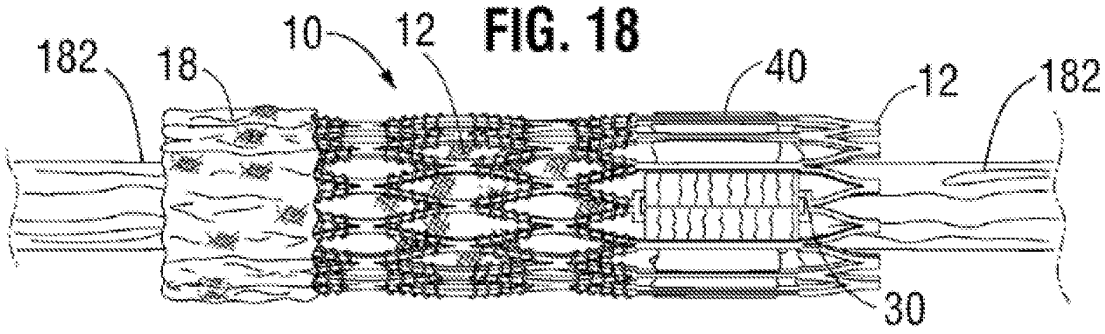
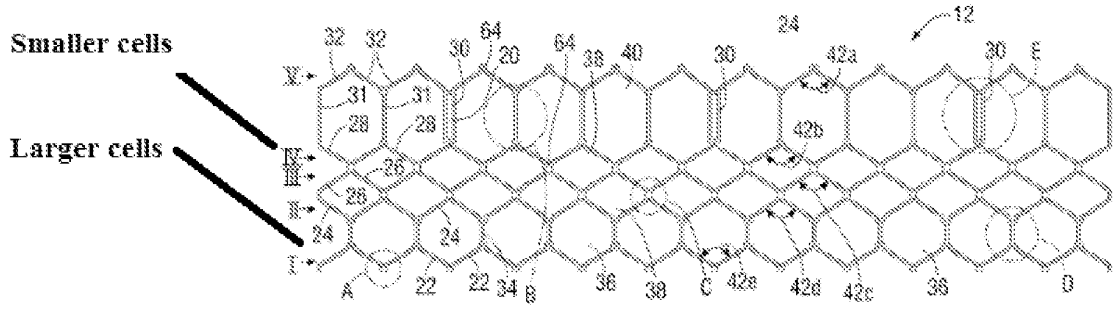


FIG. 18

In order to try and reduce the overall crimp profile to accommodate for the bulging, Levi made certain design changes to accommodate the outer seal 18. Namely, Levi made the open cells or grids of the lower most row of the frame to be larger than the next row of cells, which allowed for a reduced crimp profile at the lower most row of the frame, which thus provided a reduced crimp profile area (called "reduced diameter region 174" in Levi specification) against which the outer seal 18 could sit.

This is well illustrated in annotated FIG. 5 of Levi shown below:

FIG. 5

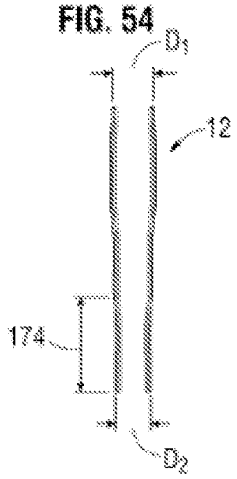


And Levi discloses:

> *Also, as can be seen in FIG. 5, the openings **36** of the lowermost row of openings in the frame are relatively larger than the openings **38** of the two intermediate rows of openings. As shown in FIG. 54, this allows the frame, when crimped, to assume an overall tapered shape that tapers from a maximum diameter D_1 at the outflow end of the valve to a minimum diameter D_2 at the inflow end of the valve. When crimped, the frame **12** has a reduced diameter region extending along a portion of the frame adjacent the inflow end of the frame, indicated by reference number **174**, that generally corresponds to the region of the frame covered by the outer skirt **18**. The diameter of region **174** is reduced compared to the diameter of the upper portion of the frame (which is not covered by the outer skirt) such that the outer skirt **18** does not increase the overall crimp profile of the valve. When the valve is deployed, the frame can expand to the cylindrical shape shown in FIG. 4. In one example, the frame of a 26-mm valve, when crimped, had a diameter D_1 of 14 French at the outflow end of the valve and a diameter D_2 of 12 French at the inflow end of the valve.*

This "reduced diameter region" 174 is also well illustrated in FIG. 54 of Levi, where a crimped valve cross-section is shown:

FIG. 54



As Levi discloses:

> *Due to the tapered shape of the frame **12** in the mounted state, even with the additional thickness of the outer skirt **18** positioned around the inflow end portion **174** of the frame **12** the overall outer diameter of the inflow end portion of the valve **10** can be about equal to, or less than, the overall outer diameter of the outflow end portion of the valve.*

Levi provides significant description on this aspect, and further teaches the dimensions of diameter D1 and D2 as shown in FIG. 54:

> *In one example, the frame of a 26-mm valve, when crimped, had a diameter D_1 of 14 French at the outflow end of the valve and a diameter D_2 of 12 French at the inflow end of the valve.*

Thus it follows that Levi, in order to accomplish a 14F crimp profile at the main portion of the frame, was able to provide a reduced diameter portion of a 12F. In other words, the outer diameter of the outer frame as measured at D2 was about 4.67 mm and the outer diameters of the outer frame at D1, the reduced diameter portion was about 4.0 mm. Thus, an outer seal having a crimped profile that adds about 0.67 mm total thickness in the crimped profile would accomplish Levi's stated purpose of "*the outer skirt **18** does not increase the overall crimp profile of the valve*."

Since the seal wraps around the perimeter of the outer frame, a maximum crimped seal profile would allow for a crimped profile thickness of the outer band of about 0.33 mm.

Dehdashtian discloses an outer band/sleeve with a thickness that ranges from 1 mm to 5 mm. Thus, Dehdashtian expressly teaches a thickness of the outer skirt that is greater than what Levi teaches is allowable. Dehdashtian does, however, teach the outer skirt is compressible, but provides no guidance on the compressibility of the outer skirt. Furthermore, if one were to assume that the skirt of Dehdashtian could be manufactured in a thickness smaller than 1.00 mm, down to an example of 0.33 mm needed to fit within the reduced diameter region (which ignores the bunching issue), it is not clear how Dehdashtian would then provide for a "compressible material" as disclosed since compression requires some level of thickness and a 0.33 mm seal may not provide for compressibility. Dehdashtian does not appear to disclose loosely packed/low density fibers found in Applicant's disclosure that provide for the ability to reduce seal profile in the crimped orientation, yet provide sufficient surface area to effectuate sealing.

Just as Applicant did for the prior rejections of Spenser in view of Dehdashtian and here in view of Rankin, Applicant can show that the proposed combination cannot meet the claim limitations as the addition of the minimal size thickness outer band as stated in Dehdashtian of 1.00 mm would result in a crimped profile that would not fit within a catheter with a maximum outer diameter of 8.00 mm.

This is well described with reference to simple calculations.

A catheter of 4.0 mm in outer diameter as disclosed by the reduced thickness portion of Levi, necessarily has a crimped cross-area of:

$$A = \pi * (2.0\ mm)^2 = 12.56\ mm^2$$

Addition of a 1.0 mm outer seal to a 25 mm valve as disclosed by Levi and Dehdashtian potentially creates an increase in cross-area of:

$$A = \pi * (13.5\ mm)^2 - (12.5\ mm)^2 = 81.64\ mm^2$$

Dehdashtian does teach that the band is a "layer of compressible material 256," so some amount of compression is expected. However, nowhere does Dehdashtian teach that the layer is

compressible by over 600 percent to be able to go from a non-compressed area size of 81.64 mm^2 to a crimped area size of 12.56 mm^2.

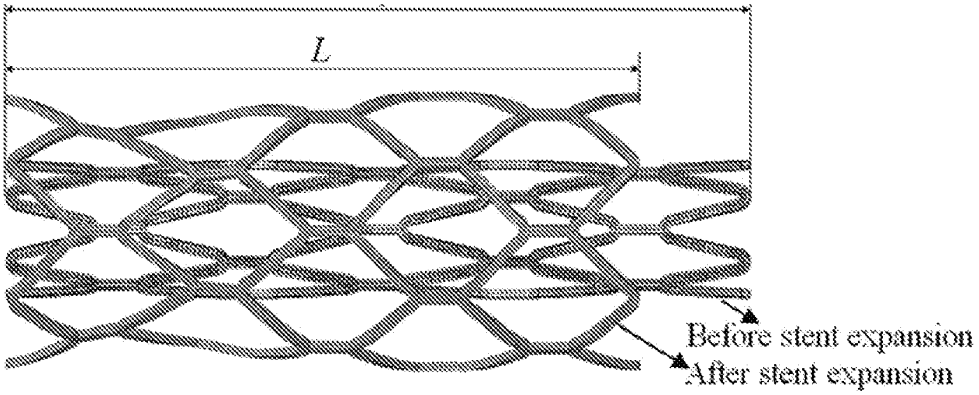
Applicant submits that a much larger catheter would be required in order to accommodate the proposed combination by the USPTO. And the much larger catheter would not be able to meet the claim limitation of the "heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient."

The declaration by Dr. Brecker at paragraph 28 supports this position, and Dr. Brecker finds the computational analysis to "be sound."

Furthermore, the band of Dehdashtian teaches that the band may take "the form of a sleeve." Thus, it follows that Dehdashtian teaches the band is tightly held against the frame similar to a "sleeve." This is also illustrated in the non-patent literature of Walther. Levi, however, teaches that the outer seal should not be tightly held against the frame. In fact, Levi expressly requires excess slack in the outer seal:

> *As can be seen in FIGS. 1, 3 and 43, the outer skirt **18** is secured to the frame **12** such that when the frame is in its expanded state, there is excess material or slack between the outer skirt's lower and upper edges **160**, **162** that does not lie flat against the outer surface of the frame **12**. In other words, the outer skirt is configured with excess material which causes the outer skirt to bulge outwardly as the frame foreshortens (i.e., shortens in length) during radial expansion. Accordingly, when the valve **10** is deployed within the body, the excess material of the outer skirt **18** can fill in gaps between the frame **12** and the surrounding native annulus to assist in forming a good fluid-tight seal between the valve and the native annulus. The outer skirt **18** therefore cooperates with the inner skirt **16** to avoid perivalvular leakage after implantation of the valve **10**. In another advantageous feature, the slack between the lower and upper edges of the outer skirt **18** allows the frame **12** to elongate axially during crimping without any resistance from the outer skirt and the outer skirt does not substantially affect the outer diameter of the prosthetic valve in the crimped condition.*

It is known that most stents foreshorten during expansion. What this means is that the stent elongates as it becomes more narrow (i.e. crimped) and shortens as it becomes wider (i.e. expanded). This is well-illustrated with the following image:



The foreshortening of the stent can be restricted by a tightly held outer seal. Dehdashtian though was not significantly concerned with foreshortening because the rigid commissure supports of Dehdashtian restricted the degree of foreshortening. This is illustrated with annotated FIG. 22 of Dehdashtian:

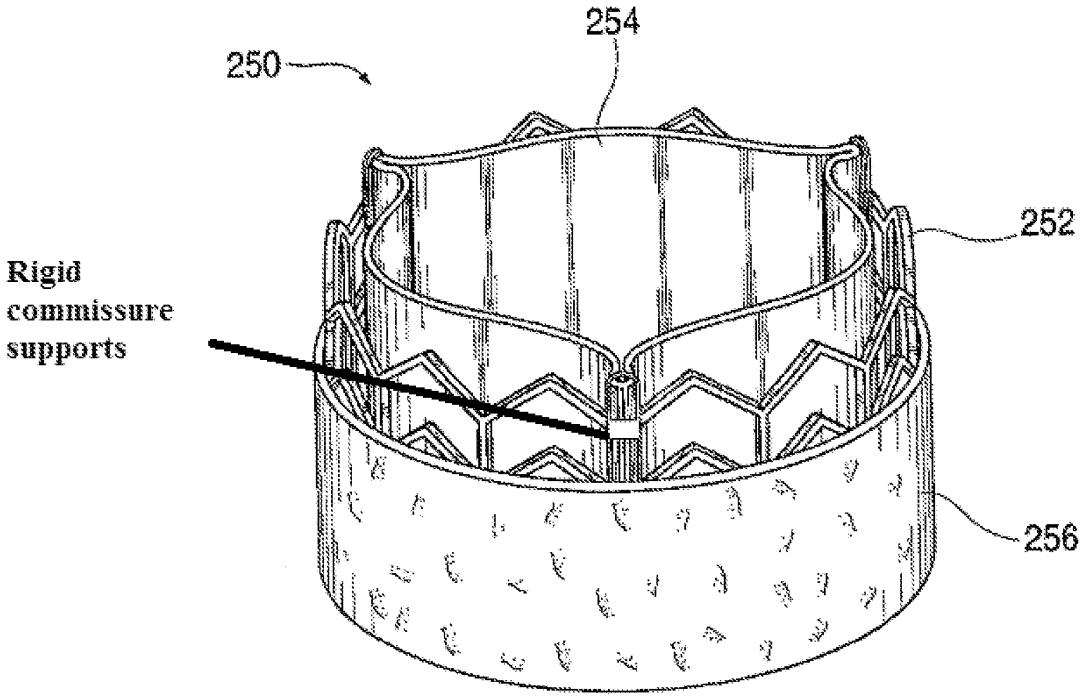


FIG. 22

However, Levi appears to undergo a significant amount of foreshortening (which helps to reduce crimp profile) and addresses the restriction of the outer seal by providing for "excess material" of the outer skirt.

If one were to stitch the seal of Dehdashtian to the outer frame of Levi at a top portion of the seal (just as shown in FIG. 1 of Levi), nowhere in the combination proposed by the USPTO is it disclosed how Levi could foreshorten without the outer seal of Dehdashtian restricting the foreshortening. If the outer seal of Dehdashtian restricts foreshortening, then the valve is not able to crimp to a fully crimped position and thus endovascular delivery through the femoral artery is unlikely if not impossible.

Dr. Brecker's declaration at paragraph 25 supports this as well. As Dr. Brecker indicates, "It is thus my opinion that modifying Levi in the manner suggested by the USPTO to include the band of Dehdashtian, which is shown in Dehdashtian being tightly held against the frame, would frustrate the advantageous features taught by Levi."

Applicant's invention accomplishes this result by having the low density fiber construction. This allows for sufficient elongation of the outer seal to allow for any foreshortening if it were to occur in Applicant's valve design. This is well illustrated in FIG. 11 of Applicant's application:

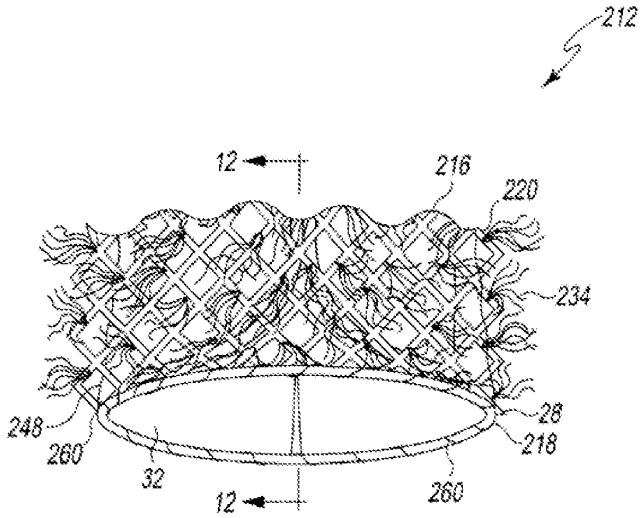


Fig. 11

Claims 34 and 44 recite generally similar limitations and the arguments relied upon for Claim 31 apply there as well.

There is no indication that modified Levi in view of Dehdashtian is capable of being further modified by Rankin to arrive at a device capable of delivery through the femoral artery.

The USPTO indicates in paragraph 3 that "The prior art discloses heart valves that are fully capable of collapsing." Applicant agrees with this. However, Applicant does not agree that the proposed combined valves are capable of collapsing down to a 24F size, i.e. 8 mm, a requirement acknowledged by Dehdashtian's coinventors in Spenser, USPN 7,510,575. The USPTO takes the position in paragraph 13 that "Additionally, it should be noted that the devices of Modified Levi et al. in view of Dehdashtian et al. can be collapsed and therefore it can be delivered through the femoral artery."

This is not accurate. As noted, the maximal size for femoral delivery appears to be a 24F catheter. As Applicant has shown previously, the uncompressed seal of Dehdashtian occupies more volume that a 24F catheter provides, and nowhere in Dehdashtian does is it disclosed that the seal is 600% compressible. This calculation also entirely ignores the size of the frame itself. Put simply, without a 600% compression of the Dehdashtian seal, even a fully collapsed to absolutely no thickness metallic frame would still not fit within a 24F catheter.

Furthermore, no part of Dehdashtian teaches the limitations of "deployed endovascularly through a femoral artery of the patient." The USPTO seems to acknowledge this. It is just as likely that Dehdashtian offers a surgically deployed valve due to the large profile, or a mitral valve, where the access pathways are much larger. The reason for this is simple; Dehdashtian discloses that the outer cloth is 1.0 mm thick as a minimum. As Applicant has previously shown in the December 14 remarks, addition of a 1.0 mm thick cloth before compression on a 25 mm valve would add 81.64 mm^2 to the valve profile before compression of the cloth. As shown, this increase in area is, in fact, larger than a 24F catheter by itself, without even allowing for space for the stent frame and prosthetic leaflets. Such a combination would require a 600% compression of the outer seal profile of Dehdashtian to accommodate a 24F size. (See arguments of December 14). Applicant submits that it is just not possible to deploy Dehdashtian endovascularly through the femoral artery. Dehdashtian was generally reduced to practice in the already provided NPL of Walther-Dehdashtian, and Walther-Dehdashtian managed only a 33F

catheter size, which the prior art indicates is incapable of TF delivery. Further discussion of the NPL of Walther-Dehdashtian, Walther-Kempfert, and Russel follows herein.

RANKIN TEACHES MULTIPLE EMBODIMENTS AND THE USPTO APPEARS TO BE COMBINING THOSE MULTIPLE EMBODIMENTS WITHOUT A RATIONALE TO COMBINE EACH

The USPTO is combining distinct embodiments in Rankin. Rankin teaches three separate, and distinct disclosures. The first is generally embodied within FIGS. 1-13 and discloses a surgical ring frame where the native leaflets are removed (see paragraph [0079] "the natural heart valve is removed, and the artificial elliptical annulus is sutured to the natural annulus", and within FIG. 14 and FIG. 15 where transcatheter valve designs are shown. The disclosure of "woven collagen fibers" is directed towards the surgical ring design. This disclosure is a graft material made from woven collagen fibers and there is no disclosure on any radially extending fibers. Notably, the transcatheter valve designs of FIGS. 14 and 15 do not disclose an outer seal at all. The reason for this is quite simple, Rankin, just like Levi, was trying to minimize profile as much as possible and addition of an outer seal would have frustrated that purpose.

As to the disclosure in paragraph [0071], this is clearly directed towards the surgical ring

> *[0071] A flexible biocompatible material (not shown) can be used to cover all surfaces of the elliptical wire frame* ***101****. The flexible biocompatible material is preferably a strong, thin fabric, such as polyester, which separates the core structure of the elliptical wire frame* ***101*** *from contact with bodily tissues and blood, and provides a sheath for suturing the elliptical support-valve assembly* ***100*** *in place without obstructing the flow of blood through valve (not shown). Alternatively, knitted or bias weave polyesters, PTFE, or woven collagen fibers may all be used to cover the surfaces of the elliptical wire frame* ***101****. The flexible biocompatible material can be configured as an elongated tube closely fitting around the elliptical wire frame* ***101****, or alternatively can be configured as a sheet that includes a pair of longitudinal edges that are folded inward on themselves and sutured together around the elliptical wire frame* ***101****.*

The surgical ring is shown in FIG. 13:

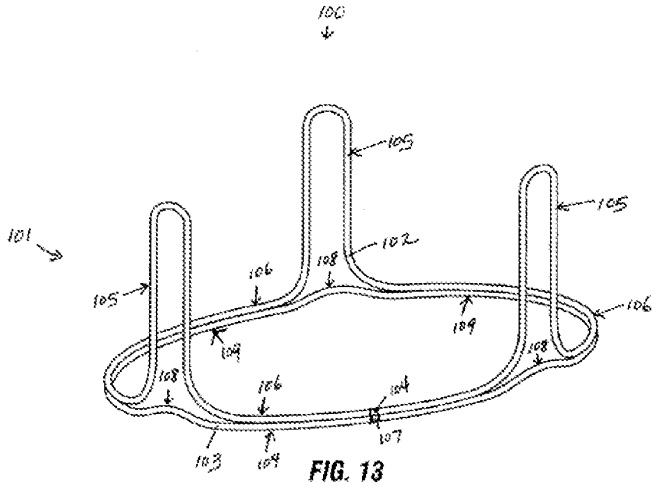
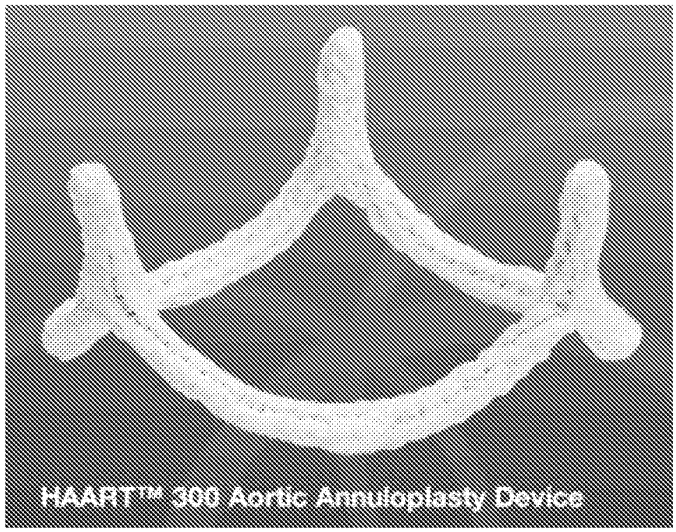


FIG. 13

This ring is not necessarily collapsible in the manner associated with a transcatheter valve and is described as "semi-rigid" by Rankin, and describes the elliptical retaining ring as "rigid". The ring is then covered with a textile type material to provide a suture ring for purposes of suturing the ring to an annulus or proximal an annulus of a patient after removal of their native leaflets in an open heart procedure. A valve available by Biostable Science and Engineering, the Applicant of Rankin, is provided for illustration purposes as a similar construction:



Rankin additionally discloses two separate embodiments, of collapsible frames that could be delivered percutaneously. One of the embodiments of Rankin is illustrated below:

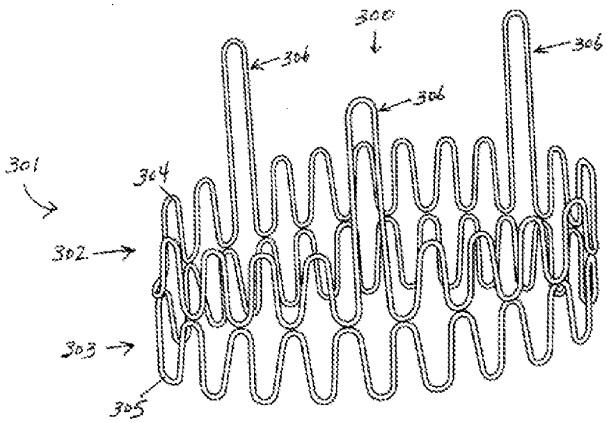


FIG. 15

However, nowhere does Rankin state that the embodiment of FIG. 14 or embodiment of FIG. 15 is capable of endovascular delivery through the femoral artery. Furthermore, to the extent that the USPTO is combining distinct embodiments within Rankin, the PTAB has made clear that for a rejection to be proper that the rejection must show that the features of various embodiments are interchangeable or that one skilled in the art would have combined those features in the manner proposed....."[1] In other words, finding features in distinct embodiments in a single reference is not proof hat the embodiments can be combined. Finally, Rankin does not teach radially extending fibers as claimed.

THE USPTO DOES NOT PROVIDE A RATIONALE AS TO HOW TO MODIFY LEVI-DEHDASHTIAN IN VIEW OF RANKIN TO ARRIVE AT THE CLAIMED INVENTION

[1] *See Abiomed*, IPR2017-01204, -01205

Nowhere does the USPTO indicate how the Levi-Dehdashtian-Rankin combination is to be accomplished. When making a modification to the prior art, the USPTO must provide rationale as to how the modification can be made. Outside of a conclusory statement that the modification would be provided "in order to prevent surgical procedures," nowhere does the USPTO present evidence of how the too-large combined design of Levi-Dehdashtian could be modified by Rankin to be endovascularly deployed through the femoral artery. Furthermore, Levi already avoids "surgical procedures," so it is not clear that the further modification in view of Rankin accomplished anything.

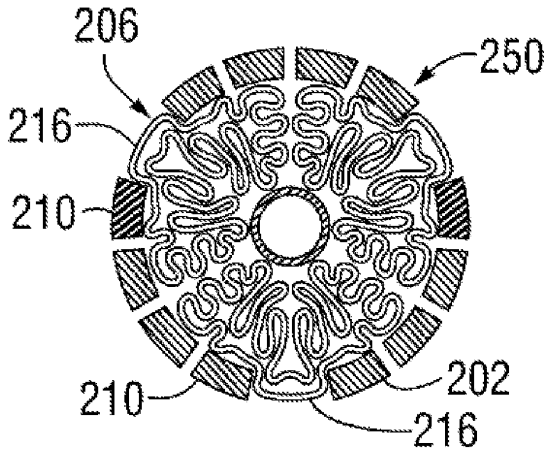
With TVR or valve design, no modification is insignificant. As Applicant has shown with the reduced thickness portion of Levi, even a small reduction in stent profile presents significant engineering challenges. Every reduction in stent profile must necessarily compensate or account for some possible reduction in prosthetic valve leaflet size, which may reduce the effective orifice area and hamper hemodynamics. Put simply, there are no free lunches in TVR design, and even the smallest, what would appear to be trivial change requires significant design forethought.

Ultimately, there is no disclosure, or teaching or suggestion or motivation among the prior art as to how anyone could modify the minimal seal thickness of 1.0 mm disclosed in the dense band of Dehdashtian to arrive at an invention that has a crimped profile sufficient for transfemoral delivery, except to reduce the fiber density significantly, something that Dehdashtian does not disclose.

For example, would a POSITA simply reduce the size of the Levi metallic frame to allow extra space for the outer seal? Not likely as that would then necessarily require a smaller area for the prosthetic valve leaflets, which would then impact hemodynamic performance. In fact, Levi FIG. 54 taught an area of reduce frame profile, however, such area was only allowing for an outer band thickness of 0.33 mm (See December 14 remarks, page 13) which is far less than a 1.0 mm thickness as Dehdashtian discloses. Adding Rankin does nothing to change this.

Furthermore, Levi required certain spacing between cells within the frame to allow leaflets to protrude through the cells during crimping to reduce crimped profile. This was well-illustrated in FIG. 47 of Levi where the leaflet structure is shown extending through openings 216.

FIG. 47



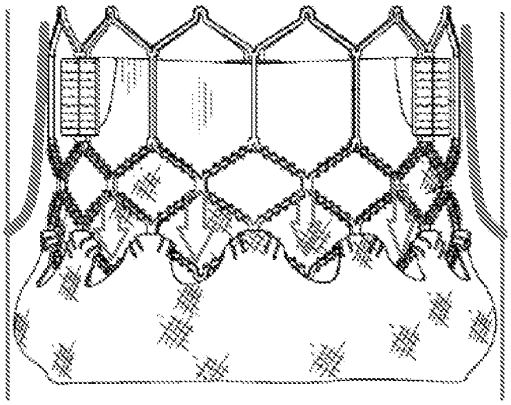
It necessarily follows that a further reduction in stent frame diameter as proposed by the USPTO would necessarily use either a lesser number of or a smaller area of each open cell in the stent frame, which would thus restrict the ability of the leaflets to pass through openings 216. In this scenario, reducing the overall stent geometry as might be proposed with the combination of Rankin could actually increase crimp profile, instead of reducing the profile. Nowhere does the USPTO propose in their combination how to address this.

Would a POSITA provide a significantly thinner seal of Dehdashtian that would allow for a significantly smaller profile increase due to addition of an outer seal? This is also not likely since Dehdashtian teaches that the band is compressed, and thus some more than nominal amount of compression is required for Dehdashtian to accomplish their prescribed purpose. Instead, the solution to the problems shown in Levi and Dehdashtian was to have outwardly extending fibers as claimed by Applicant forming the outer seal, which provided sufficient surface area for tissue in-growth and sealing capabilities, without having a very dense band or cloth as shown by Dehdashtian, Walther-Dehdashtian and Russel.

THE PROPOSED MODIFICATION BY THE USPTO WOULD RENDER THE ART UNSATISFACTORY FOR ITS INTENDED PURPOSES AND WOULD CHANGE THE PRINCIPLE OF OPERATION OF LEVI

The USPTO proposes a prior art modification that runs afoul of at least two sections of the MPEP. First, the proposed modification cannot render the prior art unsatisfactory for its intended purpose. (See MPEP 2143.01, section V). Levi in view of Dehdashtian does just this. Levi in view of Dehdashtian renders Levi unsatisfactory because it cannot be deployed endovascularly through the femoral artery. The USPTO seems to acknowledge that Levi-Dehdashtian combination by itself would be too large to deploy the the femoral artery.

Second, the proposed modification cannot change the principle of operation of a reference. Levi appears to function by billowing of the skirt when retrograde (i.e. downward) blood flow passes through openings formed in an upper surface of the outer skirt. The billowing of the skirt presses the outer surface of the skirt against the aortic annulus. Consider it similar to blowing up a balloon.



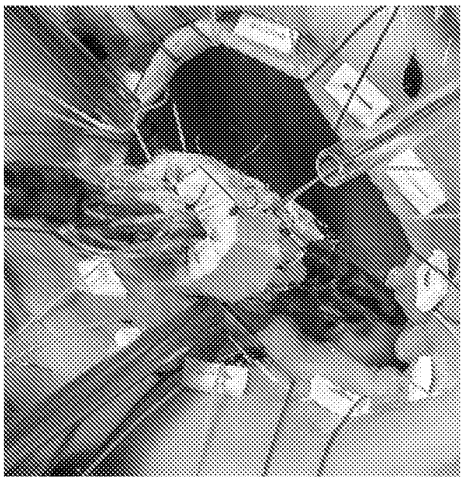
(Annotations provided by Applicant)

Levi requires a loosely fit outer seal to accomplish both this billowing concept and allowing slack in the outer seal for frame foreshortening during crimping (paragraph [0085] of Levi; *In another advantageous feature, the slack between the lower and upper edges of the outer skirt **18** allows the frame **12** to elongate axially during crimping without any resistance from the outer skirt and the outer skirt does not substantially affect the outer diameter of the prosthetic valve in the crimped condition*). Adding the tightly held outer band of Dehdashtian would thus not allow for the billowing concept, or the slack concept as **required** by Levi for sealing and crimping. Thus, the modification clearly runs afoul of 2143.01 section VI, which holds that if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to

render the claims *prima facie* obvious. *In re Ratti,* 270 F.2d 810, 813, 123 USPQ 349, 352 (CCPA 1959) (The court reversed the rejection holding the "suggested combination of references would require a substantial reconstruction and redesign of the elements shown in [the primary reference] as well as a change in the basic principle under which the [primary reference] construction was designed to operate.").

THE PROPOSED LEVI-DEHDASHTIAN MODIFICATION BY THE USPTO HAS BEEN PREVIOUSLY REDUCED TO PRACTICE AND WAS IMPOSSIBLE TO DEPLOY ENDOVASCULARLY THROUGH THE FEMORAL ARTERY

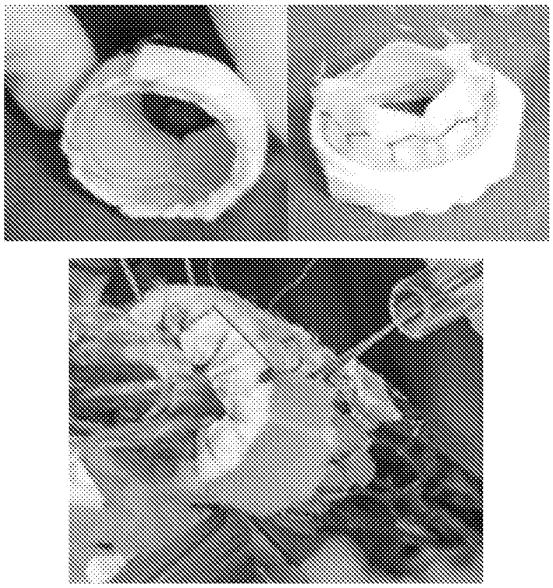
To the extent that the USPTO takes the position that the Levi-Walther-Rankin combination could be capable of endovascular delivery through the femoral artery, Applicant has also previously shown that this is not possible in the NPL of Russel, where, again, the Levi valve in combination with an outer band similar to Dehdashtian was so large that it wasn't even encapsulated within a catheter when used in a surgical procedure for a mitral valve.



In a non-patent literature entitled "Open Atrial Transcatheter Mitral Valve Replacement in Patients with Mitral Annular Calcification" by Russel,[2] aa publication made in 2018, six years after the date used by the USPTO, a combination of a product shown in Levi with a cloth seal such

[2] https://www.sciencedirect.com/science/article/pii/S0735109718357231

as shown in Dehdashtian was used in a mitral valve repair; this is generally the combination proposed by the Patent Office of Levi in combination with Dehdashtian. Representative images are shown below:



Applicant notes that the seal used in Russel was Bard Product No. 007976, which is disclosed as a 1.65 mm fabric, which is slightly larger than the minimal size disclosed in Dehdashtian of 1.00 mm, but it is similar in size[3]. The resultant valve in Russel had such a large profile that excision of the native mitral leaflets was required, and a large delivery system was also required in an open heart surgical procedure. Additionally, the Russel assembly, similar to that of Walther-Dehdashtian, proved bulky and despite being capable of collapsing, could not collapse down enough to even fit within a very large delivery system. Applicant notes that the mitral valve and paths to a mitral repair are generally considered larger than a transfemoral aortic valve approach. Similar to the benchtop testing of Walther-Dehdashtian where it was proposed that the valve could be delivered transapically, an open chest surgical approach had to be used for the delivery of the Russel valve. Thus, the Russel valve, which Applicant submits is consistent with the proposed combination set forth by the USPTO, is incapable of meeting either claim limitation of endovascular delivery through the femoral artery, or expansion of the valve assembly is

[3] https://www.westcmr.com/007976-wb10-007976

configured to press the sealing material against native valve leaflets of an aorta of the patient as required by Claim 34.

In Russel, the leaflets were excised to provide additional space ("The anterior leaflet is excised, leaving a standard rim of tissue at the aortomitral curtain that will be used to place the pledgeted anchoring sutures (Figure 4A).") Russel maintained such a large profile, and due to the deployment being open heart, crimped the valve but did not disclose passing through a catheter.

Thus, Applicant submits that the non-patent literature of Russel makes it clear that the modification of Levi with Dehdashtian could not meet the claim limitations of claims 31 and 34.

THE PROPOSED MODIFICATION STILL DOES NOT TEACH THE CLAIM LIMITATIONS OF PRESS[ING] THE SEALING MATERIAL AGAINST NATIVE VALVE LEAFLETS OF AN AORTA OF THE PATIENT

The USPTO takes the position in paragraph 10 that Dehdashtian discloses "press[ing] the radially extending fibers into engagement with native leaflets of the aorta of the patient." This is not accurate. Nowhere does Dehdashtian show that the fibers are compressed against the native leaflets of the aorta. Dehdashtian offers only scant disclosure as to FIG. 22, having only three paragraphs, none of which show fibers being compressed against the native leaflets or the valve being deployed at all, much less deployed within a TF delivery. The fibers could be, for example, pressed against the annulus in a subannular position. Or the fibers could be, for example, pressed against the annulus where the native leaflets have been removed. Or the fibers could be pressed against a surgical valve as shown in Walther. Dehdashtian is silent on this issue and the USPTO's position is just not supported. In fact, the portions relied upon by Dehdashtian say nothing about native leaflets, and instead reference "surrounding tissue" and "host annulus." (*As the compressible material expands, it fills the gaps between the stented valve and the surrounding tissue*; and *After deployment, the hydrogel absorbs fluids from the blood and expands to the fill the gaps between the valve and surrounding tissue (e.g., host annulus)*). Outside of the background, Dehdashtian doesn't mention the word "leaflet" at all in the specification except when describing the prosthetic leaflets carried by the valve frame. The disclosure in Levi and Rankin doesn't seem to disclose this limitation either. Thus, the rejection

is improper under MPEP 2143.03 because "all words in a claim must be considered in judging the patentability of that claim against the prior art." It is fundamental that all limitations must be found in the prior art to support a 35 USC 103 rejection.

Dehdashtian does teach several seal assemblies, however, in the only embodiment in which the seal assemblies are shown deployed within the patient for a TVR that has an external seal attached to its frame, the seal is positioned where the seal is subannular. Consider the following:

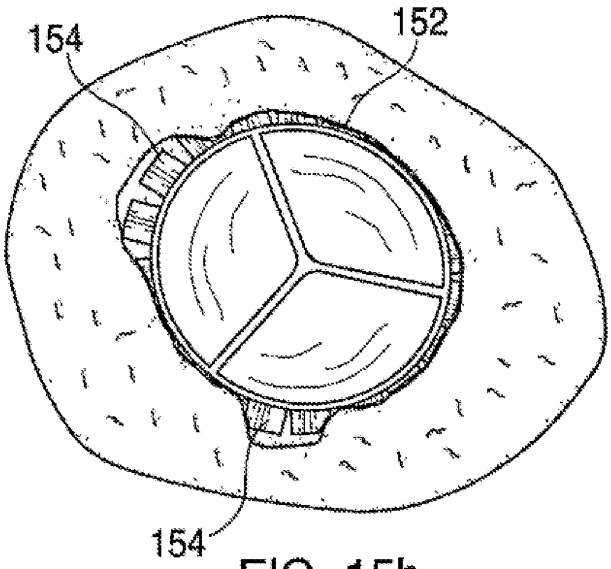


FIG. 15b

(FIG. 15b showing the seal 154 below the leaflets)

As illustrated, in the single design of Dehdashtian where there is a valve with an outer seal shown in the deployed state, the seal appears to be below the annulus, and thus not in contact with the native leaflets as required by the claims.

DEHDASHTIAN'S COAUTHOR INDICATES THAT EXTERNAL SEALS ARE NOT USABLE FOR TREATING PARAVALVULAR LEAKAGE THROUGH THE TRANSFEMORAL APPROACH

Dehdashtian and Walther cooperated to describe an invention remarkably similar to that which is shown in Dehdashtian in 2011, around the same general time as Applicant's priority. Walther and Dehdashtian reduced to practice the "cloth valve" in a valve-in-valve benchtop test. Applicant notes that Dehdashtian described their valve as having a "cloth material." (see paragraph [0085]).[4] The cloth valve of Walther-Dehdashtian is illustrated below in a side-by-side comparison with Dehdashtian:

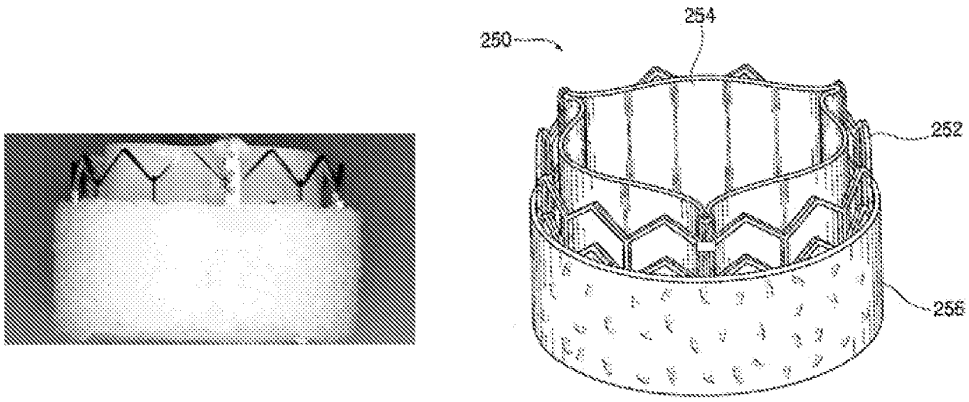


FIG. 22

However, Walther-Kempfert recognized the limitations with transfemoral access and seemed to acknowledge, in their opinion, that only transapical (i.e. much bigger access than transfemoral) would be allowed to add a seal to address paravalvular leakage.

> *Overall, when considering the various aspects in Table 1, the TA access may offer some potential advantages, despite the current drawback of requiring a minithoracotomy. Larger sheath diameters can be used with the TA access, thus leading to less need for crimping of the valves which may translate into better longevity. Solutions for improving*

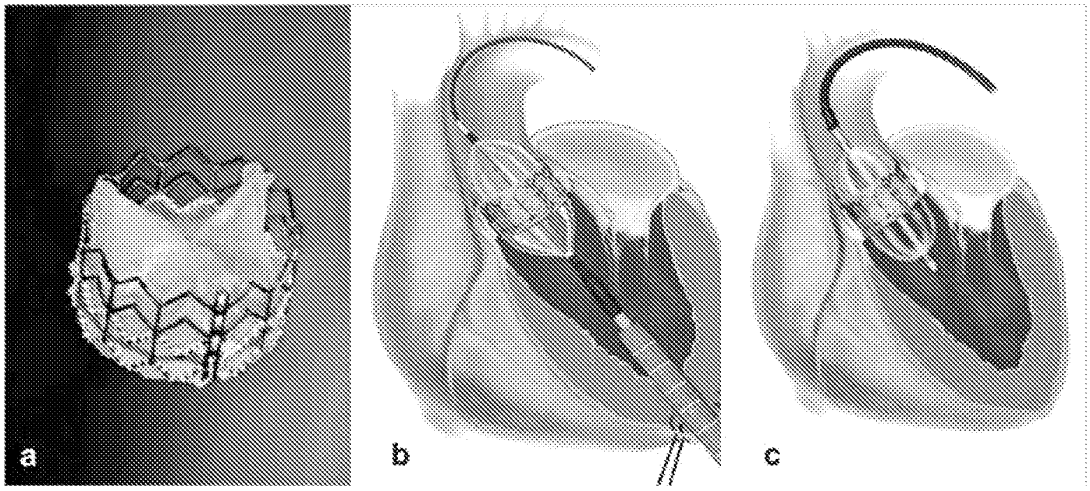
[4] https://academic.oup.com/ejcts/article/40/5/1120/446481

> *paravalvular leakage may also be implemented into clinical practice through the TA approach (theoretically these solutions require the larger diameters afforded by the TA route). Additionally, clinical trials assessing percutaneous access and closure systems are soon to be underway, hopefully leading to further improvement and reliance on the TA antegrade technique.*[5]

This Walther-Kempfert publication occurred in July 2012, about the exact time that Applicant's priority filing was made and Levi was being published. This publication represented the thought at that time by Walther that the size limitations of transfemoral would not allow for an outer seal such as is shown in Dehdashtian. This is exactly why Dehdashtian, as generally developed in a reduced to practice prototype of Walther-Dehdashtian, was only used in a hypothetical valve-in-valve scenario where the patient's native leaflets had already been removed. As Walther-Dehdashtian acknowledged, the reduced to practice valve of Walther-Dehdashtian was "an advantage, at least for the trans-apical approach, where tight crimping is not an issue."

Additionally, the transapical approach, as Walther-Dehdashtian made clear was plausible with the clothe valve, and that Walther-Kempfert recognized would be suitable for PVL treatment, by addition of an outer seal, followed a different directional path than transfemoral. Notably, the directionality was antegrade instead of retrograde as found in transfemoral. In very simple terms, transfemoral requires a downward implantation, whereas transapical requires a forward implantation. This matters because in transfemoral, a seal placed on the proximal end of the TAVR must cross the native leaflets in order to be deployed, whereas, with the transapical approach, a seal placed on the proximal end of the TAVR is not required to cross the native leaflets. An illustration of a prosthesis (similar to Spenser) shown in (a), is then shown in transapical deployment in (b), and transfemoral deployment in (c).

[5] https://www.annalscts.com/article/view/499/904



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Thus, it was the opinion of Walther-Dehdashtian that the size issues for a band like shown in the cloth valve and Dehdashtian Figure 22 would likely be prohibitive to transfemoral access, and that is why the reduced to practice cloth valve was suitable for transapical delivery "where tight crimping is not an issue."

Dr. Brecker's declaration at paragraph 31 supports this as well. As Dr. Brecker indicates, "Walther-Dehdashtian seems to acknowledge that a seal similar to Dehdashtian is not capable of reaching a crimp profile for transfemoral delivery, only available for the much larger access route of transapical." Similarly, as Dr. Brecker indicates in paragraph 33, "Dehdashtian-Kempfert seems to acknowledge that a seal used for addressing PVL would be implemented through the transapical approach (as opposed to the transfemoral approach)."

THE RATIONALE IN EARLY TAVR DESIGN WAS THAT THE METAL STENT FRAME NEEDED TO BE PRESSED AGAINST THE NATIVE LEAFLETS

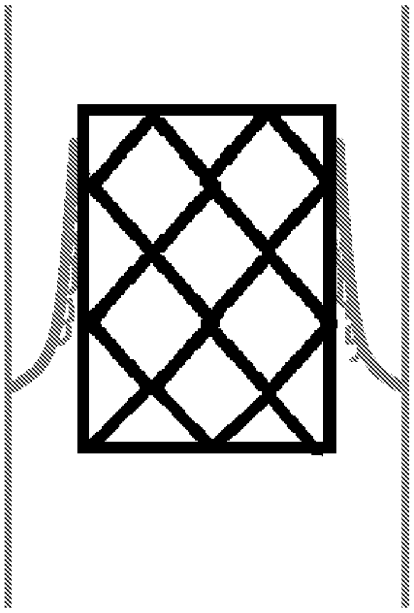
Applicant's claims require that the outer seal press against the native leaflets. However, in the infancy of TAVR design, it was believed that "*intermittent bars of the stent and the craggy,*

[6] https://www.researchgate.net/figure/a-Edwards-Sapien-prosthesis-b-transapical-placement-c-transfemoral-placement_fig1_26312143

calcified valve can act to lock [the TAVR and leaflets] together so that then the [TAVR] is fixed and it is not likely to move."

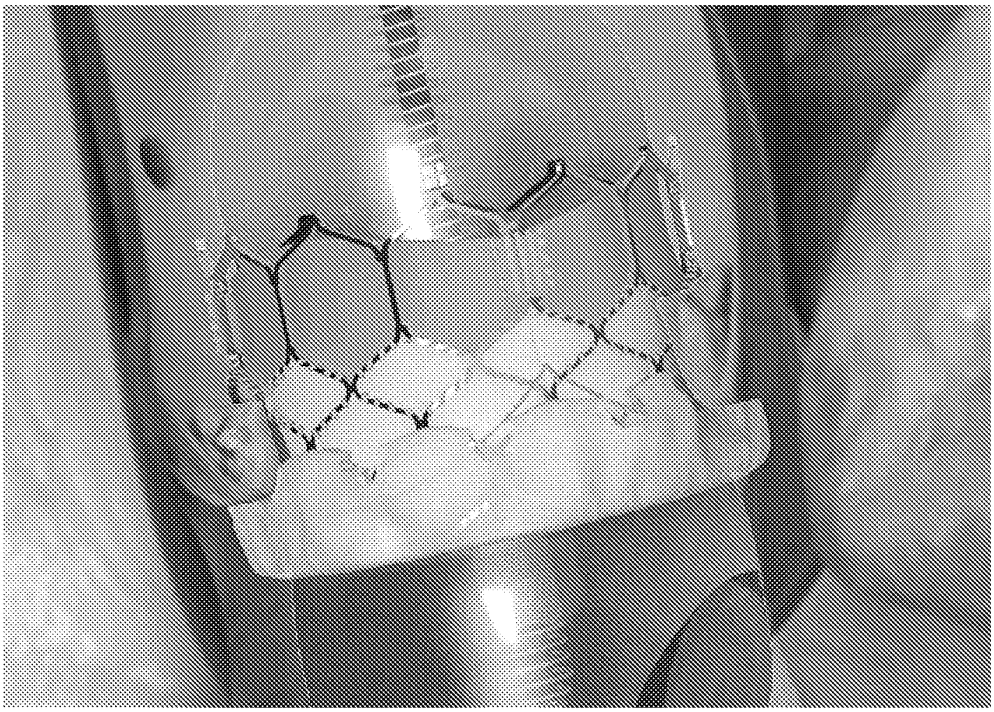
(Buller declaration, page 90, included on IDS dated February 19, 2022)

In other words, it was believed that the metal frame needed to press against the native, calcified leaflets, and that this interconnectivity would prevent the valve from migrating. It was thus believed that a dense sealing cloth between the metallic frame and the native calcified valve leaflet could prevent the interconnectivity of the metallic frame against the calcified valve leaflets and potentially be prone to migration. An Applicant provided image is illustrated below:



Thus, at the general time of Applicant's priority, the thought was that Walther-Dehdashtian's reduced to practice valve would be placed within a previously implanted surgical valve where the native valve leaflets have already been removed. Any outer seal, to the extent one existed, was likely to be positioned subannular, i.e. below the annulus as placing at the annulus would have frustrated the interconnectivity of the metal frame and the calcified leaflets per the line of thinking at that time. This was shown in the commercial embodiment of Levi. While Levi does

not include a single image of the TAVR deployed within the aorta, the commercial embodiment of Levi, the SAPIEN 3, is illustrated with the seal in a subannular deployment



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Thus, Applicant submits that to the extent that a TVR had an outer seal at all, the outer seal was likely for subannular deployment. Any modification where it was assumed that Dehdashtian would be employed with the seal intra-annular is not obvious, nor supported by the literature of record.

ANY INTENDED USE OR FUNCTIONAL LANGUAGE MUST BE CONSIDERED IN CLAIM CONSTRUCTION

The USPTO indicates:

[7] https://www.edwards.com/gb/devices/Heart-Valves/Transcatheter-Sapien-3

3. Applicant argues that the prior art references fail to disclose the heart valve being delivered through the femoral artery. Note that this is the intended use of the device.

Applicant agrees that the limitation of "configured to be deployed endovascularly through a femoral artery of the patient" may be intended use or functional language. MPEP 2114 provides guidance to the USPTO on functional limitations and when functional language is limiting to the claim. For example, this section provides "where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that the subject matter shown to be in the prior art does not possess the characteristic relied on." In other words, if Applicant can prove that the subject matter shown in the prior art does not possess the characteristic relied upon, then the USPTO has been rebutted.

As Applicant has previously shown and discusses in additional detail below, the CAFC has spoken on this exact issue, in this exact technical space. In *Snyders Heart Valve v. St Jude*, the claims required similar language of the frame being "sized and shaped for insertion [within the native leaflets]," which is highly comparable to the claim language of "configured to be deployed endovascularly through a femoral artery of the patient." In the *Snyders* case, the CAFC required consideration of the "sized and shaped" claim language when reviewing the prior art. The USPTO must do the same.

FEDERAL CIRCUIT PRECEDENT IN THE SAME FIELD OF ART IS CONTROLLING IN THIS MATTER

Finally, the Federal Circuit has spoken to this exact issue in the exact same field of art. In *Snyders Heart Valve LLC v. St. Jude Medical, LLC*[8], the Federal Circuit determined that the prior art of Bessler (USPN 5,855,601) did not anticipate claim limitations in USPN 6,821,297 that the transcatheter valve had a "frame sized and shaped for insertion in [a plurality of cusps of the

[8] https://cafc.uscourts.gov/opinions-orders/19-2111.OPINION.10-5-2021_1844521.pdf

damaged heart valve." Bessler taught a valve where a cutting tool first excised the native leaflets of a patient to provide sufficient room for deployment of the Bessler valve. The claimed invention of the '297 thus required that the native leaflets remain in place.

Here, just as in *Snyders*, the claims require that *the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient*. As already discussed, the prior art is incapable of meeting these limitations, and just as in *Snyders*, when the prior art is incapable of meeting the claim limitations in this technical space, an anticipation rejection on that prior art is improper. Put simply, as Spenser recites, a 24F catheter size is the maximal size of an endovascular deployment through the femoral artery.

Furthermore, the claims each require *expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient*. Applicant submits that the prior art of record, as proposed to be combined, is not capable of meeting these claim limitations.

The parallels to *Snyder* are striking. In *Snyder* the claims were construed in a manner consistent with Applicant's claim language--- that the expansion of the valve pressed into engagement with native leaflets of the aorta of a patient. However, in *Snyder*, the primary reference taught removing the native leaflets in order to provide sufficient space for delivery in the annulus. In determining that the Bessler reference did not anticipate the claims, the Board stated "*Of particular note, the specification expressly describes Bessler as presenting problems that the Snyders invention overcomes, stating that the procedure disclosed in Bessler is too invasive because it "**includes excision, vacuum removal of the native valve**, cardiopulmonary bypass and backflushing of the coronary arterial tree*." (emphasis added).

Just as in *Snyder*, the references of record proposed by the USPTO, when put into practice as shown in the NPL of Walther and Russel, all required removal of the native leaflets. Put simply, the proposed combination by the USPTO was too large to be deployed within the native leaflets of the aorta and the scientific papers presented herein show that to be the case.

Thus, it is clear that the proposed combination by the USPTO is incapable of meeting the claim limitation of *expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into*

engagement with native leaflets of the aorta of a patient. As such, the claims are patentable for at least this reason.

Applicant submits that the claims are patentable over the references of record as presented herein.

DEPOSIT ACCOUNT

The Commissioner is hereby authorized to charge any otherwise unpaid fees associated with the filing of this correspondence to Deposit Account No. **50-6191**.

Respectfully submitted,

Date: February 19, 2022

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Customer No. 175373

Electronic Acknowledgement Receipt

EFS ID:	45040428
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	175373
Filer:	Justin Robert Nifong
Filer Authorized By:	
Attorney Docket Number:	426/2/12 UTIL
Receipt Date:	19-FEB-2022
Filing Date:	28-JUL-2020
Time Stamp:	17:42:55
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	216219ACS.pdf	248269 9c3497f44013161a6e08ec3b15ea7748ac8fae7d	no	4

Warnings:

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2	Non Patent Literature	40-5-1120.pdf	625330 11bf094d8f86cef0eff11e53bde6442cc554cd49	no	7
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Information:					

9		426-2-12-UTIL-resp-to-oa-dtd-2-4-filed.pdf	1541978 20049c8fedd9e5eb23d030ac4efd8feb9841aca5	yes	36

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Request for Reconsideration-After Non-Final Rejection	1	1
	Claims	2	5
	Applicant Arguments/Remarks Made in an Amendment	6	36

Warnings:

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10	Non Patent Literature	14a10e5d-cdf3-4f3c-bc60-2599fbce8995-printed.pdf	11978489 98bd8f0402579a69fdbd8a1b21bb6b8587cc31ad	no	128

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Total Files Size (in bytes):	52476298

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

PTO/SB/06 (09-11)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/941,117	Filing Date 07/28/2020	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ 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	02/19/2022	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
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	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $240 =	0
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	☐ 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 ($)	ADDITIONAL FEE ($)
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	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".	/LASHAWN R MORGAN/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
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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 NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/941,117	07/28/2020	Ali Shahriari	426/2/12 UTIL	1876

175373 7590 02/04/2022

Aortic Innovations, LLC
4917 Waters Edge Drive, Suite 275
Raleigh, NC 27606

EXAMINER	
SHIPMON, TIFFANY P	

ART UNIT	PAPER NUMBER
3774	

NOTIFICATION DATE	DELIVERY MODE
02/04/2022	ELECTRONIC

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

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

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

usptomail@nkpatentlaw.com

Office Action Summary	**Application No.** 16/941,117	**Applicant(s)** Shahriari, Ali	
	Examiner TIFFANY P SHIPMON	**Art Unit** 3774	**AIA (FITF) Status** No

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

Period for Reply

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

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

Status

1)☑ Responsive to communication(s) filed on 14 December 2021.

☐ 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) 31,34 and 36-48 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) 31,34 and 36-48 is/are rejected.

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

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

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

Application Papers

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

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

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

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

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

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

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

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

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

Attachment(s)

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

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

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

4) ☐ Other: _____.

Notice of Pre-AIA or AIA Status

1. The present application is being examined under the pre-AIA first to invent provisions.

Priority

1. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, 365(c), or 386(c) is acknowledged. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 119(e) as follows:

The later-filed application must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application). The disclosure of the invention in the parent application and in the later-filed application must be sufficient to comply with the requirements of 35 U.S.C. 112(a) or the first paragraph of pre-AIA 35 U.S.C. 112, except for the best mode requirement. See Transco Products, Inc. v. Performance Contracting, Inc., 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994)

The disclosure of the prior-filed application, Application No. 61/567,458, fails to provide adequate support or enablement in the manner provided by 35 U.S.C. 112(a) or pre-AIA 35 U.S.C. 112, first paragraph for one or more claims of this application. The prior filed application fails to disclosure or support for any 'fibers'. Accordingly, claims 1-2, 4-6, 10, and 13-18 are not entitled to the benefit of the prior application.

Therefore the date being given to the subject-matter of these claim will be 11/7/2012, which is the filing date of the provisional 61/723,446.

Response to Arguments

2. Applicant's arguments with respect to claim(s) 1-2, 4-6, 10 and 13-18 have been considered but are moot because the new ground of rejection does not rely on any reference applied in the prior rejection of record for any teaching or matter specifically challenged in the argument.

3. Applicant argues that the prior art references fail to disclose the heart valve being delivered through the femoral artery. Note that this is the intended use of the device.

4. The prior art discloses heart valves that are fully capable of collapsing.

5. A new reference Rankin et al. has been added to the references below, that teaches an aortic valve that can be delivered percutaneously through a catheter. The Rankin et al. application qualifies as prior art due to the fact that 'fibers' are not present/supported by the disclosure in the 61/567,458 provisional (see above).

Claim Rejections - 35 USC § 103

6. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claim 31, 34, 37-39, 41-444, 46-47 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Levi et al. (US 2012/0123529) in view of Dehdashtian (WO 2006/005015) and further in view of Rankin et al. (US 2012/0143324).

8. Referring to claim 31, Levi et al. discloses a transcatheter heart valve assembly comprising: a graft covering housing a prosthetic heart valve (inner skirt, 16), wherein the graft covering (inner skirt,

16) extends around the prosthetic heart valve (valvular structure, 14) for providing sealing to the heart valve (paragraph 64); an outer frame (12) formed from a metallic material(paragraph 53) and defining an open cell configuration(Figs. 1-3), and being secured to the graft covering by a plurality of stitches (paragraph 74); a sealing material (outer skirt, 18) positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks (paragraph 85), wherein the sealing material is attached to the outer frame(Figs. 1-3), wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a Polymer (PET is a polymer and polyester, paragraph 84), and wherein the heart valve assembly has a radially compressed and a radially expanded orientation (abstract) wherein the outer frame extends distally further than the prosthetic heart valve (see Figs. 1-3).

9. Levi et al. lacks a detailed description of wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame; and wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient.

10. Dehdashtian et al. discloses a heart valve in the same field of endeavor with a sealing material (256) positioned externally to an outer frame (252) for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks (paragraph 145), wherein the sealing material is attached to the outer frame (Fig. 22), wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame(paragraph 145); wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient (paragraph 145, discloses the compressible material 256, is compressible and expands after deployment).

11. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the heart valve assembly of Levi et al. to include a sealing member positioned externally to an outer frame as taught in Dehdashtian et al. in order to encourage coagulation of blood to further fill gaps and prevent leakage (pages 36-37).

12. Levi et al. in view of Dehdashtian et al. lacks a detailed description of wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient.

13. Rankin et al. teaches an aortic valve device in the same field of endeavor that comprises a wire frame that can be covered with a fabric that comprises collagen fibers (paragraph 71) and can be delivered percutaneously(abstract) for the purpose of preventing complicated surgical procedures (paragraph 13). Additionally, it should be noted that the devices of modified Levi et al. in view of Dehdashtian et al. can be collapsed and therefore it can be delivered through the femoral artery.

14. It would have been obvious to a person of ordinary skill in the art to modify the heart valve of Modified Levi et al. to be delivered percutaneously as taught in Rankin et al. in order to prevent complicated surgical procedures.

15. Referring to claim 34, Levi et al. discloses a transcatheter heart valve assembly comprising: a graft covering housing a prosthetic heart valve(inner skirt, 16), wherein the graft covering (inner skirt, 16) extends radially outwardly around the prosthetic heart valve (valvular structure, 14) and radially inwardly of an outer frame for providing sealing to the heart valve(paragraph 64); wherein the outer frame(12) is formed from a metallic material (paragraph 53) and defines an open cell configuration (Figs. 1-3), and being secured to the graft covering by a plurality of stitches (paragraph 74); a sealing material (outer skirt, 18) positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks (paragraph 85), wherein the sealing material is attached to the outer frame(Figs. 1-3), and wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer (PET is a polymer and

polyester, paragraph 84), wherein the valve assembly is balloon expandable during endovascular deployment (paragraph 30), wherein expansion of the valve assembly is configured to press the sealing material against native valve leaflets of an aorta of the patient (paragraph 85), wherein the sealing material is held against the outer frame as the valve expands from the radially compressed orientation to the radially expanded orientation (paragraph 85; the sealing material is held against the outer frame, as the sealing material is continuously 'attached' to the outer frame during expansion).

16. Levi et al. discloses the proximal end of the outer frame being covered (See Figs. 42-43). Levi et al. discloses wherein the graft covering extends beyond the proximal end of the outer frame (Levi discloses a graft covering that extends beyond the proximal end of the outer frame (see Figs. 37-40). However, Levi et al. lacks a detailed description of the proximal end of the outer frame being covered by the graft. However, it would have been obvious to a person of ordinary skill in the art, to modify the graft covering, 16 to cover the proximal end of the outer frame as the graft covering 16 and outer skirt, 18 covers the proximal end of the frame, for the purpose of assisting in forming a good fluid-tight seal between the valve and the native annulus.

17. Levi et al. lacks a detailed description of wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame; wherein the sealing material includes a plurality of radially extending fibers that form a circumferential surface that extends outwardly of the outer frame; wherein the fibers cover at least two circumferentially extending rows of grids formed in the open cell configuration and the at least two circumferentially extending rows radially overlap with the prosthetic leaflets and wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient.

18. Dehdashtian et al. discloses a heart valve in the same field of endeavor with a sealing material (256) positioned externally to an outer frame (252) for providing sealing between the outer frame and a

patient's anatomical wall to prevent paravalvular leaks (paragraph 145), wherein the sealing material is attached to the outer frame(Fig. 22), wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame(paragraph 145); wherein the sealing material (256) includes a plurality of radially extending fibers that form a circumferential surface that extends outwardly of the outer frame(paragraph 145): wherein the fibers cover at least two circumferentially extending rows of grids formed in the open cell configuration and the at least two circumferentially extending rows radially overlap with the prosthetic leaflets (Fig. 22, two rows of stent 252 covered) wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient (paragraph 145, discloses the compressible material 256, is compressible and expands after deployment; the material is held against the outer frame).

19. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the heart valve assembly of Spenser et al. to include a sealing member positioned externally to an outer frame as taught in Dehdashtian et al. in order to encourage coagulation of blood to further fill gaps and prevent leakage (pages 36-37).

20. Levi et al. lacks a detailed description of wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient.

21. Rankin et al. teaches an aortic valve device in the same field of endeavor that comprises a wire frame that can be covered with a fabric that comprises collagen fibers (paragraph 71) and can be delivered percutaneously(abstract) for the purpose of preventing complicated surgical procedures (paragraph 13). Additionally, it should be noted that the devices of modified Levi et al. in view of Dehdashtian et al. can be collapsed and therefore it can be delivered through the femoral artery.

22. It would have been obvious to a person of ordinary skill in the art to modify the heart valve of Modified Levi et al. to be delivered percutaneously as taught in Rankin et al. in order to prevent complicated surgical procedures.

23. Referring to claims 37 and 41, as applied to claims 31 and 34 above, Modified Levi et al. discloses wherein the graft covering (inner skirt, 16) housing a prosthetic heart valve (14) forms an inner frame for supporting the prosthetic heart valve (Fig.2).

24. Referring to claim 38 and 42, as applied to claims 31 and 34 above, modified Levi et al. in view of Dehdashtian et al. lacks a detailed description of wherein the radially extending fibers are collagen fibers.

25. Rankin et al. teaches sealing fibers that can be woven collagen in order to cover the surfaces of the wire frame to separate the wire material from the contact with bodily tissues and blood (paragraph 71).

26. It would have been obvious to a person of ordinary skill in the art to modify the fibers as taught in Modified Levi et al. in view of Dehdashtian et al. to be collagen fibers in order to create a barrier by separating the wire material from having contact with the bodily tissues and blood.

27. Referring to claims 39 and 43, as modified in claims 31 and 34 above, modified Rankin et al. discloses wherein the second plurality of fibers extend radially inwardly from the frame (paragraph 71, discloses the material which contains fibers wrapped around the wire frame, thus the fibers would extend radially inwardly).

28. Referring to claim 44, Levi et al. discloses a transcatheter aortic heart valve assembly comprising: a graft covering engaging a prosthetic heart valve(inner skirt, 16), wherein the graft covering(skirt, 16) extends around the prosthetic heart valve for providing sealing to the heart valve(paragraph 64); a frame formed (12)from a metallic material(paragraph 53) and defining an open cell configuration(Figs. 1-3), and being secured to the graft covering by stitching(paragraph 74); a sealing

material (outer skirt, 18) positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks (paragraph 85), wherein the sealing material is attached to the frame (Figs. 1-3), wherein the heart valve assembly has a radially compressed orientation and a radially expanded orientation(abstract).

29. Levi et al. lacks a detailed description of wherein the sealing material includes a plurality of outwardly extending fibers that extend outwardly of the frame; wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the outwardly extending fibers into engagement with native leaflets of the aorta of a patient.

30. Dehdashtian et al. discloses a heart valve in the same field of endeavor wherein the sealing material includes a plurality of outwardly extending fibers that extend outwardly of the frame(paragraph 145); wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the outwardly extending fibers into engagement with native leaflets of the aorta of a patient(paragraph 145, discloses the compressible material 256, is compressible and expands after deployment; the materially is held against the outer frame).

31. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the heart valve assembly of Spenser et al. to include a sealing member positioned externally to an outer frame as taught in Dehdashtian et al. in order to encourage coagulation of blood to further fill gaps and prevent leakage (pages 36-37).

32. Levi et al. lacks a detailed description of wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient.

33. Rankin et al. teaches an aortic valve device in the same field of endeavor that comprises a wire frame that can be covered with a fabric that comprises collagen fibers (paragraph 71) and can be delivered percutaneously(abstract) for the purpose of preventing complicated surgical procedures

(paragraph 13). Additionally, it should be noted that the devices of modified Levi et al. in view of Dehdashtian et al. can be collapsed and therefore it can be delivered through the femoral artery.

34. It would have been obvious to a person of ordinary skill in the art to modify the heart valve of Modified Levi et al. to be delivered percutaneously as taught in Rankin et al. in order to prevent complicated surgical procedures.

35. Referring to claim 46, as applied to claim 44 above, Modified Levi et al. discloses wherein the graft covering (inner skirt, 16) housing a prosthetic heart valve (14) forms an inner frame for supporting the prosthetic heart valve (Fig.2).

36. Referring to claim 47 as applied to claim 44 above, modified Levi et al. in view of Dehdashtian et al. lacks a detailed description of wherein the radially extending fibers are collagen fibers.

37. Rankin et al. teaches sealing fibers that can be woven collagen in order to cover the surfaces of the wire frame to separate the wire material from the contact with bodily tissues and blood (paragraph 71).

38. It would have been obvious to a person of ordinary skill in the art to modify the fibers as taught in Modified Levi et al. in view of Dehdashtian et al. to be collagen fibers in order to create a barrier by separating the wire material from having contact with the bodily tissues and blood.

39. Referring to claim 48, as modified in claim 44 above, modified Rankin et al. discloses wherein the second plurality of fibers extend radially inwardly from the frame (paragraph 71, discloses the material which contains fibers wrapped around the wire frame, thus the fibers would extend radially inwardly).

40. Claims 36, 40, and 45 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Levi et al. (US 2012/0123529) in view of Dehdashtian (WO 2006/005015) and Rankin et al. (US 2012/0143324) as applied to claims 31, 34 and 44 above, and further in view of Rowe et al. (US 2006/0287719).

41. Referring to claims 36, 40 and 45, as modified in claims 31, 34 and 44 above, Modified Levi et al. lacks a detailed description of wherein open cells of the open cell configuration are a square shape.

42. Rowe et al. discloses a prosthetic heart valve wherein the open cells of the open configuration are a square shape (Fig. 3).

43. It would have been an obvious matter of design choice to change the shape of the cells to be square, since applicant has not disclosed that square shaped cells solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with square shaped cells.

Conclusion

44. Any inquiry concerning this communication or earlier communications from the examiner should be directed to TIFFANY P SHIPMON whose telephone number is (571)270-1448. The examiner can normally be reached MONDAY-FRIDAY.

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, Jennifer Dieterle can be reached on 571-270-7872. 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.

/TIFFANY P SHIPMON/
Examiner, Art Unit 3774

/Jennifer Dieterle/
Supervisory Patent Examiner, Art Unit 3774

Notice of References Cited	Application/Control No. 16/941,117	Applicant(s)/Patent Under Reexamination Shahriari, Ali	
	Examiner TIFFANY P SHIPMON	Art Unit 3774	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20120143324-A1	06-2012	Rankin; J. Scott	A61F2/2418	623/2.37
*	B	US-20060287719-A1	12-2006	Rowe; Stanton J.	A61F2/90	623/2.18
	C					
	D					
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	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	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 MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/941,117	Shahriari, Ali
	Examiner	Art Unit
	TIFFANY P SHIPMON	3774

CPC - Searched*		
Symbol	Date	Examiner
A61F 2/856,07,2418,82,90, 2210/0014	10/21/2021	T.S.

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
IPR2021-01527 Reviewed Petition for Inter Partes Review of US Patent No. 10,792,172 on 10/20/2021	10/21/2021	T.S.
EAST Search History	10/21/2021	T.S.
Consulted with Leslie Lopez	11/29/2021	T.S.
Updated EAST Search	12/02/2021	T.S.
Consulted with Leslie Lopez	01/05/2022	T.S.
Updated EAST Search	01/10/2022	T.S.

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
A61F	2/07	01/10/2022	T.S.

	/TIFFANY P SHIPMON/ Examiner, Art Unit 3774

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/941,117	Shahriari, Ali
	Examiner	Art Unit
	TIFFANY P SHIPMON	3774

	/TIFFANY P SHIPMON/ Examiner, Art Unit 3774

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	3	"20060084927"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2022/01/10 08:51
L3	46	((nonporous non adj2 porous)) same (graft covering material) same (porous) same (heart with valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2022/01/10 10:01
S2	3	(("7799072") or ("8002826") or ("7947074")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2014/06/28 22:05
S3	21	("20120046726" | "7018404" | "7799072" | "8016877" | "20070250146" | "6334868" | "7510574" | "8002826" | "20070276464" | "6752829" | "5102417" | "7947074" | "20070095283" | "20110257731" | "7393360" | "7914569" | "8226710" | "20040210304" | "5397355" | "7780726" | "20050197687" | "20060149351" | "20090198315" | "20100042202" | "7252682" | "20030040771" | "20120089218" | "5716393" | "6254632" | "20090125098" | "6582462" | "7771467" | "8206438" | "20080132999" | "20090099644" | "8425584").PN.	USPAT	OR	OFF	2014/06/28 23:06
S4	36	("20120046726" | "7018404" | "7799072" | "8016877" | "20070250146" | "6334868" | "7510574" | "8002826" | "20070276464" | "6752829" | "5102417" | "7947074" | "20070095283" | "20110257731" | "7393360" | "7914569" | "8226710" | "20040210304" | "5397355" | "7780726" | "20050197687" | "20060149351" | "20090198315" |	US-PGPUB; USPAT	OR	OFF	2014/06/28 23:24

		"20100042202" | "7252682" | "20030040771" | "20120089218" | "5716393" | "6254632" | "20090125098" | "6582462" | "7771467" | "8206438" | "20080132999" | "20090099644" | "8425584").PN.				
S5	317	(623/2.14).CCLS.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	OFF	2014/06/28 23:30
S7	38	a61f2/2418	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/06/28 23:31
S8	59	a61f2/2412	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/06/28 23:31
S9	41	a61f2/2436	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/06/28 23:31
S10	17	a61f2/2433	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/06/28 23:31
S11	11	a61f2/2475	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/06/28 23:31
S12	1	"13706896"	US-PGPUB; USPAT	OR	OFF	2014/06/29 16:46
S13	2,346	623/1.12	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:07
S14	401	S13 and fibers	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:07
S15	3	S13 and ((fibers with collagen) same migration)	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:12
S16	30	S13 and ((fibers with collagen))	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:13
S17	74	623/1.13 and ((fibers with collagen))	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:43
S18	2,377	stent and graft and fibers and migration	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:48

S19	317	(623/2.14).CCLS.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	OFF	2014/06/29 18:49
S20	19	S19 and S18	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:49
S21	21	("20120046726" | "7018404" | "7799072" | "8016877" | "20070250146" | "6334868" | "7510574" | "8002826" | "20070276464" | "6752829" | "5102417" | "7947074" | "20070095283" | "20110257731" | "7393360" | "7914569" | "8226710" | "20040210304" | "5397355" | "7780726" | "20050197687" | "20060149351" | "20090198315" | "20100042202" | "7252682" | "20030040771" | "20120089218" | "5716393" | "6254632" | "20090125098" | "6582462" | "7771467" | "8206438" | "20080132999" | "20090099644" | "8425584").PN.	USPAT	OR	OFF	2014/06/29 18:52
S22	1	S21 and fibers	USPAT	OR	OFF	2014/06/29 18:52
S23	3	S21 and fiber	USPAT	OR	OFF	2014/06/29 18:53
S24	3	S21 and fiber	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	OFF	2014/06/29 18:53
S25	1	("7799072").PN.	USPAT; USOCR	OR	OFF	2014/07/14 09:28
S26	3	meretei.in.	USPAT	OR	OFF	2014/07/14 09:28
S27	14	(("7799072") or ("8002826") or ("7947074")).PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2014/07/14 09:28
S28	0	"13706896"	USPAT	OR	OFF	2014/11/30 19:33
S29	1	"13706896"	US-PGPUB; USPAT; USOCR	OR	OFF	2014/11/30 19:33

S30	7	"7799072"	US-PGPUB; USPAT; USOCR	OR	OFF	2014/11/30 19:34
S31	369	(623/2.14).CCLS.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	OFF	2014/11/30 19:47
S32	2,016	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/11/30 19:59
S33	915	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/11/30 19:59
S34	0	a61f2/2418.cpc	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/11/30 20:38
S35	2,002	(623/1.35-1.36).CCLS.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2014/12/01 10:28
S39	2,556	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2016/02/08 10:24
S40	3,379	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2016/02/08 11:47
S41	2	("13706869").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2016/02/08 11:49
S42	2	("13706896").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2016/02/08 11:51
S46	1	("14614628").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/03/20 19:27

S47	1	("7799072").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/05/15 06:58
S48	2	("7799072").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/05/15 08:28
S49	4	("20080132993" | "20140336749").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/05/15 08:29
S50	2	("7799072").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/05/15 08:29
S51	0	("14445833").PN.	USPAT; USOCR	OR	OFF	2017/05/15 08:32
S52	18	("20050177222" | "20070067014" | "20100268318" | "6152956" | "20060276883" | "20070112411" | "20030220683" | "20040106981" | "20100094409").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2017/05/15 08:33
S53	651	623/2.14	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/05/15 08:35
S54	1	("20070067014").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/09/17 00:05
S55	4,867	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/09/17 00:12
S56	3,429	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/09/17 00:12
S57	2,489	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/09/17 00:13
S58	1,308	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/09/17 00:13
S59	1,182	a61f2/2475.cpc.	US-PGPUB; USPAT;	OR	OFF	2017/09/17 00:13

			EPO; JPO; DERWENT			
S60	1	("14614628").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/09/17 16:01
S61	1	("20070067014").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/09/17 16:11
S62	1	("20080132993").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/09/18 08:47
S63	1,461	carpentier.in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2018/01/11 08:54
S64	61	carpentier.in. and aorta	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2018/01/11 09:32
S65	3	"20050102018"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2018/01/11 09:39
S66	6	(US-20070168013-$ | US-20140172064-$ | US-20140316513-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:13
S67	1	("7799072").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/05 09:42
S68	6,135	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58
S69	4,276	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58
S70	3,295	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58

S71	1,674	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58
S72	1,322	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58
S73	9,150	S68 S69 S70 S71 S72	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58
S74	6,389	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
S75	4,396	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
S76	3,436	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
S77	1,760	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
S78	1,352	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
S79	9,503	S74 S75 S76 S77 S78	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
S80	9,503	S74 S75 S76 S77 S78 S79	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
S81	4,461	S80 and (artery arteries)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/04/15 09:06

S82	1,118	S80 and (artery arteries) and (aortic near arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/04/15 09:09
S83	6,421	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S84	4,413	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S85	3,462	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S86	1,773	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S87	1,354	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S88	9,549	S83 S84 S85 S86 S87	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S89	9,549	S83 S84 S85 S86 S87 S88	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S90	1,126	S89 and (artery arteries) and (aortic near arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/04/29 11:05
S91	1	("20090254172").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/05/14 15:40
S92	9	("20060155366" | "20100049313" | "6258117").PN.	US-PGPUB; USPAT; USOCR;	OR	OFF	2019/07/21 10:09

			FPRS; EPO; JPO; DERWENT			
S93	2	("20080262592").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:10
S94	6	("20070168013" | "20140172064" | "20140316513").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:10
S95	6	("20020177890" | "5976179").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:10
S96	3	"20140316513"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:19
S97	2	"20070168013"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:20
S98	4	"20140172065"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:21
S99	6	"20100049313"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:26
S100	2	"20060155366"	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2019/07/21 10:29

			JPO; DERWENT			
S101	6,666	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S102	4,593	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S103	3,601	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S104	1,864	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S105	1,380	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S106	9,898	S101 S102 S103 S104 S105	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S107	9,898	S101 S102 S103 S104 S105 S106	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S108	1,179	S107 and (artery arteries) and (aortic near arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/07/21 10:35
S109	4	"20070067014"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/07/21 11:44
S110	4	"14614628"	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	ON	2019/07/21 12:36

			JPO; DERWENT			
S111	7,098	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S112	4,889	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S113	3,856	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S114	1,965	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S115	1,422	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S116	10,508	S111 S112 S113 S114 S115	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S117	10,508	S111 S112 S113 S114 S115 S116	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S118	1,256	S117 and (artery arteries) and (aortic near arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/12/08 16:15
S120	7,401	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S121	5,076	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S122	4,040	a61f2/2436.cpc.	US-PGPUB; USPAT;	OR	OFF	2020/03/13 11:45

			EPO; JPO; DERWENT			
S123	2,043	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S124	1,443	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S125	10,919	S120 S121 S122 S123 S124	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S126	10,919	S120 S121 S122 S123 S124 S125	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S127	1,305	S126 and (artery arteries) and (aortic near arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/03/13 11:45
S128	7,401	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S129	5,076	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S130	4,040	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S131	2,043	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S132	1,443	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S133	10,919	S128 S129 S130 S131 S132	US-PGPUB; USPAT;	OR	OFF	2020/03/13 14:54

			EPO; JPO; DERWENT			
S134	10,919	S128 S129 S130 S131 S132 S133	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S135	966	S134 and (stent and artery and seal$4 and arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:56
S136	5,500	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S137	24,545	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S138	15,139	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S139	16,719	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S140	3,555	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S141	11,168	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2020/03/13 19:01

			JPO; DERWENT			
S142	1,881	(S136 S137 S138 S139 S140 S141) and (stent and artery and seal$4 and arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:02
S143	1	("9044311").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/03/13 20:21
S144	25	(US-10034784-$ | US-10065824-$ | US-16788806-$ | US-19857887-$ | US-20010044650-$ | US-20020082684-$ | US-20040249399-$ | US-20070219613-$ | US-20090036977-$ | US-20090099650-$ | US-20100087907-$ | US-20130013050-$ | US-3002816-$ | US-3025694-$ | US-3220613-$ | US-3289282-$ | US-3482228-$ | US-3506622-$ | US-3545549-$ | US-3562673-$ | US-3652198-$ | US-3715337-$ | US-3757263-$ | US-5464721-$ | US-5609627-$ | US-5773457-$ | US-5814752-$).DID.	US-PGPUB; USPAT	OR	OFF	2020/03/13 21:45
S145	0	(DE-10065824-$ | DE-19857887-$ | AI-20010044650-$ | AI-20020082684-$ | AI-20040249399-$ | AI-20070219613-$ | AI-20090036977-$ | AI-20090099650-$ | AI-20100087907-$ | AI-20130013050-$ | NO-2013040663-$ | NO-2013059596-$ | NO-2014072501-$ | BI-3482228-$ | VA-223131450-$).DID.	US-PGPUB; USPAT	OR	OFF	2020/03/13 21:46
S146	0	"16788806"	US-PGPUB; USPAT	OR	OFF	2020/03/13 21:47
S147	1	("20080132993").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/04/11 20:50
S148	4	"20070067014"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 10:30
S149	5	"20080132993"	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2020/04/13 11:39

			JPO; DERWENT			
S150	14	"13706896"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 12:11
S151	1	"16788806"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 12:11
S152	15	(US-10478320-$ | US-16788806-$ | US-20050010277-$ | US-20080082159-$ | US-20090264993-$ | US-3226814-$ | US-3402751-$ | US-3408731-$ | US-3574284-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 14:46
S153	13	(US-16788806-$ | US-20040230287-$ | US-20080275548-$ | US-20110257731-$ | US-20120158121-$ | US-3125764-$ | US-3314328-$ | US-3668892-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 14:46
S154	0	(AI-20040230287-$ | AI-20080275548-$ | AI-20110257731-$ | AI-20120158121-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 14:47
S155	3,758	623/1.12	US-PGPUB; USPAT	OR	OFF	2020/06/06 14:43
S156	51	S155 and ((fibers with collagen))	US-PGPUB; USPAT	OR	OFF	2020/06/06 14:43
S157	7,650	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S158	5,220	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S159	4,196	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43

S160	2,120	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S161	1,463	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S162	11,262	S157 S158 S159 S160 S161	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:44
S163	282	S162 and ((fibers with collagen))	US-PGPUB; USPAT	OR	OFF	2020/06/06 14:44
S164	1	"20040256759"	US-PGPUB; USPAT	OR	OFF	2020/06/06 15:28
S165	119	(US-10028848-$ | US-10034784-$ | US-10065824-$ | US-10321985-$ | US-16808137-$ | US-18153473-$ | US-19857887-$ | US-2858390-$ | US-20010044650-$ | US-20020082684-$ | US-20020177890-$ | US-20030040771-$ | US-20040210304-$ | US-20040249399-$ | US-20050043790-$ | US-20050197687-$ | US-20060149351-$ | US-20060155366-$ | US-20070067014-$ | US-20070095283-$ | US-20070168013-$ | US-20070203559-$ | US-20070219613-$ | US-20070250146-$ | US-20070276464-$ | US-20080132993-$ | US-20080132999-$ | US-20080262592-$ | US-20080275548-$ | US-20090036977-$ | US-20090099644-$ | US-20090099650-$ | US-20090125098-$ | US-20090171456-$ | US-20090198315-$ | US-20090312834-$ | US-20100042202-$ | US-20100049313-$ | US-20100087907-$ | US-20100094409-$ | US-20110257731-$ | US-20120046726-$ | US-20120089218-$ | US-20130013050-$ | US-20130144373-$ | US-20140046428-$ | US-20140172064-$ | US-20140316513-$ | US-20140336749-$ | US-20160022450-$ | US-20160270935-$ | US-20170209254-$ | US-2787925-$ | US-3002816-$ | US-3002826-$ | US-3005270-$ | US-3016877-$ | US-3021408-$ | US-3025694-$ | US-3034007-$ | US-3095343-$ | US-3102417-$ | US-	US-PGPUB; USPAT	OR	OFF	2020/06/06 16:05

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S166	15	(DE-10065824-$ | DN-102014805-$ | DE-19857887-$ | AI-20010044650-$ | AI-20020082684-$ | AI-20020177890-$ | AI-20030040771-$ | AI-20040210304-$ | AI-20040249399-$ | NO-2004089249-$ | AI-20050043790-$ | AI-20050197687-$ | NO-2005087117-$ | AI-20060149351-$ | AI-20060155366-$ | NO-2006127412-$ | AI-20070067014-$ | AI-20070095283-$ | AI-20070168013-$ | AI-20070203559-$ | AI-20070219613-$ | AI-20070250146-$ | AI-20070276464-$ | AI-20080132993-$ | AI-20080132999-$ | AI-20080262592-$ | AI-20080275548-$ | AI-20090036977-$ | AI-20090099644-$ | AI-20090099650-$ | AI-20090125098-$ | AI-20090171456-$ | AI-20090198315-$ | AI-20090312834-$ | AI-20100042202-$ | AI-20100049313-$ | NO-2010006627-$ | AI-20100087907-$ | AI-20100094409-$ |	US-PGPUB; USPAT; USOCR; FPRS; EPO; DERWENT	OR	OFF	2020/06/06 16:05

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S167	34	(US-16808137-$ | US-20020052649-$ | US-20040243221-$ | US-20040256759-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20090105805-$ | US-20100204781-$ | US-20120123529-$ | US-20120296418-$ | US-20130090729-$ | US-3370418-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; DERWENT	OR	OFF	2020/06/06 16:07
S168	1	(AI-20020052649-$ | AI-20040243221-$ | AI-20040256759-$ | JP-2005124959-$ | NO-2006005015-$ | AI-20070179591-$ | AI-20070213815-$ | AI-20070219620-$ | AI-20080021547-$ | AI-20090105805-$ | AI-20100204781-$ | AI-20120123529-$ | AI-20120296418-$ | AI-20130090729-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; DERWENT	OR	OFF	2020/06/06 16:07
S169	6	((frame with (inner and outer) same seal$4) same graft) and (heart with valve)	US-PGPUB; USPAT	OR	OFF	2020/06/06 16:53
S170	7	((frame same (inner and outer) same seal$4) same graft) and (heart with valve)	US-PGPUB; USPAT	OR	OFF	2020/06/06 17:50
S171	1	("9370419").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/06 19:30
S172	627	("20010039450" | "20020013571" | "20020026216" | "20020082630" | "20020107565" | "20020123802" | "20020151970" | "20020183835" | "20020183838" | "20020188348" | "20020198594" | "20030023303" |	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/06 19:31

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S174	3,550	a61f2/2409.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 21:44
S175	3,550	a61f2/2409.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/07 10:04
S176	1,905	S175 and (seal$4)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/07 10:04
S180	1	("20130144373").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 09:48
S181	3,557	a61f2/2409.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:52
S182	7,673	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S183	5,229	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S184	4,210	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S185	2,127	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59

S186	1,467	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S187	11,297	S182 S183 S184 S185 S186	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S188	2,885	S181 and S187	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S189	1	("7799072").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 10:48
S190	4	"16736879"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 13:27
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S194	6	(US-12854807-$ | US-16735541-$ | US-16736879-$ | US-16743828-$ | US-18153473-$ | US-2858390-$ | US-2787925-$ | US-D187180-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2020/06/17 14:37

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S195	10	(CN-102014805-$ | NO-2005087117-$ | NO-2006127412-$ | NO-2010006627-$ | NO-2010031060-$ | NO-2010105195-$ | NO-2011035154-$ | JP-2011502628-$ | JP-2011507658-$ | EP-2787925-$ | JS-2012068165-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 14:37
S196	50	(US-10034784-$ | US-10065824-$ | US-16736879-$ | US-19857887-$ | US-20010044650-$ | US-20020082684-$ | US-20040249399-$ | US-20070219613-$ | US-20090036977-$ | US-20090099650-$ | US-20100087907-$ | US-20130013050-$ | US-3002816-$ | US-3025694-$ | US-3220613-$ | US-3289282-$ | US-3482228-$ | US-3506622-$ | US-3545549-$ | US-3562673-$ | US-3652198-$ | US-3715337-$ | US-3757263-$ | US-5464721-$ | US-5609627-$ | US-5773457-$ | US-5814752-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 14:41
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S200	75	(mclean.in.) and stent	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 16:22
S201	108	(vidlund.in.) and stent	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 16:23
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S207	7,776	a61f2/2418.cpc.	US-PGPUB; USPAT;	OR	OFF	2020/07/20 11:59

			EPO; JPO; DERWENT			
S208	5,285	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/07/20 11:59
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S211	1,470	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/07/20 11:59
S212	11,433	S207 S208 S209 S210 S211	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/07/20 11:59
S215	56	2006/124649	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 09:23
S216	0	wo2006/124649	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 09:23
S217	0	(2006/124649).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 09:23
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S220	1	"16808137"	US-PGPUB; USPAT; USOCR;	OR	OFF	2020/07/29 09:55

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S221	4	"20090125098"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 11:29
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S223	1,779	(cuff with (fiber barb))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 11:58
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S225	1	(spense.in.) and valve	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 12:22
S226	573	(spence.in.) and valve	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 12:22
S227	10	(US-20070288087-$ | US-20100217382-$ | US-20100249916-$ | US-20120123529-$ | US-20200197199-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/04 10:17
S228	16	(US-3370418-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-7175652-$ | US-7470284-$ | US-7740656-$ | US-7972370-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/04 10:19
S229	34	(US-16910189-$ | US-20020052649-$ | US-20040243221-$ | US-20040256759-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ |	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2020/08/04 10:19

		US-20080021547-$ | US-20090105805-$ | US-20100204781-$ | US-20120123529-$ | US-20120296418-$ | US-20130090729-$ | US-3370418-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	JPO; DERWENT			
S230	5	(AI-20020052649-$ | AI-20040243221-$ | AI-20040256759-$ | JP-2005124959-$ | WO-2006005015-$ | AI-20070179591-$ | AI-20070213815-$ | AI-20070219620-$ | AI-20080021547-$ | AI-20090105805-$ | AI-20100204781-$ | AI-20120123529-$ | AI-20120296418-$ | AI-20130090729-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/04 10:20
S231	7,889	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S232	5,349	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S233	4,324	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S234	2,182	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S235	1,479	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S236	11,602	S231 S232 S233 S234 S235	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S237	22	S236 and ((fibers with collagen) same migration)	US-PGPUB; USPAT	OR	OFF	2020/08/28 15:54
S238	1,634	S236 and ((fibers))	US-PGPUB; USPAT	OR	OFF	2020/08/28 15:55
S239	1,688	S236 and ((fibers))	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2020/08/28 15:55

			JPO; DERWENT			
S240	332	S236 and ((fibers)) and (frame and graft)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:55
S245	4	(US-10716662-$ | US-16910189-$ | US-20090143855-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/09/27 23:02
S246	3	(wO-2001049213-$ | wO-2004032987-$ | AI-20090143855-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/09/27 23:04
S247	361	"4164046"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/09/27 23:09
S248	1	("4164046").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/09/27 23:09
S249	1	("20070142907").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/09/27 23:11
S256	85	(shahriari near ali).in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 14:07
S257	51	"2006124649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 15:17
S258	0	("2006124649").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 15:17

S259	25	"12882605"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:02
S260	0	"12882605.app"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:03
S261	0	"12882605".app.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:03
S262	0	("12882605").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 16:03
S263	0	("2006018514").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 16:03
S264	1	("20060018514").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 16:03
S265	7	"20060018514"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:04
S266	30	"2006018514"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:04
S267	16	(US-10716662-$ | US-17024060-$ | US-20070288087-$ | US-20090143855-$ | US-20100217382-$ | US-20100249916-$ | US-20120123529-$ | US-20200197199-$ | US-3992608-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 19:25
S268	0	("(NO-2001049213-$\|NO-2004032987-$|AI-20070288087-$\|AI-20090143855-$|AI-20100217382-$\|AI-20100249916-$|NO-2011069048-$|AI-20120123529-	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 19:25

		$\|AI-20200197199-$|VA-223131450-$).DID.").PN.				
S269	0	(WO-2001049213-$ | NO-2004032987-$ | AI-20070288087-$ | AI-20090143855-$ | AI-20100217382-$ | AI-20100249916-$ | NO-2011069048-$ | AI-20120123529-$ | AI-20200197199-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 19:26
S272	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:22
S273	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:23
S274	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:24
S275	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:25
S276	5,725	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:26
S277	26,012	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:26
S278	17,240	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR;	OR	OFF	2021/01/16 10:26

			FPRS; EPO; JPO; DERWENT			
S279	17,642	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:26
S280	3,934	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S281	5,886	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S282	7,416	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S283	11,668	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S284	18,724	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S285	5,565	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S286	4,782	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/01/16 10:27

			JPO; DERWENT			
S287	535	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S288	12,232	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S289	1,710	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S290	11,758	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S291	15,314	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S292	32,596	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S293	9,253	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S294	17,878	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/01/16 10:28

			JPO; DERWENT			
S295	3,437	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S296	3,130	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S297	14,644	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S298	1,594	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S299	3,931	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S300	2,511	(S272 S273 S274 S275 S276 S277 S278 S279 S280 S281 S282 S283 S284 S285 S286 S287 S288 S289 S290 S291 S292 S293 S294 S295 S296 S297 S298 S299) and (heart adj3 valve) and (fiber$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:31
S301	1,676	S300 and (seal$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:33
S302	48	((("SHAHRIARI") near3 ("Ali"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2021/01/16 11:48

S303	13	((("AORTIC") near3 ("INNOVATIONS") near3 ("LLC"))).AS,AANM.	USPAT	OR	OFF	2021/01/16 11:49
S304	13	(US-10258464-$ | US-20110218619-$ | US-20110319991-$ | US-3339377-$ | US-3408214-$ | US-3532868-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/26 17:20
S305	2	(US-20120123529-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/26 17:21
S306	4	"16910189"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/26 18:34
S307	2	"17060557"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/26 18:35
S309	8	(US-10792172-$ | US-20020052649-$ | US-3333075-$ | US-3370418-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:46
S310	3	(("9333075") or ("7921678") or ("9370418")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/11 17:48
S311	15	(US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:48
S312	0	("(us-20130304196-$).DID.").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/11 17:49
S313	2	(us-20130304196-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/02/11 17:49

			JPO; DERWENT			
S315	1	("20120123529").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/11 17:50
S317	0	(AI-20020052649-$ | AI-20060276813-$ | AI-20080077236-$ | AI-20080188929-$ | AI-20080319521-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:51
S318	10	(US-20020052649-$ | US-20060276813-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:52
S319	2	(US-20110009948-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:54
S320	5	"20060005015"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:55
S321	96	"2006005015"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:55
S322	5	"15876053"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:11
S323	2	("2018/0206982").URPN.	USPAT	OR	OFF	2021/02/13 09:12
S324	0	"20010049555"	USPAT	OR	OFF	2021/02/13 09:14
S325	4	"20010049555"	US-PGPUB; USPAT; USOCR;	OR	OFF	2021/02/13 09:14

			FPRS; EPO; JPO; DERWENT			
S326	3	"20070233228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:16
S327	3	"20120296418"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:16
S328	822	("20010021872" | "20020026094" | "20020032481" | "20020138135" | "20020173842" | "20030050694" | "20030100939" | "20030158597" | "20030212454" | "20040039436" | "20040186563" | "20040186565" | "20050075728" | "20050096736" | "20050188525" | "20050203614" | "20050203617" | "20050234546" | "20060004469" | "20060025857" | "20060058872" | "20060149350" | "20060183383" | "20060229719" | "20060259137" | "20070005131" | "20070010876" | "20070010877" | "20070112422" | "20070162102" | "20070203503" | "20070203575" | "20070203576" | "20070213813" | "20070260305" | "20070265700" | "20080114442" | "20080125853" | "20080154355" | "20080183271" | "20090125118" | "20090157175" | "20090276040" | "20090281619" | "20090299452" | "20090319037" | "20100049313" | "20100168844" | "20100198347" | "20100204781" | "20110015729" | "20110319991" | "20120259409" | "20130023985" | "20130190857" | "20130274873" | "20130310926" | "20130317598" | "20130331929" | "20140194981" | "20140200661" | "20140209238" | "20140277417" | "20140277419" | "20140277424" | "20140330372" | "20140343671" | "20150073545" | "20150073546" | "3409013" | "3548417" | "3587115" | "3657744" |	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:25

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"5749890" | "5756476" | "5769812" |
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S329	4	("20130190862" | "20160317305").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:26
S330	4	("20070233228" | "20120296418").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:27
S331	835	("20020173842" | "20030100939" | "20040186563" | "20050203617" | "20070162102" | "20080183271" | "20100204781" | "20130274873" | "20140200661" | "20150073546" | "4222126" | "4733665" | "4759758" | "4777951" | "5026366" | "5032128" | "5332402" | "5411055" | "5558644" | "5571175" | "5609626" | "6231602" | "6425916" | "6440764" | "6689123" | "6893460" | "6936067" | "7655034" | "7993394" | "8652203" | "20030212454" | "20050075728" | "20070112422" | "20100168844" | "20100198347" | "4829990" | "5397351" | "5545214" | "5549665" | "5584803" | "5855602" | "6027525" | "6132473" | "6168614" | "6221091" | "6302906" | "6350277" | "6454799" | "6605112" | "6908481" | "7510575" | "7563280" | "20070233228" | "20020138135" | "20050203614" | "20050234546" | "20060149350" | "20070260305" | "3714671" | "4297749" | "4441216" | "4692164" | "4762128" | "4883458" | "4994077" | "5007896" | "5163953" | "5360444" | "5411552" | "5591185" | "5639274" | "5665115" | "5716417" | "5749890" | "5756476" | "5855601" | "6171335" | "6245102" | "6299637" | "6488704" | "6569196" | "6769161" | "7393360" | "7585321" | "7959672" | "8167932" | "8747463" | "9078781" | "20130190862" | "20010049555" | "20040186565" | "20060058872" | "20060229719" | "20070213813" |	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:27

		"20090299452" | "20120259409" | "20130023985" | "20130310926" | "20130317598" | "20130331929" | "20140209238" | "20140277417" | "20140343671" | "4265694" | "4339831" | "4373216" | "4470157" | "4592340" | "4643732" | "4796629" | "4820299" | "4856516" | "4966604" | "5047041" | "5089015" | "5266073" | "5295958" | "5591195" | "5607464" | "5957949" | "6716244" | "6767362" | "7018406" | "7096554" | "7276084" | "7374571" | "8029556" | "20020026094" | "20050096736" | "20060259137" | "20070005131" | "20090125118" | "20090157175" | "20090319037" | "20110319991" | "20140194981" | "20140277424" | "3587115" | "3657744" | "3671979" | "4343048" | "4612011" | "4787899" | "4787901" | "4878495" | "4878906" | "4979939" | "4986830" | "5059177" | "5085635" | "5152771" | "5370685" | "5500014" | "5554185" | "5728068" | "6210408" | "6352547" | "6527979" | "6783542" | "7618446" | "20030050694" | "20030158597" | "20050188525" | "20060004469" | "20070203503" | "20080114442" | "20080154355" | "20100049313" | "20110015729" | "20140277419" | "20150073545" | "3409013" | "3548417" | "4035849" | "4056854" | "4106129" | "4406022" | "4535483" | "4922905" | "5037434" | "5080668" | "5282847" | "5769812" | "5840081" | "5855597" | "6174327" | "6458153" | "6468660" | "6652578" | "6830584" | "6878162" | "7018408" | "7225518" | "7785366" | "8454685" | "20120296418" | "20010021872" | "20040039436" | "20070010877" | "20070265700" | "20080125853" | "20090281619" | "20130190857" | "20140330372" | "4345340" | "4605407" | "5545209" | "5628792" | "6217585" | "6461382" | "6730118" | "7318278" | "7462191" | "7618447" | "8449606" | "20170014229" | "20020032481" | "20060025857" | "20060183383" | "20070010876" | "20070203575" | "20070203576" | "20090276040" | "3755823" |				

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S332	11	WO2006124649	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 10:13
S333	53	"2006124649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 10:14
S334	0	"17131869"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 11:12
S335	2	"17060557"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 11:12
S336	13	S328 and (outer$4 with (graft))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 11:49
S337	27	S328 and ((outer$4 exter$4 outsid$$)with (graft))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:00
S338	36,075	l11and ((outer$4 exter$4 outsid$$)with (graft))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:14

S339	27	S331 and ((outer$4 exter$4 outsid$$)with (graft))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:14
S340	13	(US-10258464-$ | US-20110218619-$ | US-20110319991-$ | US-3339377-$ | US-3408214-$ | US-3532868-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:56
S341	12	(US-20020052649-$ | US-20060276813-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-3333075-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:57
S342	4	"20110098802"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 15:10
S343	1	("9333075").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/17 05:33
S344	10	(US-20020052649-$ | US-20060276813-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/17 05:40
S345	70	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17007373-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 12:07

		3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.				
S346	10	"16808137"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 14:38
S347	34	"10555823"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 14:50
S348	2	"16983196"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 15:15
S349	1	("10881538").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/03/21 15:20
S350	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S351	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S352	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S353	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ |	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03

		US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.				
S354	5,771	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S355	26,423	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S356	17,810	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S357	17,863	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S358	4,039	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S359	6,081	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S360	7,540	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S361	11,779	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/21 18:03

			JPO; DERWENT			
S362	18,985	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S363	5,683	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S364	4,850	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S365	554	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S366	12,658	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S367	1,774	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S368	12,050	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S369	15,676	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/21 18:03

			JPO; DERWENT			
S370	32,778	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S371	9,317	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S372	18,227	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S373	3,573	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S374	3,174	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S375	14,799	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S376	1,655	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S377	4,153	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/21 18:03

			JPO; DERWENT			
S378	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S379	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S380	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S381	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S382	5,771	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S383	26,423	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S384	17,810	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S385	17,863	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR;	OR	OFF	2021/03/21 21:13

			FPRS; EPO; JPO; DERWENT			
S386	4,039	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S387	6,081	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S388	7,540	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S389	11,779	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S390	18,985	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S391	5,683	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S392	4,850	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S393	554	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/21 21:13

			JPO; DERWENT			
S394	12,658	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S395	1,774	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S396	12,050	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S397	15,676	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S398	32,778	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S399	9,317	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S400	18,227	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S401	3,573	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/21 21:13

			JPO; DERWENT			
S402	3,174	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S403	14,799	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S404	1,655	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S405	4,153	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S406	2,578	(S378 S379 S380 S381 S382 S383 S384 S385 S386 S387 S388 S389 S390 S391 S392 S393 S394 S395 S396 S397 S398 S399 S400 S401 S402 S403 S404 S405) and (heart adj3 valve) and (fiber$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S407	15	((frame same (inner and outer) same seal$4) same graft) and (heart with valve)	US-PGPUB; USPAT	OR	OFF	2021/03/25 16:13
S408	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S409	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S410	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ |	US-PGPUB; USPAT;	OR	OFF	2021/03/25 16:13

		US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	USOCR; FPRS; EPO; JPO; DERWENT			
S411	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S412	5,773	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S413	26,431	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S414	17,826	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S415	17,867	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S416	4,044	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S417	6,084	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13

S418	7,541	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S419	11,784	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S420	18,994	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S421	5,686	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S422	4,852	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S423	554	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S424	12,667	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S425	1,775	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13

S426	12,059	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S427	15,690	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S428	32,783	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S429	9,318	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S430	18,235	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S431	3,576	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S432	3,174	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S433	14,804	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13

S434	1,655	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S435	4,158	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S436	2,585	(S408 S409 S410 S411 S412 S413 S414 S415 S416 S417 S418 S419 S420 S421 S422 S423 S424 S425 S426 S427 S428 S429 S430 S431 S432 S433 S434 S435) and (heart adj3 valve) and (fiber$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S438	0	("13706896").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/03/27 09:37
S439	34	"13706896"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 09:37
S440	1	("7799072").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/03/27 09:58
S441	70	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17170957-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:38

S442	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S443	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S444	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S445	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S446	5,776	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S447	26,437	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S448	17,841	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S449	17,872	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39

S450	4,046	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S451	6,089	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S452	7,542	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S453	11,785	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S454	18,999	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S455	5,689	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S456	4,854	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S457	555	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39

S458	12,674	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S459	1,777	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S460	12,063	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S461	15,695	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S462	32,786	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S463	9,323	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S464	18,239	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S465	3,579	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39

S466	3,175	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S467	14,810	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S468	1,657	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S469	4,160	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S470	2,587	(S442 S443 S444 S445 S446 S447 S448 S449 S450 S451 S452 S453 S454 S455 S456 S457 S458 S459 S460 S461 S462 S463 S464 S465 S466 S467 S468 S469) and (heart adj3 valve) and (fiber$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S471	0	("16910189").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/04/08 16:49
S472	6	"16910189"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 16:49
S473	11	"16808137"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 17:22
S474	1	("10881538").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/04/08 18:29

S475	2	"16941117"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 18:36
S476	72	(US-10016271-$ | US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17006793-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 23:48
S477	0	(AI-20020052649-$ | AI-20030153974-$ | AI-20040243221-$ | AI-20040256759-$ | NO-2006005015-$ | AI-20060276813-$ | NO-2006124649-$ | AI-20070179591-$ | AI-20070213815-$ | AI-20070219620-$ | AI-20080021547-$ | AI-20080077236-$ | AI-20080188929-$ | AI-20080319521-$ | AI-20090105805-$ | AI-20100204781-$ | AI-20110009948-$ | AI-20110098802-$ | AI-20110218619-$ | AI-20110319991-$ | AI-20120123529-$ | AI-20120296418-$ | AI-20130304196-$ | NO-3829057-$ | IF-617622-$ | SO-0225223-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 23:48
S478	54	"2006124649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/09 09:42
S479	3	"20060259136"	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/04/09 14:18

			JPO; DERWENT			
S480	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/04/09 16:30
S481	28	S480 and (mitral)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/09 16:37
S482	6	"20020052649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/10 11:44
S483	2	"17170957"	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/04/10 15:48

			JPO; DERWENT			
S484	2	"17170957"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/24 09:59
S485	5	"17060557"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/24 09:59
S486	6	"20020052649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/24 10:57
S487	55	"2006124649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 10:15
S488	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/04/27 10:19

		10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.				
S489	39	S488 and (seal with3 (inflow and outflow))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 10:19
S490	41	S488 and (seal$4 with3 (inflow and outflow))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 10:23
S491	21	("2014/0316513").URPN.	USPAT	OR	OFF	2021/04/27 10:28
S492	0	"17006793"	USPAT	OR	OFF	2021/04/27 10:32
S493	1	"16792197"	USPAT	OR	OFF	2021/04/27 10:32
S494	4	"20110098802"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 11:19
S496	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/04/27 19:42

		20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.				
S497	41	S496 and (seal$4 with3 (inflow and outflow))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 19:42
S498	4	"20110098802"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/05/24 12:23
S499	15	((("AORTIC") near3 ("INNOVATIONS") near3 ("LLC"))).AS,AANM.	USPAT	OR	OFF	2021/05/25 08:57
S500	54	((("SHAHRIARI") near3 ("Ali"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2021/05/25 08:57
S503	22	(US-17170957-$ | US-20050240137-$ | US-20060013863-$ | US-20140277424-$ | US-20150148889-$ | US-20150335424-$ | US-20150335429-$ | US-20160022444-$ | US-20190192286-$ | US-20200352707-$ | US-3039757-$ | US-3421098-$ | US-3834552-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/05/30 17:02
S504	74	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17213251-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ |	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/02 13:20

		US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-20150335429-$ | US-20160022444-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.				
S505	3	"17007373"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/02 16:13
S506	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/06/03 13:29

S507	15	S506 and (collagen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:29
S508	22	(US-17170957-$ | US-20050240137-$ | US-20060013863-$ | US-20140277424-$ | US-20150148889-$ | US-20150335424-$ | US-20150335429-$ | US-20160022444-$ | US-20190192286-$ | US-20200352707-$ | US-3039757-$ | US-3421098-$ | US-3834552-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:55
S509	74	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17213251-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-20150335429-$ | US-20160022444-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:55
S510	92	S508 S509	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:55
S511	10	S510 and (collagen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:55
S512	232	(collagen same fibers same graft) and (heart and valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/06/03 14:01

			JPO; DERWENT			
S513	1	("7921678").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/06/03 14:08
S514	35	(US-17170957-$ | US-20030153974-$ | US-20060025857-$ | US-20060074484-$ | US-20070282436-$ | US-20100036484-$ | US-20110040367-$ | US-20110098802-$ | US-20110125244-$ | US-20110166636-$ | US-20120022633-$ | US-20120071969-$ | US-20120310328-$ | US-20130018458-$ | US-20130073030-$ | US-20140018915-$ | US-20140155997-$ | US-20170128209-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/18 10:36
S518	6	(("20130018458") or ("20110125244") or ("20110166636") or ("20110098802") or ("20060074484") or ("20120310328")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/01 09:32
S520	102	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17327673-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060025857-$ | US-20060074484-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20070282436-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100036484-$ | US-20100204781-$ | US-20110009948-$ | US-20110040367-$ | US-20110098802-$ | US-20110125244-$ | US-20110166636-$ | US-20110218619-$ | US-20110319991-$ | US-20120022633-$ | US-20120071969-$ | US-20120123529-$ | US-20120296418-$ | US-20120310328-$ | US-20130018458-$ | US-20130073030-$ | US-20130304196-$ | US-20140018915-$ | US-20140155997-$ | US-20150335429-$ | US-20160022444-$ | US-20170128209-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/21 16:59

S521	0	(AI-20020052649-$ | AI-20030153974-$ | AI-20040243221-$ | AI-20040256759-$ | AI-20060025857-$ | NO-2006005015-$ | AI-20060074484-$ | AI-20060276813-$ | NO-2006124649-$ | AI-20070179591-$ | AI-20070213815-$ | AI-20070219620-$ | AI-20070282436-$ | AI-20080021547-$ | AI-20080077236-$ | AI-20080188929-$ | AI-20080319521-$ | AI-20090105805-$ | AI-20100036484-$ | AI-20100204781-$ | AI-20110009948-$ | AI-20110040367-$ | AI-20110098802-$ | AI-20110125244-$ | AI-20110166636-$ | AI-20110218619-$ | AI-20110319991-$ | AI-20120022633-$ | AI-20120071969-$ | AI-20120123529-$ | AI-20120296418-$ | AI-20120310328-$ | NO-2012068175-$ | AI-20130018458-$ | AI-20130073030-$ | AI-20130304196-$ | AI-20140018915-$ | AI-20140155997-$ | AI-20150335429-$ | AI-20160022444-$ | AI-20170128209-$ | NO-3829057-$ | SO-0225223-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/21 17:17
S522	0	"17327673"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/22 11:09
S523	4	"17096253"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/22 11:10
S526	17	((("AORTIC") near3 ("INNOVATIONS") near3 ("LLC"))).AS,AANM.	USPAT	OR	OFF	2021/07/22 15:41
S527	58	((("SHAHRIARI") near3 ("Ali"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2021/07/22 15:41
S528	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/07/25 16:50

		20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.				
S529	15	S528 and collagen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/25 16:50
S530	4	"20110098802"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/25 17:00
S531	23	"2005023584"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/25 17:16
S532	12	"20050023584"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/25 17:17

S533	0	("2005023584").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/25 17:18
S534	1	("20050023584").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/25 17:18
S535	1	("20060004442").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/25 17:19
S536	398	("2006/0004442").URPN.	USPAT	OR	OFF	2021/07/25 17:20
S537	1	("20130018458").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/25 17:28
S539	41	"13706896"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/30 11:20
S542	22	"10299917"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/08/23 10:08
S545	234	(collagen same fibers same graft) and (heart and valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/08/25 14:20
S546	3	"20060276813"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/08/26 12:46
S547	25	"2011143263"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/08/26 12:47
S548	0	WO2005115275	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/10/19 09:38

			JPO; DERWENT			
S549	19	"2005115275"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 09:38
S550	3	"20050273155"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 09:39
S551	17	"2005112821"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 09:39
S552	9	("20030153974" | "20060276813" | "3365728" | "5411552" | "6893460" | "7393360" | "7510575" | "9393110" | "9829057").PN.	US-PGPUB; USPAT	OR	OFF	2021/10/19 09:56
S553	17	("20030153974" | "20060276813" | "3365728" | "5411552" | "6893460" | "7393360" | "7510575" | "9393110" | "9829057" | "10716662" | "20070288087" | "20090143855" | "20100217382" | "20100249916" | "20120123529" | "20200197199" | "8992608").PN.	US-PGPUB; USPAT	OR	OFF	2021/10/19 09:56
S554	8	("20030153974" | "3365728" | "5411552" | "6893460" | "7393360" | "7510575" | "9393110" | "9829057").PN.	US-PGPUB; USPAT	OR	OFF	2021/10/19 10:09
S555	385	"03047468"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 10:52
S556	17	WO03047468	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 10:53

S557	1	("8992608").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/19 11:07
S558	1	("10792172").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/19 11:16
S559	1	("7510575").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/19 12:31
S560	108	"2006005015"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 12:32
S561	1	("8992608").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 09:25
S562	6	(("8645300") or ("7827487") or ("6615226") or ("6912505") or ("7865455") or ("6266649")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 10:07
S563	1	("20080235204").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 10:09
S564	1	("8032506").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 10:10
S565	76	(fibers adj (stent frame) same (attach$4 secur$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 11:14
S566	262	(fiber$4 adj (stent frame) same (attach$4 secur$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 11:16
S567	24	"2005023584"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 13:42
S568	12	"20050023584"	US-PGPUB; USPAT; USOCR;	OR	OFF	2021/10/20 13:42

			FPRS; EPO; JPO; DERWENT			
S569	12	"10883575"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 13:44
S570	0	"35116043"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 13:46
S571	0	("35116043").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 13:46
S572	1	("20060004442").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 13:54
S573	17	"1641117"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 16:23
S574	2	"16941117"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 16:23
S575	1	("9393110").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 17:10
S576	2	(("7510575") or ("7510573")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 17:18
S577	58	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/10/23 14:38

		or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$ or US-20110208297-$ or US-20050273155-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$ or WO-2006005015-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$ or WO-2005112821-$ or WO-2005115275-$).did.				
S578	17	S577 and (collagen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 14:39
S579	0	(("16808137") or ("16910189") or ("17096253")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/23 16:50
S580	17	"16808137" "16910189" "17096253"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 16:50
S581	58	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/10/23 18:28

		or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$ or US-20110208297-$ or US-20050273155-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$ or WO-2006005015-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$ or WO-2005112821-$ or WO-2005115275-$).did.				
S582	1	(non adj2 porous) and S581	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 18:28
S583	97	(non adj2 porous) same graft and (heart with valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 18:29
S584	47	(non adj2 porous) same PET and (heart with valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 18:30
S585	29	(non adj2 porous) same (polyethylene adj2 terephthalate) and (heart with valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 18:31

S587	691,079	(graft wtih non adj2 porous)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 19:06
S588	1	("5152782").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/23 20:03
S589	699	(non$1porous with graft)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 20:04
S590	87	(non$1porous with graft) same (seal$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 20:06
S591	14,252	(collagen with (fiber$3 fibril$4)) and graft	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 20:28
S592	1,597	(collagen with (fiber$3 fibril$4)) same graft	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 20:28
S593	1	("5171273").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/23 20:51
S594	178	(collagen with (fiber$3 fibril$4)) same graft and (heart with valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 20:53
S595	17	(collagen with (fiber$3 fibril$4)) same graft and (heart with valve) same seal$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 20:57

S596	12	(collagen adj2 (fiber$3)) same graft and (heart with valve) same seal$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 21:38
S597	1	(porous with nonporous) same graft same (heart adj2 valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 21:48
S598	3	(porous with nonporous) same (graft covering material) same (heart adj2 valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 21:49
S599	0	((polyethylene adj2 terephthalate) with nonporous) same (graft covering material) same (heart adj2 valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 21:50
S600	98	((polyethylene adj2 terephthalate) with nonporous) same (graft covering material)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 21:51
S601	337	((polyethylene adj2 terephthalate) with (nonporous non adj2 porous)) same (graft covering material)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 21:53
S602	75,836	((nonporous non adj2 porous)) same (graft covering material) same (porous)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 22:12
S603	45	((nonporous non adj2 porous)) same (graft covering material) same (porous) same (heart with valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 22:12

S604	12	"16910189"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/23 22:30

1/10/2022 10:05:15 AM
C:\Users\tshipmon\Documents\EAST\Workspaces\16941117.wsp

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Application No: 16/941,117

Foreign Priority claimed: ○ Yes ◉ No

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

Verified and Acknowledged: /TIFFANY P SHIPMON/ (Examiner's Signature) | (Initials)

Title: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
07/28/2020	623	3774	426/2/12 UTIL
RULE			

APPLICANTS

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INVENTORS

Ali Shahriari, Boca Raton, FL, UNITED STATES

CONTINUING DATA

This application is a CON of 16935261 07/22/2020

16935261 is a CON of 16808137 03/03/2020 PAT 10792172

16808137 is a CON of 16736879 01/08/2020 PAT 10842655

16736879 is a CON of 16042286 07/23/2018 PAT 10555823

16042286 is a CON of 14614628 02/05/2015 PAT 10028848

14614628 is a CON of 14569306 12/12/2014 PAT 9339399

14569306 is a DIV of 13706896 12/06/2012 PAT 8940040

13706896 has PRO of 61723446 11/07/2012

13706896 has PRO of 61567458 12/06/2011

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

08/04/2020

**** SMALL ENTITY ****

STATE OR COUNTRY

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FILING FEE RECEIVED

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/941,117	Filing Date 07/28/2020	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ 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	12/14/2021	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 15	Minus	** 20	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $240 =	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".	/DAWN BREWER/
*** 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.**

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

COMMUNICATION TO THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	16/941,117	Confirmation No.:	1876
Applicant	:	Aortic Innovations, LLC		
First Named Inventor	:	Ali Shahriari		
Filing Date	:	July 28, 2020		
TC/A.U.	:	3774		
Examiner	:	Shipmon, Tiffany		
Docket No.	:	426/2/12 UTIL		
Customer No.	:	175373		

Title of Invention: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

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

RESPONSE TO OFFICE ACTION DATED DECEMBER 13, 2021

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 6 of this paper.

Amendments to the Claims:

The claims are amended as follows and will replace all previous versions and listings of claims:

Listing of Claims:

Claims 1-30 (Canceled)

31. (Previously Presented) A transcatheter heart valve assembly comprising:

a graft covering housing a prosthetic heart valve, wherein the graft covering extends around the prosthetic heart valve for providing sealing to the heart valve;

an outer frame formed from a metallic material and defining an open cell configuration, and being secured to the graft covering by a plurality of stitches; and

a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks,

wherein the sealing material is attached to the outer frame,

wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame;

wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer,

wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,

wherein the heart valve assembly has a radially compressed and a radially expanded orientation,

wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient,

wherein the outer frame extends distally further than the prosthetic heart valve.

Claims 32-33 (Canceled)

34. (Currently Amended) A transcatheter heart valve assembly comprising:

a graft covering housing a prosthetic heart valve, wherein the graft covering extends radially outwardly around the prosthetic heart valve and radially inwardly of [[the]] an outer frame for providing sealing to the heart valve;

wherein the [[an]] outer frame is formed from a metallic material and ~~defining~~ defines an open cell configuration, and being secured to the graft covering by a plurality of stitches; and

a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks,

wherein the sealing material is attached to the outer frame,

wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame,

wherein the graft covering extends beyond [[the]] a proximal end of the outer frame and over the proximal end thereof to cover the proximal end of the outer frame,

wherein the sealing material includes a plurality of radially extending fibers that form a circumferential surface that extends outwardly of the outer frame;

wherein the fibers cover at least two circumferentially extending rows of grids formed in the open cell configuration and the at least two circumferentially extending rows radially overlap with the prosthetic heart valve ~~leaflets~~,

wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer,

wherein the valve assembly is balloon expandable during endovascular deployment,

wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,

wherein expansion of the valve assembly is configured to press the sealing material against native valve leaflets of an aorta of the patient,

wherein the sealing material is held against the outer frame as the valve expands from the radially compressed orientation to the radially expanded orientation.

35. (Canceled)

36. (New) The valve assembly of claim 31, wherein open cells of the open cell configuration are a square shape.

37. (New) The valve assembly of claim 31, wherein the graft covering housing a prosthetic heart valve forms an inner frame for supporting the prosthetic heart valve.

38. (New) The valve assembly of claim 31, wherein the radially extending fibers are collagen fibers.

39. (New) The valve assembly of claim 34, further including a second portion of fibers that extend radially inwardly from the outer frame.

40. (New) The valve assembly of claim 34, wherein open cells of the open cell configuration are a square shape.

41. (New) The valve assembly of claim 34, wherein the graft covering housing a prosthetic heart valve forms an inner frame for supporting the prosthetic heart valve.

42. (New) The valve assembly of claim 34, wherein the radially extending fibers are collagen fibers.

43. (New) The valve assembly of claim 34, further including a second portion of fibers that extend radially inwardly from the outer frame.

44. (New) A transcatheter aortic heart valve assembly comprising:

a graft covering engaging a prosthetic heart valve, wherein the graft covering extends around the prosthetic heart valve for providing sealing to the heart valve;

a frame formed from a metallic material and defining an open cell configuration, and being secured to the graft covering by stitching; and

a sealing material positioned externally to the frame for providing sealing between the frame and a patient's anatomical wall to prevent paravalvular leaks,

wherein the sealing material is attached to the frame,

wherein the sealing material includes a plurality of outwardly extending fibers that extend outwardly of the frame;

wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,

wherein the heart valve assembly has a radially compressed orientation and a radially expanded orientation,

wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the outwardly extending fibers into engagement with native leaflets of the aorta of a patient.

45. (New) The valve assembly of claim 44, wherein open cells of the open cell configuration are a square shape.

46. (New) The valve assembly of claim 44, wherein the graft covering housing a prosthetic heart valve forms an inner frame for supporting the prosthetic heart valve.

47. (New) The valve assembly of claim 44, wherein the outwardly extending fibers are collagen fibers.

48. (New) The valve assembly of claim 44, further including a second portion of fibers that extend radially inwardly from the frame.

REMARKS

This is in response to the Office Action dated December 13, 2021, which is in furtherance to an Applicant reply made on November 4, 2021.

In the November 4, 2021 reply, Applicant made certain arguments relating to the combinations of Spenser (USPN 7,510,575) in view of Dehdashtian (WO 2006/005015) and how the proposed combination could not be used to arrive at the claimed invention, namely, related to a limitation that the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient. These arguments were made in view of Spenser's acknowledgment that a 24F crimp profile represents the maximal profile for endovascular delivery through the femoral artery.

It appears as if those arguments were persuasive, and a new ground of rejection under 35 USC 103(a) is being entered. Specifically, claims 31 and 34 are rejected under 35 USC 103(a) as being unpatentable over Levi (USPN 9,393,110) in view of Dehdashtian (WO 2006/005015).

PRIOR ART REJECTION OF CLAIMS 31 AND 34

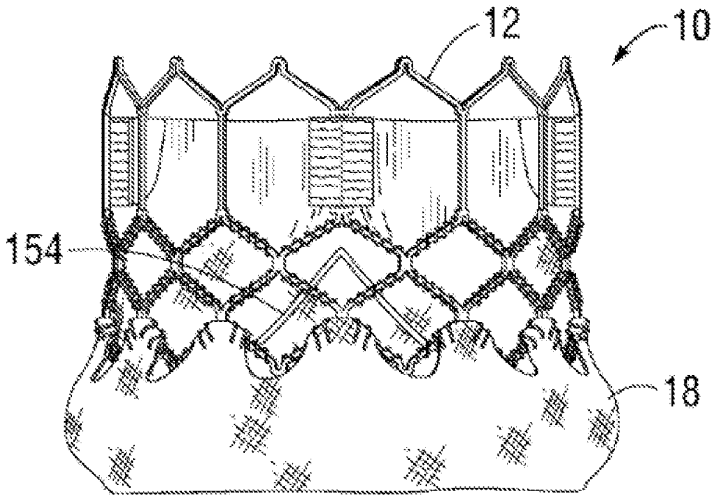
Claim 31 recites:

A transcatheter heart valve assembly comprising:
a graft covering housing a prosthetic heart valve, wherein the graft covering extends around the prosthetic heart valve for providing sealing to the heart valve;
an outer frame formed from a metallic material and defining an open cell configuration, and being secured to the graft covering by a plurality of stitches; and
a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks,
wherein the sealing material is attached to the outer frame,
wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame;
wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer,
wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,
wherein the heart valve assembly has a radially compressed and a radially expanded orientation,
wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient,
wherein the outer frame extends distally further than the prosthetic heart valve.

(emphasis added)

The USPTO relies on FIGS. 1-3 of Levi in forming the prior art rejections. FIG. 1 is representative and is illustrated below:

FIG. 1



And FIG. 22 of Dehdashtian:

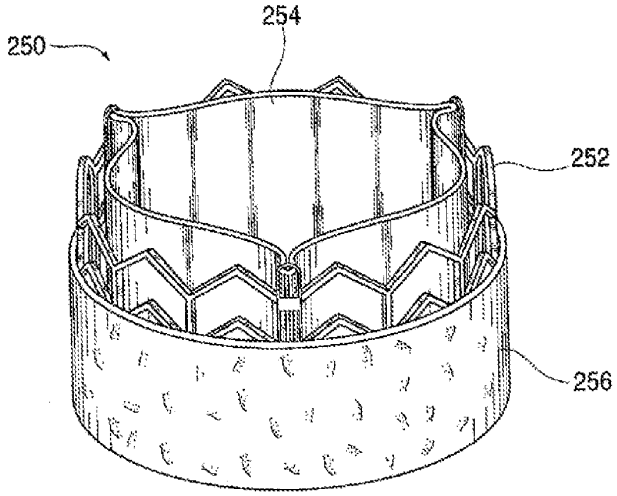


FIG. 22

The USPTO proposes a combination of Levi plus Spenser to arrive at the claimed invention. According to the USPTO:

> 19. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the heart valve assembly of Spenser et al. to include a sealing member positioned externally to an outer frame as taught in Dehdashtian et al. in order to provide additional sealing against leakage. Additionally, Spenser et al. teaches an outer sealing member (21) in the embodiment of Fig. 1.

The prior art has made clear, such as in Spenser, that a 24F catheter is the maximal size of a catheter inserted into the femoral artery. Spenser discloses:

> *A typical size of an aortic prosthetic valve is from about 19 to about 25 mm in diameter. **A maximal size of a catheter inserted into the femoral artery should be no more than 8 mm in diameter**. The present invention introduces a device, which has the ability to change its diameter from about 4 mm to about 25 mm. Artificial valves are not new; however, artificial valves in accordance with the present invention posses the ability to change shape and size for the purpose of delivery and as such are novel. These newly designed valves require new manufacturing methods and technical inventions and improvements, some of which were described herein.*
>
> (Emphasis added)

Valve crimp profile is of significant importance in transcatheter valves as Spenser and Levi recognize. The crimp profile impacts not only the delivery route, but the ability to cross the native leaflets of the aorta for deployment. And each of the claims require some general limitation of endovascular deployment through the femoral artery.

It is bedrock analysis that if the proposed combination from the USPTO is incapable of meeting the claim limitations (in this instance, endovascular deployment through the femoral artery), then the proposed combination is not proper for rejecting the claims under 35 USC 103. Catheter size is typically expressed in terms of French numbers, where each millimeter of catheter diameter equates to a 3F increase in French size. Thus, an 8.00 mm diameter catheter would be

expressed as a 24F system. Spenser states that an 8.00 mm diameter catheter is the maximal for femoral access, and thus a 24F catheter would be the maximum as well.

Just as the prior rejection of Spenser in view of Dehdashtian was overcome by showing that the combination could not be delivered endovascularly through the femoral artery, Applicant submits that the combination of Levi in view of Dehdashtian suffers from the same shortcoming. As previously discussed, the inventors in Dehdashtian recognized a 24F catheter size at the maximal size.

Levi recognized the significance of crimp profile. Indeed, the background of Levi states:

> *An important design parameter of a transcatheter heart valve is the diameter of the folded or crimped profile. The diameter of the crimped profile is important because it directly influences the physician's ability to advance the transcatheter heart valve through the femoral artery or vein. More particularly, a smaller profile allows for treatment of a wider population of patients, with enhanced safety.*

As previously discussed, adding an outer seal to a valve structure is not trivial, and the results are not necessarily expected because of the aforementioned crimp profile concerns. Crimping of the valve necessarily creates "bunching" on the outside of the valve. This is well-illustrated in FIG. 26c of Spenser.

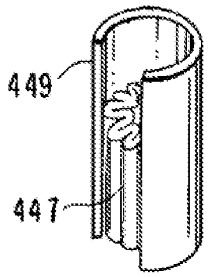


FIG.26c

As illustrated, addition of an outer seal necessarily adds significantly to the crimp profile, and may further restrict full crimping of the valve. This is even more pronounced with the proposed combination by the USPTO, where adding the outer "band" of Dehdashtian is likely to significantly add to crimped profile such that the crimped profile will exceed the "maximal size [of]….. 8 mm in diameter."

Levi understands this is an issue, as the bulging is shown in the outer seal 18 in FIG. 18 of Levi:

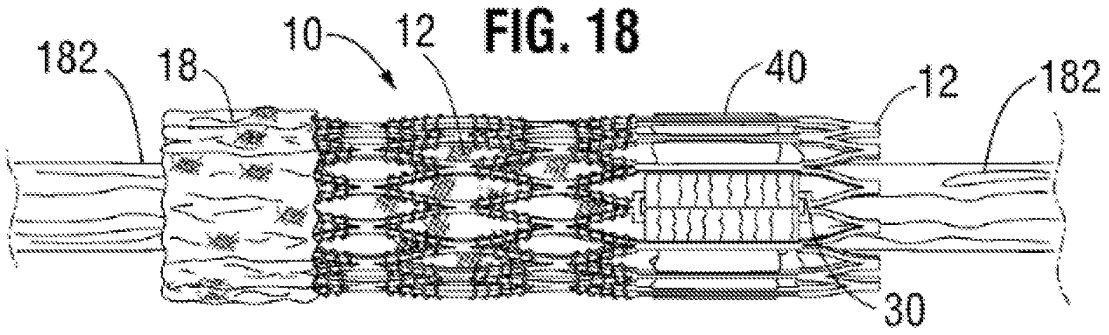
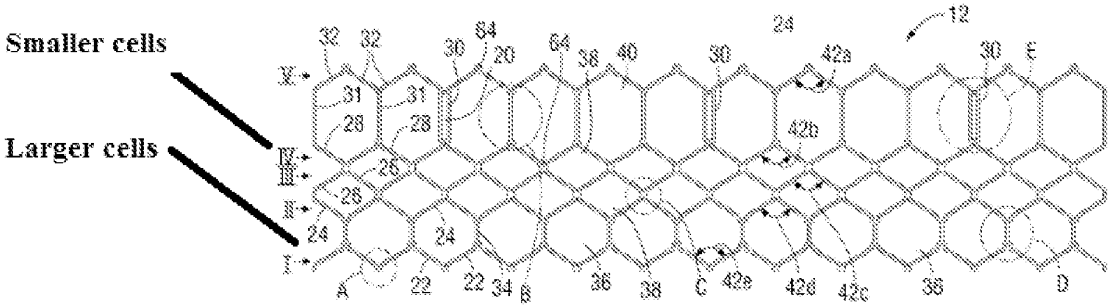


FIG. 18

In order to try and reduce the overall crimp profile to accommodate for the bulging, Levi made certain design changes to accommodate the outer seal 18. Namely, Levi made the open cells or grids of the lower most row of the frame to be larger than the next row of cells, which allowed for a reduced crimp profile at the lower most row of the frame, which thus provided a reduced crimp profile area (called "reduced diameter region 174" in Levi specification) against which the outer seal 18 could sit.

This is well illustrated in annotated FIG. 5 of Levi shown below:

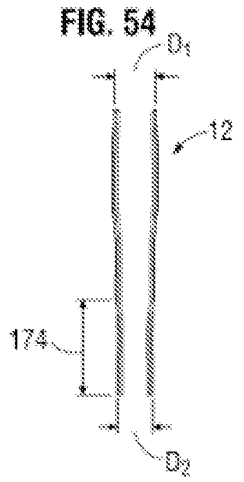
FIG. 5



And Levi discloses:

*Also, as can be seen in FIG. 5, the openings **36** of the lowermost row of openings in the frame are relatively larger than the openings **38** of the two intermediate rows of openings. As shown in FIG. 54, this allows the frame, when crimped, to assume an overall tapered shape that tapers from a maximum diameter D_1 at the outflow end of the valve to a minimum diameter D_2 at the inflow end of the valve. When crimped, the frame **12** has a reduced diameter region extending along a portion of the frame adjacent the inflow end of the frame, indicated by reference number **174**, that generally corresponds to the region of the frame covered by the outer skirt **18**. The diameter of region **174** is reduced compared to the diameter of the upper portion of the frame (which is not covered by the outer skirt) such that the outer skirt **18** does not increase the overall crimp profile of the valve. When the valve is deployed, the frame can expand to the cylindrical shape shown in FIG. 4. In one example, the frame of a 26-mm valve, when crimped, had a diameter D_1 of 14 French at the outflow end of the valve and a diameter D_2 of 12 French at the inflow end of the valve.*

This "reduced diameter region" 174 is also well illustrated in FIG. 54 of Levi, where a crimped valve cross-section is shown:



As Levi discloses:

*Due to the tapered shape of the frame **12** in the mounted state, even with the additional thickness of the outer skirt **18** positioned around the inflow end portion **174** of the frame **12** the overall outer diameter of the inflow end portion of the valve **10** can be about equal to, or less than, the overall outer diameter of the outflow end portion of the valve.*

Levi provides significant description on this aspect, and further teaches the dimensions of diameter D1 and D2 as shown in FIG. 54:

> *In one example, the frame of a 26-mm valve, when crimped, had a diameter D_1 of 14 French at the outflow end of the valve and a diameter D_2 of 12 French at the inflow end of the valve.*

Thus it follows that Levi, in order to accomplish a 14F crimp profile at the main portion of the frame, was able to provide a reduced diameter portion of a 12F. In other words, the outer diameter of the outer frame as measured at D2 was about 4.67 mm and the outer diameters of the outer frame at D1, the reduced diameter portion was about 4.0 mm. Thus, an outer seal having a crimped profile that adds about 0.67 mm total thickness in the crimped profile would accomplish Levi's stated purpose of "*the outer skirt **18** does not increase the overall crimp profile of the valve*."

Since the seal wraps around the perimeter of the outer frame, a maximum crimped seal profile would allow for a crimped profile thickness of the outer band of about 0.33 mm.

Dehdashtian discloses an outer band/sleeve with a thickness that ranges from 1 mm to 5 mm. Thus, Dehdashtian expressly teaches a thickness of the outer skirt that is greater than what Levi teaches is allowable. Dehdashtian does, however, teach the outer skirt is compressible, but provides no guidance on the compressibility of the outer skirt. Furthermore, if one were to assume that the skirt of Dehdashtian could be manufactured in thickness smaller than 1.00 mm, down to an example of 0.33 mm needed to fit within the reduced diameter region (which ignores the bunching issue), it is not clear how Dehdashtian would then provide for a "compressible material" as disclosed since compression requires some level of thickness and a 0.33 mm seal may not provide for compressibility. Dehdashtian does not appear to disclose loosely packed/low density fibers found in Applicant's disclosure that provide for the ability to reduce seal profile in the crimped orientation, yet provide sufficient surface area to effectuate sealing.

Just as Applicant did for the prior rejections of Spenser in view of Dehdashtian, Applicant can show that the proposed combination cannot meet the claim limitations as the addition of the minimal size thickness outer band as stated in Dehdashtian of 1.00 mm would result in a crimped profile that would not fit within a catheter with a maximum outer diameter of 8.00 mm.

This is well described with reference to simple calculations.

A catheter of 4.0 mm in outer diameter as disclosed by the reduced thickness portion of Levi, necessarily has a crimped cross-area of:

$$A = \pi * (2.0\ mm)^2 = 12.56\ mm^2$$

Addition of a 1.0 mm outer seal to a 25 mm valve as disclosed by Levi and Dehdashtian potentially creates an increase in cross-area of:

$$A = \pi * (13.5\ mm)^2 - (12.5\ mm)^2 = 81.64\ mm^2$$

Dehdashtian does teach that the band is a "layer of compressible material 256," so some amount of compression is expected. However, nowhere does Dehdashtian teach that the layer is compressible by over 600 percent to be able to go from a non-compressed area size of 81.64 mm^2 to a crimped area size of 12.56 mm^2.

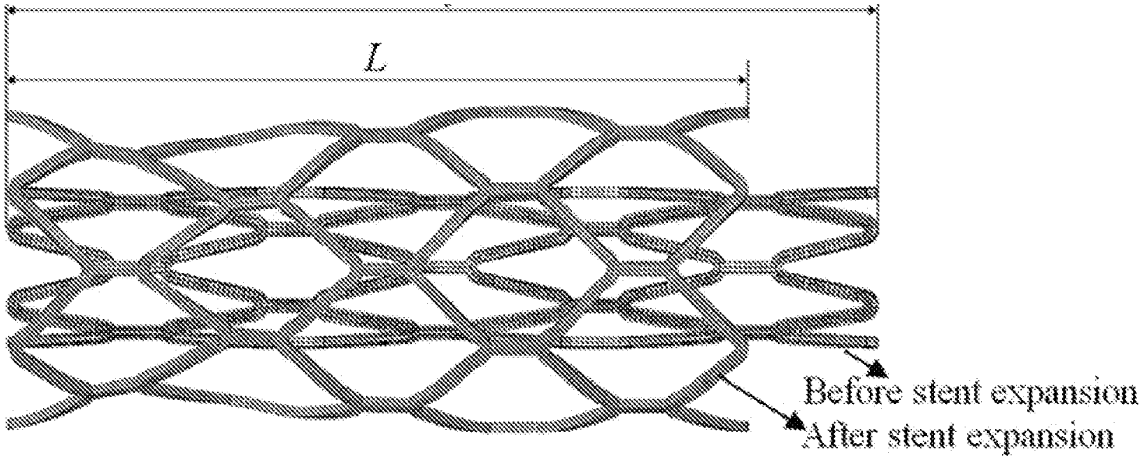
Applicant submits that a much larger catheter would be required in order to accommodate the proposed combination by the USPTO. And the much larger catheter would not be able to meet the claim limitation of the "heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient."

Furthermore, the band of Dehdashtian teaches that the band may take "the form of a sleeve." Thus, it follows that Dehdashtian teaches the band is tightly held against the frame similar to a "sleeve." This is also illustrated in the non-patent literature of Walther. Levi, however, teaches that the outer seal should not be tightly held against the frame. In fact, Levi expressly requires excess slack in the outer seal:

> *As can be seen in FIGS. 1, 3 and 43, the outer skirt **18** is secured to the frame **12** such that when the frame is in its expanded state, there is excess material or slack between the outer skirt's lower and upper edges **160**, **162** that does not lie flat against the outer surface of the frame **12**. In other words, the outer skirt is configured with excess material which causes the outer skirt to bulge outwardly as the frame foreshortens (i.e., shortens in length) during radial expansion. Accordingly, when the valve **10** is deployed within the body, the excess material of the outer skirt **18** can fill in gaps between the frame **12** and the surrounding native annulus to assist in forming a good fluid-tight seal between the valve and the native annulus. The outer skirt **18** therefore cooperates with the inner skirt **16** to avoid perivalvular leakage after implantation of the valve **10**. In another*

advantageous feature, the slack between the lower and upper edges of the outer skirt ***18*** *allows the frame* ***12*** *to elongate axially during crimping without any resistance from the outer skirt and the outer skirt does not substantially affect the outer diameter of the prosthetic valve in the crimped condition.*

It is known that most stents foreshorten during expansion. What this means is that the stent elongates as it becomes more narrow (i.e. crimped) and shortens as it becomes wider (i.e. expanded). This is well-illustrated with the following image:



The foreshortening of the stent can be restricted by a tightly held outer seal. Dehdashtian though was not significantly concerned with foreshortening because the rigid commissure supports of Dehdashtian restricted the degree of foreshortening. This is illustrated with annotated FIG. 22 of Dehdashtian:

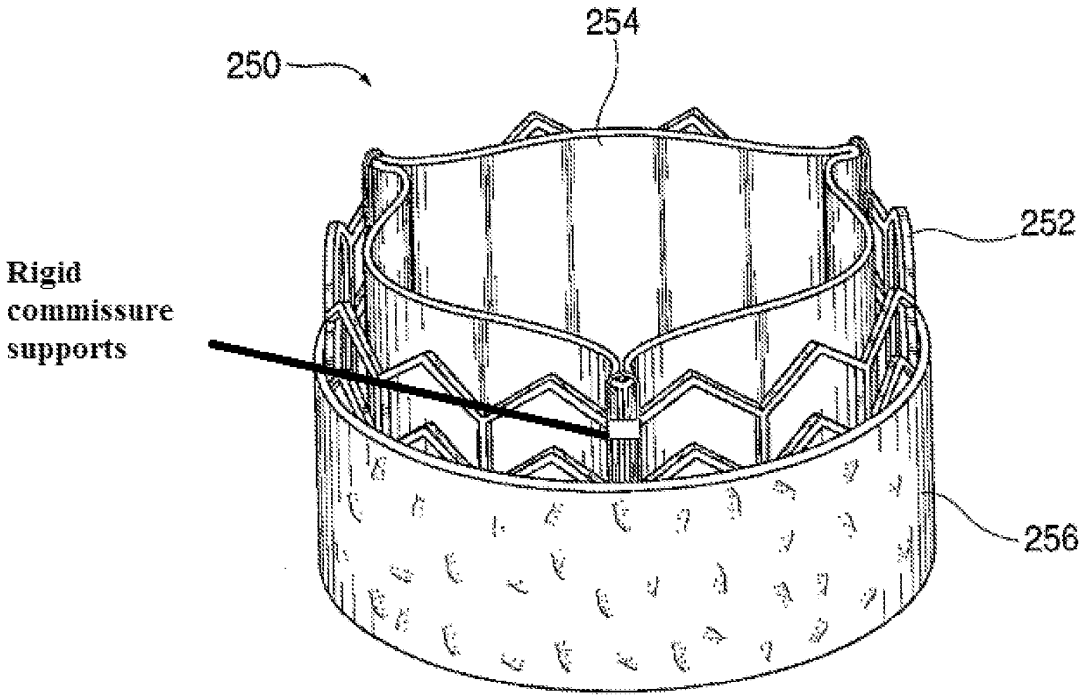


FIG. 22

However, Levi appears to undergo a significant amount of foreshortening (which helps to reduce crimp profile) and addresses the restriction of the outer seal by providing for "excess material" of the outer skirt.

If one were to stitch the seal of Dehdashtian to the outer frame of Levi at a top portion of the seal (just as shown in FIG. 1 of Levi), nowhere in the combination proposed by the USPTO is it disclosed how Levi could foreshorten without the outer seal of Dehdashtian restricting the foreshortening. If the outer seal of Dehdashtian restricts foreshortening, then the valve is not able to crimp to a fully crimped position and thus endovascular delivery through the femoral artery is unlikely if not impossible.

Applicant's invention accomplishes this result by having the low density fiber construction. This allows for sufficient elongation of the outer seal to allow for any foreshortening if it were to occur in Applicant's valve design. This is well illustrated in FIG. 12 of Applicant's application:

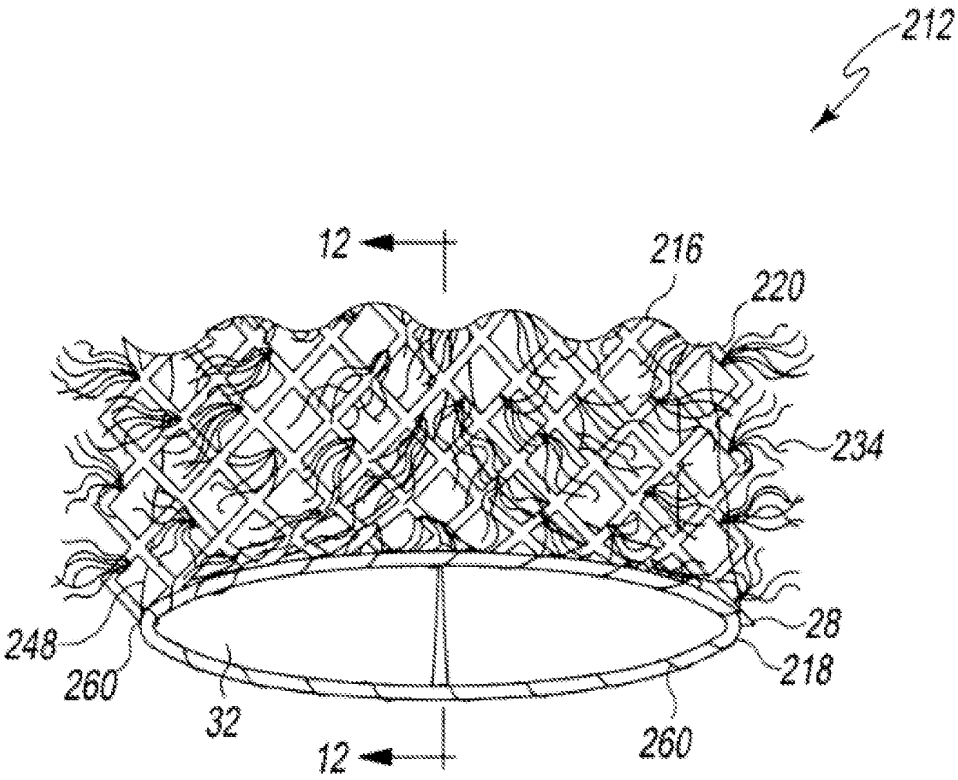


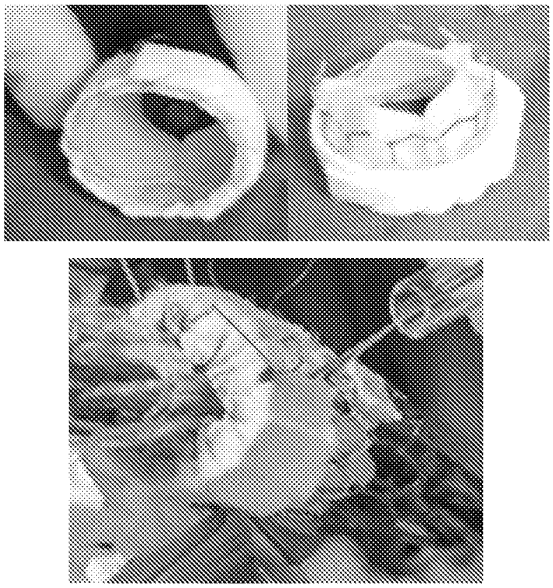
Fig. 11

Claims 34 and 44 recite generally similar limitations and the arguments relied upon for Claim 31 apply there as well.

THE NON-PATENT LITERATURE OF RECORD SUPPORTS APPLICANT'S POSITION THAT THE PROPOSED COMBINATIONS CANNOT MEET THE LIMITATIONS OF CLAIM 31, 34, AND 44

In a non-patent literature entitled "Open Atrial Transcatheter Mitral Valve Repaclement in Patients with Mitral Annular Calcification" by Russel, available at https://www.sciencedirect.com/science/article/pii/S0735109718357231, a combination of a product shown in Levi with a cloth seal such as shown in Dehdashtian was used in a mitral valve

repair; this is generally the combination proposed by the Patent Office of Levi in combination with Dehdashtian. Representative images are shown below:



Applicant notes that the seal used in Russel was Bard Product No. 007976, which is disclosed as a 1.65 mm fabric, which is slightly larger than the minimal size disclosed in Dehdashtian of 1.00 mm, but it is similar in size[1]. The resultant valve in Russel had such a large profile that excision of the native mitral leaflets was required, and a large delivery system was also required in an open heart surgical procedure. Applicant notes that the mitral valve and paths to a mitral repair are generally considered larger than a transfemoral aortic valve approach. Thus, the Russel valve, which Applicant submits is consistent with the proposed combination set forth by the USPTO, is incapable of meeting either claim limitation of endovascular delivery through the femoral artery, or expansion of the valve assembly is configured to press the sealing material against native valve leaflets of an aorta of the patient as required by Claim 34.

In Russel, the leaflets were excised to provide additional space ("The anterior leaflet is excised, leaving a standard rim of tissue at the aortomitral curtain that will be used to place the pledgeted anchoring sutures (Figure 4A).") Russel maintained such a large profile, and due to the deployment being open heart, crimped the valve but did not disclose passing through a catheter.

[1] https://www.westcmr.com/007976-wb10-007976

Thus, Applicant submits that the non-patent literature of Russel makes it clear that the modification of Levi with Dehdashtian could not meet the claim limitations of claims 31 and 34.

FEDERAL CIRCUIT PRECEDENT IN THE SAME FIELD OF ART IS CONTROLLING IN THIS MATTER

Finally, the Federal Circuit has spoken to this exact issue in the exact same field of art. In *Snyders Heart Valve LLC v. St. Jude Medical, LLC*[2], the Federal Circuit determined that the prior art of Bessler (USPN 5,855,601) did not anticipate claim limitations in USPN 6,821,297 that the transcatheter valve had a "frame sized and shaped for insertion in [a plurality of cusps of the damaged heart valve." Bessler taught a valve where a cutting tool first excised the native leaflets of a patient to provide sufficient room for deployment of the Bessler valve. The claimed invention of the '297 thus required that the native leaflets remain in place.

Here, just as in *Snyders*, the claims require that *the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient*. As already discussed, the prior art is incapable of meeting these limitations, and just as in *Snyders*, when the prior art is incapable of meeting the claim limitations in this technical space, an anticipation rejection on that prior art is improper. Put simply, as Spenser recites, a 24F catheter size is the maximal size of an endovascular deployment through the femoral artery.

Furthermore, the claims each require *expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient*. Applicant submits that the prior art of record, as proposed to be combined, is not capable of meeting these claim limitations.

The parallels to *Snyder* are striking. In *Snyder* the claims were construed in a manner consistent with Applicant's claim language--- that the expansion of the valve pressed into engagement with native leaflets of the aorta of a patient. However, in *Snyder*, the primary reference taught removing the native leaflets in order to provide sufficient space for delivery in the annulus. In determining that the Bessler reference did not anticipate the claims, the Board stated "*Of particular note, the specification expressly describes Bessler as presenting problems*

[2] https://cafc.uscourts.gov/opinions-orders/19-2111.OPINION.10-5-2021_1844521.pdf

*that the Snyders invention overcomes, stating that the procedure disclosed in Bessler is too invasive because it "**includes excision, vacuum removal of the native valve**, cardiopulmonary bypass and backflushing of the coronary arterial tree."* (emphasis added).

Just as in *Snyder*, the references of record proposed by the USPTO, when put into practice as shown in the NPL of Walther and Russel, all required removal of the native leaflets. Put simply, the proposed combination by the USPTO was too large to be deployed within the native leaflets of the aorta and the scientific papers presented herein show that to be the case.

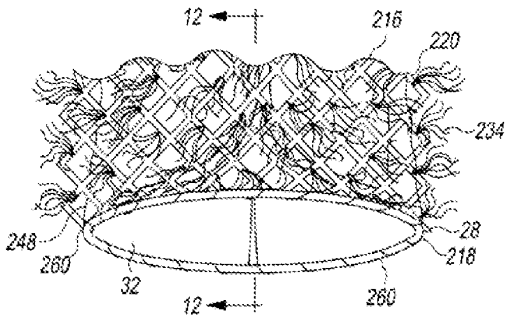
Thus, it is clear that the proposed combination by the USPTO is incapable of meeting the claim limitation of *expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient*. As such, the claims are patentable for at least this reason.

Applicant submits that the claims are patentable over the references of record as presented herein.

THE CLAIMS ARE ENABLED AND OPERABLE

The claims are enabled and operable. A claim chart relative to claim 44 is provided for completeness:

Claims	
44. (New) A transcatheter aortic heart valve assembly comprising:	A transcatheter valve is illustrated in FIG. 20.
a graft covering engaging a prosthetic heart valve,	A graft covering is illustrated in FIG. 11. The prosthetic leaflets are visible being engaged by the prosthetic heart valve.
wherein the graft covering extends around the prosthetic heart valve for providing sealing to the heart valve;	The covering is shown illustrated at least partially around the heart valve to provide sealing to the heart valve.
a frame formed from a metallic material and defining an open cell configuration, and being secured to the graft covering by stitching; and	A frame formed from a metallic material and defining an open cell configuration is shown in FIG. 11. The graft covering is shown attached by stitching 260.

	 Fig. 11
a sealing material positioned externally to the frame for providing sealing between the frame and a patient's anatomical wall to prevent paravalvular leaks,	The plurality of fibers are shown as a sealing material that is positioned externally to the frame. The specification discloses that "*In the illustrative embodiment, collagen fibers **234** are attached to the proximal section **220** to aid in preventing paravalvular leaks and migration of the proximal component **212** within the aortic walls.*"
wherein the sealing material is attached to the frame, wherein the sealing material includes a plurality of outwardly extending fibers that extend outwardly of the frame;	The fibers are shown attached to the frame. The fibers are shown as a plurality of outwardly extending fibers. The specification discloses "collagen fibers" but the initially filed claims in the priority filings are generic to "fibers" See claim 16 of first patent filing. ' FIG. 9 appears to illustrate fibers that extend outwardly
wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,	*Referring now to FIGS. 17-22, the proximal component **12** or the proximal component **212** may be used as a transcatheter valve with slight modification. Such a valve may be deployed via a transfemoral or trans-axillary route, as will be described in further detail below.*
wherein the heart valve assembly has a radially compressed orientation and a radially expanded orientation,	The disclosure teaches that the frame is expandable.
wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the outwardly extending fibers into engagement with native leaflets of the aorta of a patient.	FIG. 21 illustrates that the transcatheter valve is deployed such that the fibers are pressed into engagement with native leaflets of the aorta of a patient.

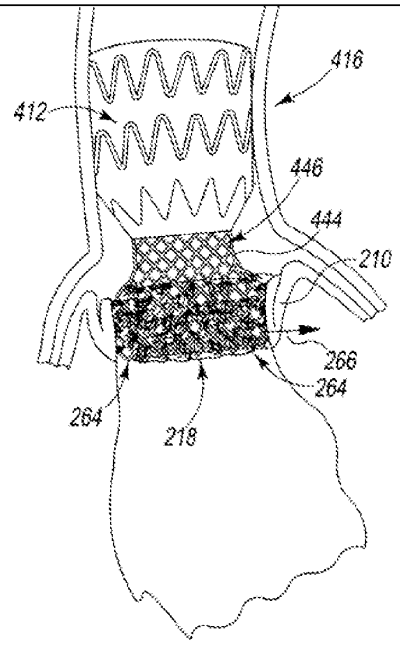


Fig. 21

DEPOSIT ACCOUNT

The Commissioner is hereby authorized to charge any otherwise unpaid fees associated with the filing of this correspondence to Deposit Account No. **50-6191**.

Respectfully submitted,

Date: December 14, 2021

/Justin R. Nifong/
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Customer No. 175373

Electronic Acknowledgement Receipt	
EFS ID:	44506391
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	175373
Filer:	Justin Robert Nifong
Filer Authorized By:	
Attorney Docket Number:	426/2/12 UTIL
Receipt Date:	14-DEC-2021
Filing Date:	28-JUL-2020
Time Stamp:	08:39:39
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		426-2-12-UTIL-resp-to-oa-dtd-12-13.pdf	1241329 37307ad32dce3566ecb0c9fafa332e417eff2033	yes	21

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	5
	Applicant Arguments/Remarks Made in an Amendment	6	21
Warnings:			
Information:			
	Total Files Size (in bytes):	1241329	

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

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/941,117	07/28/2020	Ali Shahriari	426/2/12 UTIL	1876

175373 7590 12/13/2021

Aortic Innovations, LLC
4917 Waters Edge Drive, Suite 275
Raleigh, NC 27606

EXAMINER	
SHIPMON, TIFFANY P	

ART UNIT	PAPER NUMBER
3774	

NOTIFICATION DATE	DELIVERY MODE
12/13/2021	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):

usptomail@nkpatentlaw.com

Office Action Summary	**Application No.** 16/941,117	**Applicant(s)** Shahriari, Ali	
	Examiner TIFFANY P SHIPMON	**Art Unit** 3774	**AIA (FITF) Status** No

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

Period for Reply

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

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

Status

1)☑ Responsive to communication(s) filed on 04 November 2021.

☐ 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) 31 and 34 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) 31 and 34 is/are rejected.

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

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

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

Application Papers

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

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

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

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

Priority under 35 U.S.C. § 119

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

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

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

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

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

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

Attachment(s)

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

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

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

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application is being examined under the pre-AIA first to invent provisions.

Response to Arguments

2. Applicant's arguments with respect to claim(s) 31 and 34 have been considered but are moot in light of the new rejections below.

3. Applicant argued that the prior art reference does not teach the heart valve assembly is configured to be deployed endovascularly through a femoral artery.

4. The Levi et al. reference teaches the device being crimped and the importance of having the device crimped as to be implanted in to the femoral artery.

5. Applicant argues that the Levi et al. does not discloses the sealing material held against the outer frame during expansion.

6. However, it should be noted that the 'held against' during expansion can be met by Levi et al. because the sealing material, 18, is attached to the outer frame, and thus can be considered held against it during expansion.

Claim Rejections - 35 USC § 103

7. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claim 31 and 34 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Levi et al. (US 2012/0123529) in view of Dehdashtian (WO 2006/005015).

9. Referring to claim 31, Levi et al. discloses a transcatheter heart valve assembly comprising: a graft covering housing a prosthetic heart valve(inner skirt, 16), wherein the graft covering(inner skirt, 16) extends around the prosthetic heart valve (valvular structure, 14) for providing sealing to the heart valve(paragraph 64); an outer frame(12) formed from a metallic material(paragraph 53) and defining an open cell configuration(Figs. 1-3), and being secured to the graft covering by a plurality of stitches (paragraph 74); a sealing material (outer skirt, 18) positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks(paragraph 85), wherein the sealing material is attached to the outer frame(Figs. 1-3), and wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer(PET is a polymer and polyester, paragraph 84), wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient(paragraph 52 discloses a smaller more even crimped profile, and paragraph 7 discloses the importance of a crimped profile because it directly influences the physicians ability to advance the heart valve through the femoral artery), and wherein the heart valve assembly has a radially compressed and a radially expanded orientation (abstract) wherein the outer frame extends distally further than the prosthetic heart valve (see Figs. 1-3).

10. Levi et al. lacks a detailed description of wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame; and wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient.

11. Dehdashtian et al. discloses a heart valve in the same field of endeavor with a sealing material (256) positioned externally to an outer frame (252) for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks (paragraph 145), wherein the sealing material is attached to the outer frame (Fig. 22), wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame(paragraph 145); wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient (paragraph 145, discloses the compressible material 256, is compressible and expands after deployment).

12. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the heart valve assembly of Levi et al. to include a sealing member positioned externally to an outer frame as taught in Dehdashtian et al. in order to encourage coagulation of blood to further fill gaps and prevent leakage (pages 36-37).

13. Referring to claim 34, Levi et al. discloses a transcatheter heart valve assembly comprising: a graft covering housing a prosthetic heart valve(inner skirt, 16), wherein the graft covering (inner skirt, 16) extends radially outwardly around the prosthetic heart valve(valvular structure, 14) and radially inwardly of the outer frame for providing sealing to the heart valve(paragraph 64); an outer frame(12) formed from a metallic material(paragraph 53) and defining an open cell configuration(Figs. 1-3), and being secured to the graft covering by a plurality of stitches (paragraph 74); a sealing material(outer skirt, 18) positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks(paragraph 85), wherein the sealing material is attached to the outer frame(Figs. 1-3), and wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer(PET is a polymer and

polyester, paragraph 84), wherein the valve assembly is balloon expandable during endovascular deployment (paragraph 30) wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient (paragraph 52 discloses a smaller more even crimped profile, and paragraph 7 discloses the importance of a crimped profile because it directly influences the physicians ability to advance the heart valve through the femoral artery),

14. wherein expansion of the valve assembly is configured to press the sealing material against native valve leaflets of an aorta of the patient(paragraph 85),

15. wherein the sealing material is held against the outer frame as the valve expands from the radially compressed orientation to the radially expanded orientation (paragraph 85; the sealing material is held against the outer frame, as the sealing material is continuously 'attached' to the outer frame during expansion).

16. Levi et al. discloses the proximal end of the outer frame being covered (See Figs. 42-43). Levi et al. discloses wherein the graft covering extends beyond the proximal end of the outer frame (Levi discloses a graft covering that extends beyond the proximal end of the outer frame (see Figs. 37-40). However, Levi et al. lacks a detailed description of the proximal end of the outer frame being covered by the graft. However, it would have been obvious to a person of ordinary skill in the art, to modify the graft covering, 16 to cover the proximal end of the outer frame as the graft covering 16 and outer skirt, 18 covers the proximal end of the frame, for the purpose of assisting in forming a good fluid-tight seal between the valve and the native annulus.

17. Levi et al. lacks a detailed description of wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame; wherein the sealing material includes a plurality of radially extending fibers that form a circumferential surface that extends outwardly of the outer frame; wherein the fibers cover at least two circumferentially extending rows of grids formed in the open cell configuration and the at least two circumferentially extending rows radially overlap with

the prosthetic leaflets and wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient.

18. Dehdashtian et al. discloses a heart valve in the same field of endeavor with a sealing material (256) positioned externally to an outer frame (252) for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks (paragraph 145), wherein the sealing material is attached to the outer frame(Fig. 22), wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame(paragraph 145); wherein the sealing material (256) includes a plurality of radially extending fibers that form a circumferential surface that extends outwardly of the outer frame(paragraph 145): wherein the fibers cover at least two circumferentially extending rows of grids formed in the open cell configuration and the at least two circumferentially extending rows radially overlap with the prosthetic leaflets (Fig. 22, two rows of stent 252 covered) wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient (paragraph 145, discloses the compressible material 256, is compressible and expands after deployment; the material is held against the outer frame).

19. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the heart valve assembly of Spenser et al. to include a sealing member positioned externally to an outer frame as taught in Dehdashtian et al. in order to encourage coagulation of blood to further fill gaps and prevent leakage (pages 36-37).

Conclusion

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to TIFFANY P SHIPMON whose telephone number is (571)270-1448. The examiner can normally be reached MONDAY-FRIDAY.

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, Jennifer Dieterle can be reached on 571-270-7872. 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.

/TIFFANY P SHIPMON/
Examiner, Art Unit 3774

/JERRAH EDWARDS/
Supervisory Patent Examiner, Art Unit 3774

Notice of References Cited	Application/Control No. 16/941,117	Applicant(s)/Patent Under Reexamination Shahriari, Ali	
	Examiner TIFFANY P SHIPMON	Art Unit 3774	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20120123529-A1	05-2012	Levi; Tamir	A61F2/2433	623/2.11
	B					
	C					
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NON-PATENT DOCUMENTS

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

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/941,117	Shahriari, Ali
	Examiner	Art Unit
	TIFFANY P SHIPMON	3774

CPC - Searched*		
Symbol	Date	Examiner
A61F 2/856,07,2418,82,90, 2210/0014	10/21/2021	T.S.

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
IPR2021-01527 Reviewed Petition for Inter Partes Review of US Patent No. 10,792,172 on 10/20/2021	10/21/2021	T.S.
EAST Search History	10/21/2021	T.S.
Consulted with Leslie Lopez	11/29/2021	T.S.
Updated EAST Search	12/02/2021	T.S.

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

	/TIFFANY P SHIPMON/ Examiner, Art Unit 3774

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S2	3	(("7799072") or ("8002826") or ("7947074")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2014/06/28 22:05
S3	21	("20120046726" | "7018404" | "7799072" | "8016877" | "20070250146" | "6334868" | "7510574" | "8002826" | "20070276464" | "6752829" | "5102417" | "7947074" | "20070095283" | "20110257731" | "7393360" | "7914569" | "8226710" | "20040210304" | "5397355" | "7780726" | "20050197687" | "20060149351" | "20090198315" | "20100042202" | "7252682" | "20030040771" | "20120089218" | "5716393" | "6254632" | "20090125098" | "6582462" | "7771467" | "8206438" | "20080132999" | "20090099644" | "8425584").PN.	USPAT	OR	OFF	2014/06/28 23:06
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S5	317	(623/2.14).CCLS.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	OFF	2014/06/28 23:30
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S8	59	a61f2/2412	US-PGPUB; USPAT;	OR	OFF	2014/06/28 23:31

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S10	17	a61f2/2433	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/06/28 23:31
S11	11	a61f2/2475	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/06/28 23:31
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S15	3	S13 and ((fibers with collagen) same migration)	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:12
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S25	1	("7799072").PN.	USPAT; USOCR	OR	OFF	2014/07/14 09:28
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S33	915	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/11/30 19:59
S34	0	a61f2/2418.cpc	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/11/30 20:38

S35	2,002	(623/1.35-1.36).CCLS.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2014/12/01 10:28
S39	2,556	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2016/02/08 10:24
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S41	2	("13706869").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2016/02/08 11:49
S42	2	("13706896").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2016/02/08 11:51
S46	1	("14614628").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/03/20 19:27
S47	1	("7799072").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/05/15 06:58
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S56	3,429	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/09/17 00:12
S57	2,489	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/09/17 00:13
S58	1,308	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/09/17 00:13
S59	1,182	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/09/17 00:13
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S70	3,295	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58
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S72	1,322	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58
S73	9,150	S68 S69 S70 S71 S72	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58
S74	6,389	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
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S79	9,503	S74 S75 S76 S77 S78	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
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S82	1,118	S80 and (artery arteries) and (aortic near arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/04/15 09:09
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S84	4,413	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S85	3,462	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S86	1,773	a61f2/2433.cpc.	US-PGPUB; USPAT;	OR	OFF	2019/04/29 11:05

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S89	9,549	S83 S84 S85 S86 S87 S88	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
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S92	9	("20060155366" | "20100049313" | "6258117").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:09
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S107	9,898	S101 S102 S103 S104 S105 S106	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
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S113	3,856	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S114	1,965	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S115	1,422	a61f2/2475.cpc.	US-PGPUB; USPAT;	OR	OFF	2019/12/08 16:15

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S121	5,076	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
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S130	4,040	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
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S132	1,443	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S133	10,919	S128 S129 S130 S131 S132	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
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S135	966	S134 and (stent and artery and seal$4 and arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:56
S136	5,500	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01

S137	24,545	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S138	15,139	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S139	16,719	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S140	3,555	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S141	11,168	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S142	1,881	(S136 S137 S138 S139 S140 S141) and (stent and artery and seal$4 and arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:02
S143	1	("9044311").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/03/13 20:21
S144	25	(US-10034784-$ | US-10065824-$ | US-16788806-$ | US-19857887-$ | US-20010044650-$ | US-20020082684-$ | US-20040249399-$ | US-20070219613-$ | US-20090036977-$ | US-20090099650-$ | US-20100087907-$ | US-20130013050-$ | US-3002816-$ | US-3025694-$ | US-3220613-$ | US-3289282-$ | US-3482228-$ | US-3506622-$ | US-3545549-$ | US-3562673-$ | US-3652198-$ | US-	US-PGPUB; USPAT	OR	OFF	2020/03/13 21:45

		3715337-$ | US-3757263-$ | US-5464721-$ | US-5609627-$ | US-5773457-$ | US-5814752-$).DID.				
S145	0	(DE-10065824-$ | DE-19857887-$ | AI-20010044650-$ | AI-20020082684-$ | AI-20040249399-$ | AI-20070219613-$ | AI-20090036977-$ | AI-20090099650-$ | AI-20100087907-$ | AI-20130013050-$ | NO-2013040663-$ | NO-2013059596-$ | NO-2014072501-$ | BI-3482228-$ | VA-223131450-$).DID.	US-PGPUB; USPAT	OR	OFF	2020/03/13 21:46
S146	0	"16788806"	US-PGPUB; USPAT	OR	OFF	2020/03/13 21:47
S147	1	("20080132993").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/04/11 20:50
S148	4	"20070067014"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 10:30
S149	5	"20080132993"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 11:39
S150	14	"13706896"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 12:11
S151	1	"16788806"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 12:11
S152	15	(US-10478320-$ | US-16788806-$ | US-20050010277-$ | US-20080082159-$ | US-20090264993-$ | US-3226814-$ | US-3402751-$ | US-3408731-$ | US-3574284-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 14:46
S153	13	(US-16788806-$ | US-20040230287-$ | US-20080275548-$ | US-20110257731-$	US-PGPUB; USPAT; USOCR;	OR	OFF	2020/04/13 14:46

		| US-20120158121-$ | US-3125764-$ | US-3314328-$ | US-3668892-$).DID.	FPRS; EPO; JPO; DERWENT			
S154	0	(AI-20040230287-$ | AI-20080275548-$ | AI-20110257731-$ | AI-20120158121-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 14:47
S155	3,758	623/1.12	US-PGPUB; USPAT	OR	OFF	2020/06/06 14:43
S156	51	S155 and ((fibers with collagen))	US-PGPUB; USPAT	OR	OFF	2020/06/06 14:43
S157	7,650	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S158	5,220	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S159	4,196	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S160	2,120	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S161	1,463	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S162	11,262	S157 S158 S159 S160 S161	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:44
S163	282	S162 and ((fibers with collagen))	US-PGPUB; USPAT	OR	OFF	2020/06/06 14:44
S164	1	"20040256759"	US-PGPUB; USPAT	OR	OFF	2020/06/06 15:28
S165	119	(US-10028848-$ | US-10034784-$ | US-10065824-$ | US-10321985-$ | US-16808137-$ | US-18153473-$ | US-19857887-$ | US-2858390-$ | US-20010044650-$ | US-20020082684-$ | US-20020177890-$ | US-20030040771-$	US-PGPUB; USPAT	OR	OFF	2020/06/06 16:05

		| US-20040210304-$ | US-20040249399-$ | US-20050043790-$ | US-20050197687-$ | US-20060149351-$ | US-20060155366-$ | US-20070067014-$ | US-20070095283-$ | US-20070168013-$ | US-20070203559-$ | US-20070219613-$ | US-20070250146-$ | US-20070276464-$ | US-20080132993-$ | US-20080132999-$ | US-20080262592-$ | US-20080275548-$ | US-20090036977-$ | US-20090099644-$ | US-20090099650-$ | US-20090125098-$ | US-20090171456-$ | US-20090198315-$ | US-20090312834-$ | US-20100042202-$ | US-20100049313-$ | US-20100087907-$ | US-20100094409-$ | US-20110257731-$ | US-20120046726-$ | US-20120089218-$ | US-20130013050-$ | US-20130144373-$ | US-20140046428-$ | US-20140172064-$ | US-20140316513-$ | US-20140336749-$ | US-20160022450-$ | US-20160270935-$ | US-20170209254-$ | US-2787925-$ | US-3002816-$ | US-3002826-$ | US-3005270-$ | US-3016877-$ | US-3021408-$ | US-3025694-$ | US-3034007-$ | US-3095343-$ | US-3102417-$ | US-3114001-$ | US-3157174-$ | US-3179931-$ | US-3206438-$ | US-3220613-$ | US-3220899-$ | US-3226710-$ | US-3258117-$ | US-3269739-$ | US-3289282-$ | US-3314324-$ | US-3358140-$ | US-3393021-$ | US-3393136-$ | US-3394119-$ | US-3397355-$ | US-3398701-$ | US-3414635-$ | US-3419788-$ | US-3425584-$ | US-3452070-$ | US-3482228-$ | US-3506622-$ | US-3545549-$ | US-3561102-$ | US-3562673-$ | US-3582462-$ | US-3603156-$ | US-3617234-$ | US-3623067-$ | US-3629739-$ | US-3652198-$ | US-3715317-$ | US-3715337-$ | US-3721676-$ | US-3757263-$ | US-3833341-$ | US-3864808-$ | US-3911490-$ | US-3940040-$ | US-3943427-$ | US-3976179-$ | US-5004346-$ | US-5061275-$ | US-5254632-$ | US-5334868-$ | US-5464721-$ | US-5609627-$ | US-5716393-$ | US-5718159-$ | US-			

		5752829-$ | US-5773457-$ | US-5814752-$ | US-5918925-$ | US-5957974-$ | US-7018404-$ | US-7771467-$ | US-7799072-$ | US-7914569-$ | US-D187180-$).DID.				
S166	15	(DE-10065824-$ | DN-102014805-$ | DE-19857887-$ | AI-20010044650-$ | AI-20020082684-$ | AI-20020177890-$ | AI-20030040771-$ | AI-20040210304-$ | AI-20040249399-$ | NO-2004089249-$ | AI-20050043790-$ | AI-20050197687-$ | NO-2005087117-$ | AI-20060149351-$ | AI-20060155366-$ | NO-2006127412-$ | AI-20070067014-$ | AI-20070095283-$ | AI-20070168013-$ | AI-20070203559-$ | AI-20070219613-$ | AI-20070250146-$ | AI-20070276464-$ | AI-20080132993-$ | AI-20080132999-$ | AI-20080262592-$ | AI-20080275548-$ | AI-20090036977-$ | AI-20090099644-$ | AI-20090099650-$ | AI-20090125098-$ | AI-20090171456-$ | AI-20090198315-$ | AI-20090312834-$ | AI-20100042202-$ | AI-20100049313-$ | NO-2010006627-$ | AI-20100087907-$ | AI-20100094409-$ | NO-2010031060-$ | NO-2010105195-$ | AI-20110257731-$ | NO-2011035154-$ | JP-2011502628-$ | JP-2011507658-$ | AI-20120046726-$ | AI-20120089218-$ | NO-2012147675-$ | AI-20130013050-$ | AI-20130144373-$ | NO-2013040663-$ | NO-2013059596-$ | NO-2013086132-$ | AI-20140046428-$ | AI-20140172064-$ | AI-20140316513-$ | AI-20140336749-$ | NO-2014072501-$ | AI-20160022450-$ | AI-20160270935-$ | AI-20170209254-$ | EP-2787925-$ | BI-3482228-$ | BI-3582462-$ | BI-5254632-$ | BI-5334868-$ | JS-2012068165-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; DERWENT	OR	OFF	2020/06/06 16:05
S167	34	(US-16808137-$ | US-20020052649-$ | US-20040243221-$ | US-20040256759-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20090105805-$ | US-20100204781-$ | US-20120123529-$ | US-20120296418-$ | US-20130090729-$ | US-3370418-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; DERWENT	OR	OFF	2020/06/06 16:07
S168	1	(AI-20020052649-$ | AI-20040243221-$ | AI-20040256759-$ | JP-2005124959-$	US-PGPUB; USPAT;	OR	OFF	2020/06/06 16:07

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S169	6	((frame with (inner and outer) same seal$4) same graft) and (heart with valve)	US-PGPUB; USPAT	OR	OFF	2020/06/06 16:53
S170	7	((frame same (inner and outer) same seal$4) same graft) and (heart with valve)	US-PGPUB; USPAT	OR	OFF	2020/06/06 17:50
S171	1	("9370419").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/06 19:30
S172	627	("20010039450" | "20020013571" | "20020026216" | "20020082630" | "20020107565" | "20020123802" | "20020151970" | "20020183835" | "20020183838" | "20020188348" | "20020198594" | "20030023303" | "20030050694" | "20030078652" | "20030130729" | "20030153943" | "20030163194" | "20030167071" | "20030171806" | "20030199975" | "20030229394" | "20030229395" | "20030233142" | "20030236568" | "20030236569" | "20040002719" | "20040003819" | "20040010305" | "20040015230" | "20040015232" | "20040015233" | "20040019374" | "20040019377" | "20040019378" | "20040024447" | "20040024451" | "20040024452" | "20040030321" | "20040030381" | "20040030382" | "20040030405" | "20040034380" | "20040034411" | "20040039436" | "20040039442" | "20040039443" | "20040044350" | "20040044365" | "20040044403" | "20040049207" | "20040049211" | "20040049266" | "20040059351" | "20040059411" | "20040059412" | "20040060161" | "20040073301" | "20040073302" | "20040078072" | "20040078074" | "20040082910" | "20040082923" | "20040082991" | "20040087975" | "20040088045" | "20040088046" | "20040092858" | "20040093060" | "20040093070" | "20040093080" | "20040097979" | "20040098098" |	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/06 19:31

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S176	1,905	S175 and (seal$4)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/07 10:04
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S183	5,229	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S184	4,210	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S185	2,127	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S186	1,467	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S187	11,297	S182 S183 S184 S185 S186	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S188	2,885	S181 and S187	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S189	1	("7799072").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 10:48
S190	4	"16736879"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 13:27
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S195	10	(CN-102014805-$ | NO-2005087117-$ | NO-2006127412-$ | NO-2010006627-$ | NO-2010031060-$ | NO-2010105195-$ | NO-2011035154-$ | JP-2011502628-$ | JP-2011507658-$ | EP-2787925-$ | JS-2012068165-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 14:37
S196	50	(US-10034784-$ | US-10065824-$ | US-16736879-$ | US-19857887-$ | US-20010044650-$ | US-20020082684-$ | US-20040249399-$ | US-20070219613-$ | US-20090036977-$ | US-20090099650-$ | US-20100087907-$ | US-20130013050-$ | US-3002816-$ | US-3025694-$ | US-3220613-$ | US-3289282-$ | US-3482228-$ | US-3506622-$ | US-3545549-$ | US-3562673-$ | US-3652198-$ | US-3715337-$ | US-3757263-$ | US-5464721-$ | US-5609627-$ | US-5773457-$ | US-5814752-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 14:41
S197	8	(DE-10065824-$ | DE-19857887-$ | AI-20010044650-$ | AI-20020082684-$ | AI-20040249399-$ | AI-20070219613-$ | AI-20090036977-$ | AI-20090099650-$ | AI-20100087907-$ | AI-20130013050-$ | NO-2013040663-$ | NO-2013059596-$ | NO-2014072501-$ | BI-3482228-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 14:41
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S210	2,147	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/07/20 11:59
S211	1,470	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/07/20 11:59
S212	11,433	S207 S208 S209 S210 S211	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/07/20 11:59
S215	56	2006/124649	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 09:23
S216	0	wo2006/124649	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 09:23
S217	0	(2006/124649).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 09:23

S218	0	(2006/0124649).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 09:24
S219	5	("2006124649").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; DERWENT	OR	OFF	2020/07/29 09:24
S220	1	"16808137"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 09:55
S221	4	"20090125098"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 11:29
S222	7	"20030040771"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 11:30
S223	1,779	(cuff with (fiber barb))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 11:58
S224	270	("20020036220" | "20030023303" | "20030050694" | "20030130726" | "20040049262" | "20040093075" | "20040102837" | "20040111111" | "20040210304" | "20040260389" | "20050096726" | "20050137682" | "20050137695" | "20050137697" | "20050203605" | "20050256566" | "20060008497" | "20060020327" | "20060025857" | "20060036308" | "20060074484" | "20060122692" | "20060149360" | "20060161249" | "20060173532" | "20060178740" | "20060206202" | "20060241744" | "20060241745" | "20060259120" | "20060259136" | "20060259137" | "20060265056" | "20060276813" | "20060276874" | "20070010876" |	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 12:03

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"20080125853" | "20080140189" |
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S225	1	(spense.in.) and valve	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 12:22
S226	573	(spence.in.) and valve	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 12:22
S227	10	(US-20070288087-$ | US-20100217382-$ | US-20100249916-$ | US-20120123529-$ | US-20200197199-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/04 10:17

S228	16	(US-3370418-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-7175652-$ | US-7470284-$ | US-7740656-$ | US-7972370-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/04 10:19
S229	34	(US-16910189-$ | US-20020052649-$ | US-20040243221-$ | US-20040256759-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20090105805-$ | US-20100204781-$ | US-20120123529-$ | US-20120296418-$ | US-20130090729-$ | US-3370418-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/04 10:19
S230	5	(AI-20020052649-$ | AI-20040243221-$ | AI-20040256759-$ | JP-2005124959-$ | WO-2006005015-$ | AI-20070179591-$ | AI-20070213815-$ | AI-20070219620-$ | AI-20080021547-$ | AI-20090105805-$ | AI-20100204781-$ | AI-20120123529-$ | AI-20120296418-$ | AI-20130090729-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/04 10:20
S231	7,889	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S232	5,349	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S233	4,324	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S234	2,182	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S235	1,479	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S236	11,602	S231 S232 S233 S234 S235	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53

S237	22	S236 and ((fibers with collagen) same migration)	US-PGPUB; USPAT	OR	OFF	2020/08/28 15:54
S238	1,634	S236 and ((fibers))	US-PGPUB; USPAT	OR	OFF	2020/08/28 15:55
S239	1,688	S236 and ((fibers))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:55
S240	332	S236 and ((fibers)) and (frame and graft)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:55
S245	4	(US-10716662-$ | US-16910189-$ | US-20090143855-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/09/27 23:02
S246	3	(wO-2001049213-$ | wO-2004032987-$ | AI-20090143855-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/09/27 23:04
S247	361	"4164046"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/09/27 23:09
S248	1	("4164046").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/09/27 23:09
S249	1	("20070142907").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/09/27 23:11
S256	85	(shahriari near ali).in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 14:07
S257	51	"2006124649"	US-PGPUB; USPAT;	OR	OFF	2020/11/06 15:17

			USOCR; FPRS; EPO; JPO; DERWENT			
S258	0	("2006124649").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 15:17
S259	25	"12882605"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:02
S260	0	"12882605.app"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:03
S261	0	"12882605".app.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:03
S262	0	("12882605").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 16:03
S263	0	("2006018514").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 16:03
S264	1	("20060018514").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 16:03
S265	7	"20060018514"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:04
S266	30	"2006018514"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:04
S267	16	(US-10716662-$ | US-17024060-$ | US-20070288087-$ | US-20090143855-$ |	US-PGPUB; USPAT;	OR	OFF	2020/11/06 19:25

		US-20100217382-$ | US-20100249916-$ | US-20120123529-$ | US-20200197199-$ | US-3992608-$).DID.	USOCR; FPRS; EPO; JPO; DERWENT			
S268	0	("(NO-2001049213-$\|NO-2004032987-$|AI-20070288087-$\|AI-20090143855-$|AI-20100217382-$\|AI-20100249916-$|NO-2011069048-$\|AI-20120123529-$|AI-20200197199-$\|VA-223131450-$).DID.").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 19:25
S269	0	(WO-2001049213-$ | NO-2004032987-$ | AI-20070288087-$ | AI-20090143855-$ | AI-20100217382-$ | AI-20100249916-$ | NO-2011069048-$ | AI-20120123529-$ | AI-20200197199-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 19:26
S272	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:22
S273	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:23
S274	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:24
S275	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:25
S276	5,725	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:26
S277	26,012	A61F2/07.CPC.	US-PGPUB; USPAT;	OR	OFF	2021/01/16 10:26

			USOCR; FPRS; EPO; JPO; DERWENT			
S278	17,240	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:26
S279	17,642	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:26
S280	3,934	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S281	5,886	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S282	7,416	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S283	11,668	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S284	18,724	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S285	5,565	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR;	OR	OFF	2021/01/16 10:27

			FPRS; EPO; JPO; DERWENT			
S286	4,782	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S287	535	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S288	12,232	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S289	1,710	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S290	11,758	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S291	15,314	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S292	32,596	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S293	9,253	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/01/16 10:28

			JPO; DERWENT			
S294	17,878	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S295	3,437	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S296	3,130	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S297	14,644	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S298	1,594	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S299	3,931	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S300	2,511	(S272 S273 S274 S275 S276 S277 S278 S279 S280 S281 S282 S283 S284 S285 S286 S287 S288 S289 S290 S291 S292 S293 S294 S295 S296 S297 S298 S299) and (heart adj3 valve) and (fiber$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:31
S301	1,676	S300 and (seal$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/01/16 10:33

			JPO; DERWENT			
S302	48	((("SHAHRIARI") near3 ("Ali"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2021/01/16 11:48
S303	13	((("AORTIC") near3 ("INNOVATIONS") near3 ("LLC"))).AS,AANM.	USPAT	OR	OFF	2021/01/16 11:49
S304	13	(US-10258464-$ | US-20110218619-$ | US-20110319991-$ | US-3339377-$ | US-3408214-$ | US-3532868-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/26 17:20
S305	2	(US-20120123529-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/26 17:21
S306	4	"16910189"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/26 18:34
S307	2	"17060557"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/26 18:35
S309	8	(US-10792172-$ | US-20020052649-$ | US-3333075-$ | US-3370418-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:46
S310	3	(("9333075") or ("7921678") or ("9370418")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/11 17:48
S311	15	(US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:48

S312	0	("(us-20130304196-$).DID.").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/11 17:49
S313	2	(us-20130304196-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:49
S315	1	("20120123529").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/11 17:50
S317	0	(AI-20020052649-$ | AI-20060276813-$ | AI-20080077236-$ | AI-20080188929-$ | AI-20080319521-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:51
S318	10	(US-20020052649-$ | US-20060276813-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:52
S319	2	(US-20110009948-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:54
S320	5	"20060005015"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:55
S321	96	"2006005015"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:55
S322	5	"15876053"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:11

S323	2	("2018/0206982").URPN.	USPAT	OR	OFF	2021/02/13 09:12
S324	0	"20010049555"	USPAT	OR	OFF	2021/02/13 09:14
S325	4	"20010049555"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:14
S326	3	"20070233228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:16
S327	3	"20120296418"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:16
S328	822	("20010021872" | "20020026094" | "20020032481" | "20020138135" | "20020173842" | "20030050694" | "20030100939" | "20030158597" | "20030212454" | "20040039436" | "20040186563" | "20040186565" | "20050075728" | "20050096736" | "20050188525" | "20050203614" | "20050203617" | "20050234546" | "20060004469" | "20060025857" | "20060058872" | "20060149350" | "20060183383" | "20060229719" | "20060259137" | "20070005131" | "20070010876" | "20070010877" | "20070112422" | "20070162102" | "20070203503" | "20070203575" | "20070203576" | "20070213813" | "20070260305" | "20070265700" | "20080114442" | "20080125853" | "20080154355" | "20080183271" | "20090125118" | "20090157175" | "20090276040" | "20090281619" | "20090299452" | "20090319037" | "20100049313" | "20100168844" | "20100198347" | "20100204781" | "20110015729" | "20110319991" | "20120259409" | "20130023985" | "20130190857" | "20130274873" | "20130310926" | "20130317598" |	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:25

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S329	4	("20130190862" | "20160317305").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:26
S330	4	("20070233228" | "20120296418").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:27
S331	835	("20020173842" | "20030100939" | "20040186563" | "20050203617" | "20070162102" | "20080183271" | "20100204781" | "20130274873" | "20140200661" | "20150073546" | "4222126" | "4733665" | "4759758" | "4777951" | "5026366" | "5032128" | "5332402" | "5411055" | "5558644" | "5571175" | "5609626" | "6231602" | "6425916" | "6440764" | "6689123" | "6893460" | "6936067" | "7655034" | "7993394" | "8652203" | "20030212454" | "20050075728" | "20070112422" | "20100168844" | "20100198347" | "4829990" | "5397351" | "5545214" | "5549665" | "5584803" | "5855602" | "6027525" | "6132473" | "6168614" | "6221091" | "6302906" | "6350277" | "6454799" | "6605112" | "6908481" | "7510575" | "7563280" | "20070233228" | "20020138135" | "20050203614" | "20050234546" | "20060149350" | "20070260305" | "3714671" | "4297749" | "4441216" | "4692164" | "4762128" | "4883458" | "4994077" | "5007896" | "5163953" | "5360444" | "5411552" | "5591185" | "5639274" | "5665115" | "5716417" | "5749890" | "5756476" | "5855601" | "6171335" | "6245102" | "6299637" | "6488704" | "6569196" | "6769161" | "7393360" | "7585321" | "7959672" | "8167932" | "8747463" |	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:27

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S332	11	WO2006124649	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 10:13
S333	53	"2006124649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 10:14
S334	0	"17131869"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 11:12
S335	2	"17060557"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 11:12
S336	13	S328 and (outer$4 with (graft))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 11:49
S337	27	S328 and ((outer$4 exter$4 outsid$$)with (graft))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:00
S338	36,075	l11and ((outer$4 exter$4 outsid$$)with (graft))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:14

S339	27	S331 and ((outer$4 exter$4 outsid$$)with (graft))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:14
S340	13	(US-10258464-$ | US-20110218619-$ | US-20110319991-$ | US-3339377-$ | US-3408214-$ | US-3532868-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:56
S341	12	(US-20020052649-$ | US-20060276813-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-3333075-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:57
S342	4	"20110098802"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 15:10
S343	1	("9333075").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/17 05:33
S344	10	(US-20020052649-$ | US-20060276813-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/17 05:40
S345	70	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17007373-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 12:07

		5665117-$ | US-5824037-$ | US-20130144373-$).DID.				
S346	10	"16808137"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 14:38
S347	34	"10555823"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 14:50
S348	2	"16983196"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 15:15
S349	1	("10881538").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/03/21 15:20
S350	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S351	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S352	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S353	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03

S354	5,771	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S355	26,423	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S356	17,810	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S357	17,863	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S358	4,039	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S359	6,081	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S360	7,540	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S361	11,779	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03

S362	18,985	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S363	5,683	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S364	4,850	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S365	554	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S366	12,658	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S367	1,774	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S368	12,050	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S369	15,676	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03

S370	32,778	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S371	9,317	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S372	18,227	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S373	3,573	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S374	3,174	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S375	14,799	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S376	1,655	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S377	4,153	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03

S378	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S379	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S380	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S381	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S382	5,771	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S383	26,423	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S384	17,810	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S385	17,863	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13

S386	4,039	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S387	6,081	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S388	7,540	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S389	11,779	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S390	18,985	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S391	5,683	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S392	4,850	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S393	554	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13

S394	12,658	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S395	1,774	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S396	12,050	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S397	15,676	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S398	32,778	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S399	9,317	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S400	18,227	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S401	3,573	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13

S402	3,174	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S403	14,799	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S404	1,655	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S405	4,153	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S406	2,578	(S378 S379 S380 S381 S382 S383 S384 S385 S386 S387 S388 S389 S390 S391 S392 S393 S394 S395 S396 S397 S398 S399 S400 S401 S402 S403 S404 S405) and (heart adj3 valve) and (fiber$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S407	15	((frame same (inner and outer) same seal$4) same graft) and (heart with valve)	US-PGPUB; USPAT	OR	OFF	2021/03/25 16:13
S408	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S409	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S410	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/25 16:13

		$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	JPO; DERWENT			
S411	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S412	5,773	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S413	26,431	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S414	17,826	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S415	17,867	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S416	4,044	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S417	6,084	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S418	7,541	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/25 16:13

			JPO; DERWENT			
S419	11,784	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S420	18,994	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S421	5,686	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S422	4,852	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S423	554	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S424	12,667	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S425	1,775	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S426	12,059	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/25 16:13

			JPO; DERWENT			
S427	15,690	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S428	32,783	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S429	9,318	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S430	18,235	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S431	3,576	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S432	3,174	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S433	14,804	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S434	1,655	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/25 16:13

			JPO; DERWENT			
S435	4,158	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S436	2,585	(S408 S409 S410 S411 S412 S413 S414 S415 S416 S417 S418 S419 S420 S421 S422 S423 S424 S425 S426 S427 S428 S429 S430 S431 S432 S433 S434 S435) and (heart adj3 valve) and (fiber$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S438	0	("13706896").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/03/27 09:37
S439	34	"13706896"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 09:37
S440	1	("7799072").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/03/27 09:58
S441	70	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17170957-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:38
S442	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/27 10:39

			JPO; DERWENT			
S443	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S444	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S445	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S446	5,776	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S447	26,437	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S448	17,841	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S449	17,872	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S450	4,046	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/27 10:39

			JPO; DERWENT			
S451	6,089	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S452	7,542	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S453	11,785	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S454	18,999	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S455	5,689	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S456	4,854	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S457	555	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S458	12,674	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/27 10:39

			JPO; DERWENT			
S459	1,777	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S460	12,063	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S461	15,695	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S462	32,786	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S463	9,323	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S464	18,239	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S465	3,579	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S466	3,175	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/27 10:39

			JPO; DERWENT			
S467	14,810	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S468	1,657	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S469	4,160	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S470	2,587	(S442 S443 S444 S445 S446 S447 S448 S449 S450 S451 S452 S453 S454 S455 S456 S457 S458 S459 S460 S461 S462 S463 S464 S465 S466 S467 S468 S469) and (heart adj3 valve) and (fiber$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S471	0	("16910189").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/04/08 16:49
S472	6	"16910189"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 16:49
S473	11	"16808137"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 17:22
S474	1	("10881538").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/04/08 18:29
S475	2	"16941117"	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/04/08 18:36

			JPO; DERWENT			
S476	72	(US-10016271-$ | US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17006793-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 23:48
S477	0	(AI-20020052649-$ | AI-20030153974-$ | AI-20040243221-$ | AI-20040256759-$ | NO-2006005015-$ | AI-20060276813-$ | NO-2006124649-$ | AI-20070179591-$ | AI-20070213815-$ | AI-20070219620-$ | AI-20080021547-$ | AI-20080077236-$ | AI-20080188929-$ | AI-20080319521-$ | AI-20090105805-$ | AI-20100204781-$ | AI-20110009948-$ | AI-20110098802-$ | AI-20110218619-$ | AI-20110319991-$ | AI-20120123529-$ | AI-20120296418-$ | AI-20130304196-$ | NO-3829057-$ | IF-617622-$ | SO-0225223-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 23:48
S478	54	"2006124649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/09 09:42
S479	3	"20060259136"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/09 14:18
S480	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/04/09 16:30

		20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.				
S481	28	S480 and (mitral)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/09 16:37
S482	6	"20020052649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/10 11:44
S483	2	"17170957"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/10 15:48
S484	2	"17170957"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/24 09:59

S485	5	"17060557"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/24 09:59
S486	6	"20020052649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/24 10:57
S487	55	"2006124649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 10:15
S488	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/04/27 10:19
S489	39	S488 and (seal with3 (inflow and outflow))	US-PGPUB; USPAT;	OR	OFF	2021/04/27 10:19

			USOCR; FPRS; EPO; JPO; DERWENT			
S490	41	S488 and (seal$4 with3 (inflow and outflow))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 10:23
S491	21	("2014/0316513").URPN.	USPAT	OR	OFF	2021/04/27 10:28
S492	0	"17006793"	USPAT	OR	OFF	2021/04/27 10:32
S493	1	"16792197"	USPAT	OR	OFF	2021/04/27 10:32
S494	4	"20110098802"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 11:19
S496	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/04/27 19:42

		US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.				
S497	41	S496 and (seal$4 with3 (inflow and outflow))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 19:42
S498	4	"20110098802"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/05/24 12:23
S499	15	((("AORTIC") near3 ("INNOVATIONS") near3 ("LLC"))).AS,AANM.	USPAT	OR	OFF	2021/05/25 08:57
S500	54	((("SHAHRIARI") near3 ("Ali"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2021/05/25 08:57
S503	22	(US-17170957-$ | US-20050240137-$ | US-20060013863-$ | US-20140277424-$ | US-20150148889-$ | US-20150335424-$ | US-20150335429-$ | US-20160022444-$ | US-20190192286-$ | US-20200352707-$ | US-3039757-$ | US-3421098-$ | US-3834552-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/05/30 17:02
S504	74	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17213251-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-20150335429-$ | US-20160022444-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/02 13:20

S505	3	"17007373"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/02 16:13
S506	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/06/03 13:29
S507	15	S506 and (collagen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:29
S508	22	(US-17170957-$ | US-20050240137-$ | US-20060013863-$ | US-20140277424-$ | US-20150148889-$ | US-20150335424-$ | US-20150335429-$ | US-20160022444-$ | US-20190192286-$ | US-20200352707-$ | US-3039757-$ | US-3421098-$ | US-3834552-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:55

S509	74	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17213251-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-20150335429-$ | US-20160022444-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:55
S510	92	S508 S509	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:55
S511	10	S510 and (collagen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:55
S512	232	(collagen same fibers same graft) and (heart and valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 14:01
S513	1	("7921678").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/06/03 14:08
S514	35	(US-17170957-$ | US-20030153974-$ | US-20060025857-$ | US-20060074484-$ | US-20070282436-$ | US-20100036484-$ | US-20110040367-$ | US-20110098802-$ | US-20110125244-$ | US-20110166636-$ | US-20120022633-$ | US-20120071969-$ | US-20120310328-$ | US-20130018458-$ | US-20130073030-$ | US-20140018915-$ |	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/18 10:36

		US-20140155997-$ | US-20170128209-$).DID.				
S518	6	(("20130018458") or ("20110125244") or ("20110166636") or ("20110098802") or ("20060074484") or ("20120310328")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/01 09:32
S520	102	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17327673-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060025857-$ | US-20060074484-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20070282436-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100036484-$ | US-20100204781-$ | US-20110009948-$ | US-20110040367-$ | US-20110098802-$ | US-20110125244-$ | US-20110166636-$ | US-20110218619-$ | US-20110319991-$ | US-20120022633-$ | US-20120071969-$ | US-20120123529-$ | US-20120296418-$ | US-20120310328-$ | US-20130018458-$ | US-20130073030-$ | US-20130304196-$ | US-20140018915-$ | US-20140155997-$ | US-20150335429-$ | US-20160022444-$ | US-20170128209-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/21 16:59
S521	0	(AI-20020052649-$ | AI-20030153974-$ | AI-20040243221-$ | AI-20040256759-$ | AI-20060025857-$ | NO-2006005015-$ | AI-20060074484-$ | AI-20060276813-$ | NO-2006124649-$ | AI-20070179591-$ | AI-20070213815-$ | AI-20070219620-$ | AI-20070282436-$ | AI-20080021547-$ | AI-20080077236-$ | AI-20080188929-$ | AI-20080319521-$ | AI-20090105805-$ | AI-20100036484-$ | AI-20100204781-$ | AI-20110009948-$ | AI-20110040367-$ | AI-20110098802-$ | AI-20110125244-$ | AI-20110166636-$ | AI-20110218619-$ | AI-20110319991-$ | AI-20120022633-$ | AI-20120071969-$ | AI-20120123529-$ | AI-20120296418-$ | AI-20120310328-$	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/21 17:17

		| NO-2012068175-$ | AI-20130018458-$ | AI-20130073030-$ | AI-20130304196-$ | AI-20140018915-$ | AI-20140155997-$ | AI-20150335429-$ | AI-20160022444-$ | AI-20170128209-$ | NO-3829057-$ | SO-0225223-$ | VA-223131450-$).DID.				
S522	0	"17327673"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/22 11:09
S523	4	"17096253"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/22 11:10
S526	17	((("AORTIC") near3 ("INNOVATIONS") near3 ("LLC"))).AS,AANM.	USPAT	OR	OFF	2021/07/22 15:41
S527	58	((("SHAHRIARI") near3 ("Ali"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2021/07/22 15:41
S528	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/07/25 16:50

		(WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.				
S529	15	S528 and collagen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/25 16:50
S530	4	"20110098802"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/25 17:00
S531	23	"2005023584"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/25 17:16
S532	12	"20050023584"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/25 17:17
S533	0	("2005023584").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/25 17:18
S534	1	("20050023584").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/25 17:18
S535	1	("20060004442").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/25 17:19
S536	398	("2006/0004442").URPN.	USPAT	OR	OFF	2021/07/25 17:20
S537	1	("20130018458").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/25 17:28
S539	41	"13706896"	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/07/30 11:20

			JPO; DERWENT			
S542	22	"10299917"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/08/23 10:08
S545	234	(collagen same fibers same graft) and (heart and valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/08/25 14:20
S546	3	"20060276813"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/08/26 12:46
S547	25	"2011143263"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/08/26 12:47
S548	8	("20030153974" | "3365728" | "5411552" | "6893460" | "7393360" | "7510575" | "9393110" | "9829057").PN.	US-PGPUB; USPAT	OR	OFF	2021/11/16 10:19
S549	1	(("20060276813") or ("2011143263")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/11/16 10:26
S550	2	(("20060276813") or ("20110143263")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/11/16 10:26
S551	25	"2011143263"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/11/16 10:27
S552	2	"16941117"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/11/16 13:48

S553	9	("20030153974" | "20060276813" | "3365728" | "5411552" | "6893460" | "7393360" | "7510575" | "9393110" | "9829057").PN.	US-PGPUB; USPAT	OR	OFF	2021/11/17 16:07
S554	6	"20120123529"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/11/19 19:46
S555	3	"20050273155"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/11/19 20:08
S556	1	("7511575").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/11/20 14:26
S557	1	("7510575").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/11/20 14:26
S558	1	("11129735").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/11/20 16:09
S559	1	("11045335").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/11/20 16:10
S560	1	("11026817").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/11/20 16:11
S561	1	("10966846").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/11/20 16:11
S562	1	("10888441").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/11/20 16:20
S563	3	(("10881538") or ("10857011") or ("10792172")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/11/20 16:20
S564	13	("20020052649" | "20030153974" | "20090281619" | "20110098802" | "3365728" | "5411552" | "5957949" | "6730118" | "6893460" | "7393360" | "7510575" | "7585321" | "9393110").PN.	US-PGPUB; USPAT	OR	OFF	2021/11/28 06:03

S565	1	("20120123529").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/11/28 10:31
S566	1	("7510575").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/11/28 10:47
S567	1	("20120123529").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/12/02 15:03

12/2/2021 4:09:30 PM
C:\Users\tshipmon\Documents\EAST\Workspaces\13706896.wsp

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16941117
Filing Date	2020-07-28
First Named Inventor	Ali Shahriari
Art Unit	3774
Examiner Name	Shipmon, Tiffany
Attorney Docket Number	426/2/12 UTIL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	3365728	A	1968-01-30	Lowell et al.	
	2	5411552		1995-05-02	Andersen et al.	
	3	5957949		1999-09-28	Leonhardt et al.	
	4	6730118		2004-05-04	Spenser et al.	
	5	6893460		2005-05-17	Spenser et al.	
	6	7393360		2008-07-01	Spenser et al.	
	7	7510575		2009-03-31	Spenser et al.	
	8	7585321		2009-09-08	Cribier	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.P.S/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16941117
	Filing Date	2020-07-28
	First Named Inventor	Ali Shahriari
	Art Unit	3774
	Examiner Name	Shipmon, Tiffany
	Attorney Docket Number	426/2/12 UTIL

	9	9393110		2016-07-19	Levi et al.	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20020052649	A1	2002-05-02	Greenhalgh	
	2	20030153974	A1	2003-08-14	Spenser et al.	
	3	20090281619	A1	2009-11-12	Le et al.	
	4	20110098802	A1	2011-04-28	Braido et al.	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2006005015	WO	A2	2011-04-28	Spenser		
	2	2006124649	WO	A2	2006-11-23	Nguyen et al.		

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.P.S/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16941117
	Filing Date	2020-07-28
	First Named Inventor	Ali Shahriari
	Art Unit	3774
	Examiner Name	Shipmon, Tiffany
	Attorney Docket Number	426/2/12 UTIL

	3	2011051043	WO	A1	2011-05-05	Essinger et al.			
	4	9829057	WO	A1	1998-07-09	Letac			

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	1	Walther, Trans-catheter valve-in-valve implantation ("Walther"), April 2011	
	2	Conradi, Transcatheter aortic and mitral valve interventions, 2010	
	3	Cribier, Technique of Transcatheter Aortic Valve Implantation ("Cribier"), 2009	
	4	Alkashkari, Percutaneous Pulmonary Valve Implantation ("Alkashkari"), September 2010	
	5	Cheung, Transapical Transcatheter Mitral Valve-in-valve Implantation, 2009	
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	Filing Date	2020-07-28
	First Named Inventor	Ali Shahriari
	Art Unit	3774
	Examiner Name	Shipmon, Tiffany
	Attorney Docket Number	426/2/12 UTIL

	8	Smith, Transcatheter versus Surgical Aortic-Valve Replacement, June 9, 2011	
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	21	Kainuma, Transcatheter aortic valve implantation, April 2011	
	22	Craido, Iliac Arterial Conduits, 2007	
	23	Piazza, Anatomy of the Aortic Valvar Complex, 2008	
	24	Buller, Nigel declaration, IPR IPR2022-00193, associated documents	
	25	Buller, Nigel declaration, IPR IPR2022-00034, associated documents	
	26	Buller, Nigel declaration, IPR IPR2021-01584, associated documents	
	27	Buller, Nigel declaration, IPR IPR2021-01527, associated documents	
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	Art Unit	3774
	Examiner Name	Shipmon, Tiffany
	Attorney Docket Number	426/2/12 UTIL

EXAMINER SIGNATURE			
Examiner Signature	/TIFFANY P SHIPMON/	Date Considered	11/28/2021

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	Examiner Name	Shipmon, Tiffany
	Attorney Docket Number	426/2/12 UTIL

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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	/Justin R. Nifong/	Date (YYYY-MM-DD)	2021-11-24
Name/Print	Justin R. Nifong	Registration Number	59389

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Application Number	16941117
Filing Date	2020-07-28
First Named Inventor	Ali Shahriari
Art Unit	3774
Examiner Name	Shipmon, Tiffany
Attorney Docket Number	426/2/12 UTIL

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	1	3365728	A	1968-01-30	Lowell et al.	
	2	5411552		1995-05-02	Andersen et al.	
	3	5957949		1999-09-28	Leonhardt et al.	
	4	6730118		2004-05-04	Spenser et al.	
	5	6893460		2005-05-17	Spenser et al.	
	6	7393360		2008-07-01	Spenser et al.	
	7	7510575		2009-03-31	Spenser et al.	
	8	7585321		2009-09-08	Cribier	

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	1	20020052649	A1	2002-05-02	Greenhalgh	
	2	20030153974	A1	2003-08-14	Spenser et al.	
	3	20090281619	A1	2009-11-12	Le et al.	
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	1	2006005015	WO	A2	2011-04-28	Spenser		
	2	2006124649	WO	A2	2006-11-23	Nguyen et al.		

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	3	2011051043	WO	A1	2011-05-05	Essinger et al.			
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Name/Print	Justin R. Nifong	Registration Number	59389

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Electronic Patent Application Fee Transmittal	
Application Number:	16941117
Filing Date:	28-Jul-2020
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Filer:	Justin Robert Nifong
Attorney Docket Number:	426/2/12 UTIL
Filed as Small Entity	
Filing Fees for Utility under 35 USC 111(a)	

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
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Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	2806	1	130	130
		Total in USD ($)		**130**

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EFS ID:	44360601
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	175373
Filer:	Justin Robert Nifong
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Attorney Docket Number:	426/2/12 UTIL
Receipt Date:	24-NOV-2021
Filing Date:	28-JUL-2020
Time Stamp:	07:49:32
Application Type:	Utility under 35 USC 111(a)

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Payment Type	CARD
Payment was successfully received in RAM	$130
RAM confirmation Number	E2021AN851491059
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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

COMMUNICATION TO THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	16/941,117	Confirmation No.:	1876
Applicant	:	Aortic Innovations, LLC		
First Named Inventor	:	Ali Shahriari		
Filing Date	:	July 28, 2020		
TC/A.U.	:	3774		
Examiner	:	Shipmon, Tiffany		
Docket No.	:	426/2/12 UTIL		
Customer No.	:	175373		

Title of Invention: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

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

RESPONSE TO OFFICE ACTION DATED OCTOBER 26, 2021

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 5 of this paper.

Amendments to the Claims:

The claims are amended as follows and will replace all previous versions and listings of claims:

Listing of Claims:

Claims 1-30 (Canceled)

31. (Currently Amended) A transcatheter heart valve assembly comprising:

~~an inner frame comprising~~ a graft covering housing a prosthetic heart valve, wherein the graft covering extends around the prosthetic heart valve for providing sealing to the heart valve;

an outer frame formed from a metallic material and defining an open cell configuration, and being secured to the graft covering by a plurality of stitches; and

a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks,

wherein the sealing material is attached to the outer frame,

wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame;

wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer,

wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,

wherein the heart valve assembly has a radially compressed and a radially expanded orientation,

wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient,

wherein the outer frame extends distally further than the prosthetic heart valve.

Claims 32-33 (Canceled)

34. (Currently Amended) A transcatheter heart valve assembly comprising:

~~an inner frame comprising~~ a graft covering housing a prosthetic heart valve, wherein the graft covering extends radially outwardly around the prosthetic heart valve and radially inwardly of the outer frame for providing sealing to the heart valve;

an outer frame formed from a metallic material and defining an open cell configuration, and being secured to the graft covering by a plurality of stitches; and

a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks,

wherein the sealing material is attached to the outer frame,

wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame,

wherein the graft covering extends beyond the proximal end of the outer frame and over the proximal end thereof to cover the proximal end of the outer frame,

wherein the sealing material includes a plurality of radially extending fibers that form a circumferential surface that extends outwardly of the outer frame;

wherein the fibers cover at least two circumferentially extending rows of grids formed in the open cell configuration and the at least two circumferentially extending rows radially overlap with the prosthetic leaflets,

wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer,

wherein the valve assembly is balloon expandable during endovascular deployment,

wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,

wherein expansion of the valve assembly is configured to press the sealing material against native valve leaflets of an aorta of the patient,

wherein the sealing material is held against the outer frame as the valve expands from the radially compressed orientation to the radially expanded orientation.

35. (Canceled)

REMARKS

This is in response to the Office Action dated October 26, 2021.

Claim 31 is rejected under 35 USC 103(a) as being unpatentable over Spenser (USPN 7,510,575) in view of Dehdashtian (WO 2006/005015).

Claims 32-34 are rejected under 35 USC 103(a) as being unpatentable over Spenser in view of Dehdashtian and Bahler (US 2005/0273155).

Claims 35-36 are rejected under 35 USC 103(a) as being unpatentable over Spenser in view of Dehdashtian and Levi (USPN 9,393,110).

Claims 32-24 are canceled in response hereto. The cancellation renders moot the rejections under 35 USC 112.

Claim 35 has been amended to include the limitations of claim 36 (previously incorrectly numbered as claims 34 and 35, respectively), and to recite further limitations.

PRIOR ART REJECTION OF CLAIM 31

Claim 31 recites:

A transcatheter heart valve assembly comprising:

~~an inner frame comprising~~ a graft covering housing a prosthetic heart valve, wherein the graft covering extends around the prosthetic heart valve for providing sealing to the heart valve;

an outer frame formed from a metallic material and defining an open cell configuration, and being secured to the graft covering by a plurality of stitches; and

a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks,

wherein the sealing material is attached to the outer frame,

wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame;

wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer,

wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,

wherein the heart valve assembly has a radially compressed and a radially expanded orientation,

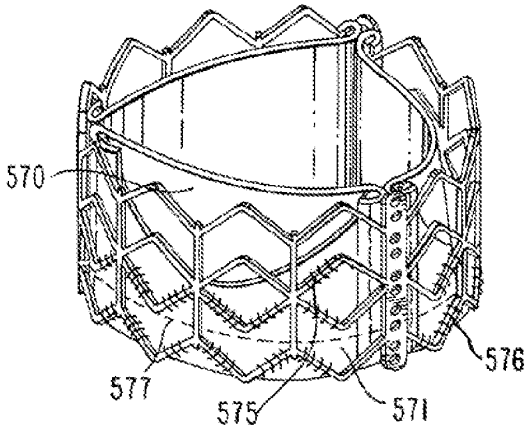
wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient,

wherein the outer frame extends distally further than the prosthetic heart valve.

(emphasis added)

The USPTO relies on FIG. 44a of Spenser in forming the prior art rejections:

FIG. 44a



And FIG. 22 of Dehdashtian:

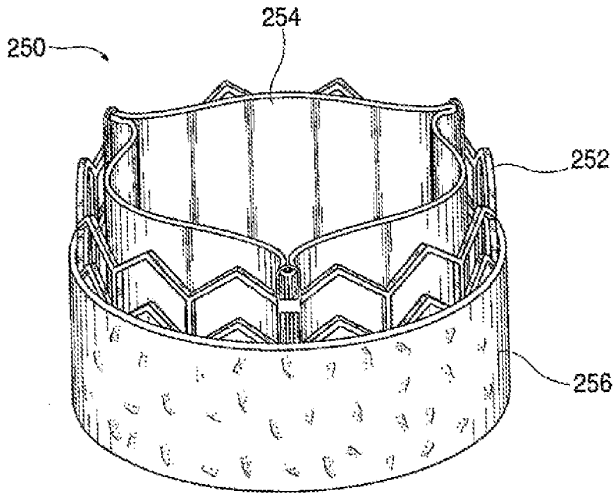
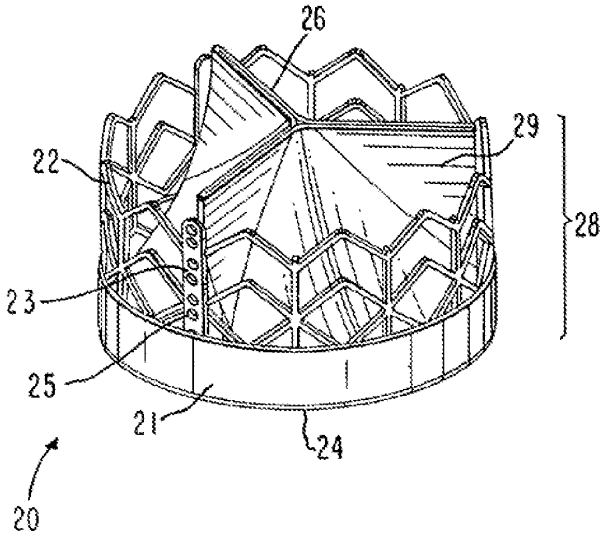


FIG. 22

According to the USPTO:

19. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the heart valve assembly of Spenser et al. to include a sealing member positioned externally to an outer frame as taught in Dehdashtian et al. in order to provide additional sealing against leakage. Additionally, Spenser et al. teaches an outer sealing member (21) in the embodiment of Fig. 1.

FIG. 1



The member 21 of FIG. 1 of Spenser is described as a "cuff portion 21" to "enhance the stability." It does not appear that cuff portion 21 is provided for addressing paravalvular leakage ("PVL"), the technical solution being addressed by the claimed invention. In fact, Dehdashtian teaches that cuff portion 21 of Spenser is not for addressing PVL.

Dehdashtian and Spenser share commonality in the majority of the listed inventors (see inventors Spenser, Benichu, and Bash), and the disclosures of the primary references have a significant amount of overlap. These inventors describe Spenser as "not address[ing] leaks that can occur around the implanted valve." ([0010] of Dehdashtian),

[0010] Spenser et al. also do not address leaks that can occur around the implanted valve.

Spenser further discloses:

A typical size of an aortic prosthetic valve is from about 19 to about 25 mm in diameter. ***A maximal size of a catheter inserted into the femoral artery should be no more than 8 mm in diameter****. The present invention introduces a device, which has the ability to change its diameter from about 4 mm to about 25 mm. Artificial valves are not new; however, artificial valves in accordance with the present invention posses the ability to change shape and size for the purpose of delivery and as such are novel. These newly designed valves require new manufacturing methods and technical inventions and improvements, some of which were described herein.*

(Emphasis added)

Valve crimp profile is of significant importance in transcatheter valves as Spenser recognizes. The crimp profile impacts not only the delivery route, but the ability to cross the native leaflets of the aorta for deployment. And each of the claims require some general limitation of endovascular deployment through the femoral artery.

It is bedrock analysis that if the proposed combination from the USPTO is incapable of meeting the claim limitations (in this instance, endovascular deployment through the femoral artery), then the proposed combination is not proper for rejecting the claims under 35 USC 103. Catheter size is typically expressed in terms of French numbers, where each millimeter of catheter diameter equates to a 3F increase in French size. Thus, an 8.00 mm diameter catheter would be expressed as a 24F system. Spenser states that an 8.00 mm diameter catheter is the maximal for femoral access, and thus a 24F catheter would be the maximum as well. Thus, if the proposed combination by the USPTO of Spenser and other references would yield a valve having a crimp profile greater than a 24F catheter size, then, according to the majority of the inventors of the primary references, the proposed combination cannot meet the claim limitation of endovascular deployment through the femoral artery.

Adding an outer seal to a valve structure such as Spenser is not trivial, and the results are not necessarily expected because of the aforementioned crimp profile concerns. Crimping of the valve necessarily creates "bunching" on the outside of the Spenser valve. This is well-illustrated in FIG. 26c of Spenser.

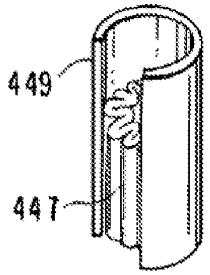


FIG.26c

As illustrated, addition of an outer seal necessarily adds significantly to the crimp profile, and further restricts full crimping of the valve. This is even more pronounced with the proposed combination by the USPTO, where adding the outer "band" of Dehdashtian is likely to significantly add to crimped profile such that the crimped profile will exceed the "maximal size [of]….. 8 mm in diameter."

Assuming *arguendo* that Spenser is capable of reaching a crimp profile of 4.00 mm as stated in Spenser, the addition of the minimal size thickness outer band as stated in Dehdashtian of 1.00 mm would result in a crimped profile that would not fit within a catheter with a maximum outer diameter of 8.00 mm.

This is not only well-illustrated with reference to the bunching shown in Fig. 26c of Spenser, but it is further well described with reference to simple calculations.

A catheter of 4.0 mm in outer diameter, assuming an infinitely thin wall thickness, necessarily has a crimped cross-area of:

$$A = \pi * (2.0\ mm)^2 = 12.56\ mm^2$$

Addition of a 1.0 mm outer seal to a 25 mm valve as disclosed by Spenser and Dehdashtian potentially creates an increase in cross-area of:

$$A = \pi * (13.5\ mm)^2 - (12.5\ mm)^2 = 81.64\ mm^2$$

Dehdashtian does teach that the band is a "layer of compressible material 256," so some amount of compression is expected. However, nowhere does Dehdashtian teach that the layer is compressible by over 600 percent to be able to go from a non-compressed area size of 81.64 mm^2 to a crimped area size of 12.56 mm^2 (this analysis entirely ignores the thickness of the stent frame itself; inclusion of the thickness of the stent frame for these calculations would further emphasize the mathematical impossibility presented by the proposed combination by the USPTO).

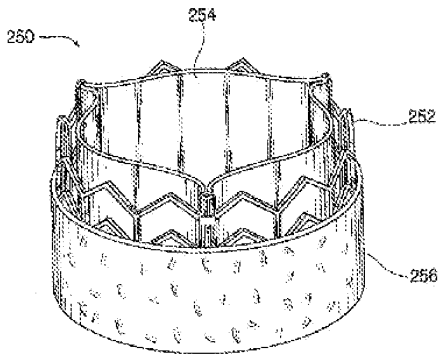
Applicant submits that a much larger catheter would be required in order to accommodate the proposed combination by the USPTO. And the much larger catheter would not be able to meet the claim limitation of the "heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient."

THE NON-PATENT LITERATURE OF RECORD SUPPORTS APPLICANT POSITION THAT THE PROPOSED COMBINATIONS CANNOT MEET THE LIMITATIONS OF CLAIM 31

The same Dehdashtian that is an inventor on one of the primary references collaborated with Walther to make a valve having the same general construction as the proposed combination used by the USPTO. This is shown in the Walther non-patent literature submitted herewith. The Walther non-patent literature indicates that the proposed combination cannot be deployed endovascularly through a femoral artery of the patient.

In the NPL of Walther, Dehdashtian and others reported on a mitral valve replacement similar to that which is shown in Figure 22 of Dehdashtian.

The similarity in the valve illustrated in the patent application of Dehdashtian and the publication by Dehdashtian and Walther is striking:



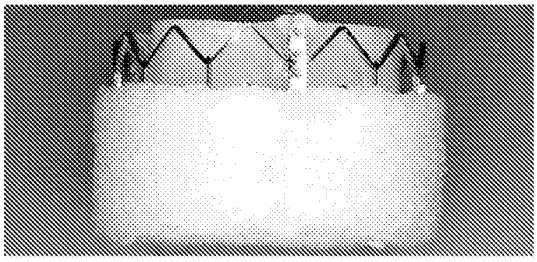


FIG. 22

In the Walther NPL, just as in the Dehdashtian Patent, a "cloth" valve is disclosed. (Described as a cloth valve in Walther, and described as "the compressible material 256 may resemble a cloth or fabric having small fibers extending from the surface of the material.") And Walther makes clear that a substantially larger catheter was required to deploy the cloth valve in a benchtop testing of a second implant, mitral valve in surgical valve deployment. In Walther, a 33F catheter was required for -use, having a profile of 11.0 mm, far greater than the 8.0 mm that Spenser indicates is a maximal diameter. ("A maximal size of a catheter inserted into the femoral artery should be no more than 8 mm in diameter" per Spenser, whereas Walther discloses "The SAPIEN valves were deployed inside various CEP valves (see Figs. 2 and 3) via the 33F Ascendra system"). The 11.00 mm 33F catheter allows for an area size of almost 95 mm^2 (again, assuming an infinitesimally small catheter wall thickness), which is needed to accommodate the additional profile size of the cloth seal of Walther and Dehdashtian.

This valve may have been suitable for benchtop testing as shown in the Walther NPL, or for surgical implantation in a valve-in-valve procedure where leaflets have already been removed from the patient, however, the valve is not suitable for endovascular deployment through the femoral artery, a requirement of the claims. And one of ordinary skill would not necessarily further modify the cloth of Dehdashtian to be of a smaller thickness because Dehdashtian utilizes "expan[sion] after deployment at a treatment site" and "as the compressible material expands, it fills the gaps between the stented valve and the surrounding tissue." And Dehdashtian also discloses "a cloth or fabric having small fibers extending from the surface of the material" and thus requires two distinct elements: the cloth base material, plus fibers extending from the cloth

base material. Thus, when considering that a certain amount of material must be present for the expansion of the compressible material, and that the seal has two distinct elements, it would not be routine to further reduce the thickness of the cloth material until a sufficient profile is reached.

Thus, Applicant has shown that not only does the proposed combination not teach the claim limitation of the "heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient" but that such a combination, even if it taught all elements of the claim, would be inoperable. MPEP 2143 makes clear that:

> *If a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)*

PRIOR ART REJECTION OF CLAIM 35

Claim 35 recites:

A transcatheter heart valve assembly comprising:

~~an inner frame comprising~~ a graft covering housing a prosthetic heart valve, wherein the graft covering extends radially outwardly around the prosthetic heart valve and radially inwardly of the outer frame for providing sealing to the heart valve;

an outer frame formed from a metallic material and defining an open cell configuration, and being secured to the graft covering by a plurality of stitches; and

a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks,

wherein the sealing material is attached to the outer frame,

wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame,

wherein the graft covering extends beyond the proximal end of the outer frame and over the proximal end thereof to cover the proximal end of the outer frame,

wherein the sealing material includes a plurality of radially extending fibers that form a circumferential surface that extends outwardly of the outer frame;

wherein the fibers cover at least two circumferentially extending rows of grids formed in the open cell configuration and the at least two circumferentially extending rows radially overlap with the prosthetic leaflets,

wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer,

wherein the valve assembly is balloon expandable during endovascular deployment,

wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,

wherein expansion of the valve assembly is configured to press the sealing material against native valve leaflets of an aorta of the patient,

wherein the sealing material is held against the outer frame as the valve expands from the radially compressed orientation to the radially expanded orientation.

In rejecting this claim (prior to the amendment reflected with underling), the USPTO further relies on Levi. Applicant submits that Levi is not combinable with the other references of record to arrive at claim 35. Claim 35 requires that the "sealing material is held against the outer frame as the valve expands from the radially compressed orientation to the radially expanded orientation." Levi is not capable of meeting this limitation, and any modification including Levi would render Levi inoperable.

Levi functions by having an outer skirt 18 with excess skirt material to create "slack" in the outer seal (FIG. 3, reproduced below) so that when the valve is crimped, the slack allows for elongation of the crimped valve to maintain a small enough profile.

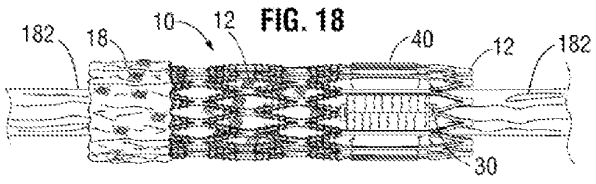


FIG. 18

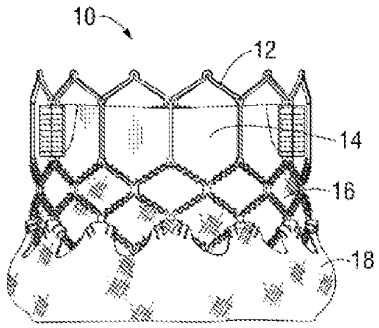


FIG. 3

Levi discloses the criticality of the slack outer seal:

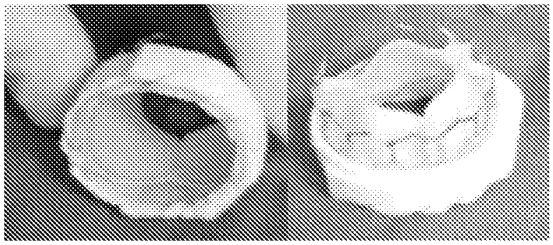
*In other words, the outer skirt is configured with excess material which causes the outer skirt to bulge outwardly as the frame foreshortens (i.e., shortens in length) during radial expansion. Accordingly, when the valve **10** is deployed within the body, the excess material of the outer skirt **18** can fill in gaps between the frame **12** and the surrounding native annulus to assist in forming a good fluid-tight seal between the valve and the native annulus. The outer skirt **18** therefore cooperates with the inner skirt **16** to avoid*

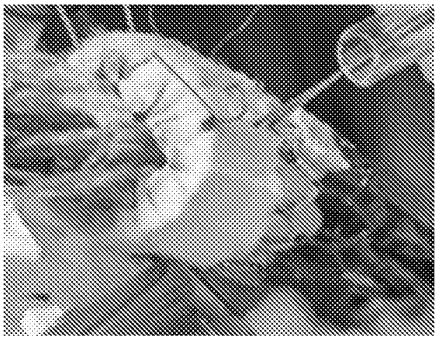
> *perivalvular leakage after implantation of the valve **10**. In another advantageous feature, the slack between the lower and upper edges of the outer skirt **18** allows the frame **12** to elongate axially during crimping without any resistance from the outer skirt and the outer skirt does not substantially affect the outer diameter of the prosthetic valve in the crimped condition.*

Thus, any modification of Levi *where the sealing material is held against the outer frame as the valve expands from the radially compressed orientation to the radially expanded orientation* would thus be inoperable for Levi's intended purpose, and such a modification is not proper under MPEP 2143.

THE NON-PATENT LITERATURE OF RECORD SUPPORTS APPLICANT POSITION THAT THE PROPOSED COMBINATIONS CANNOT MEET THE LIMITATIONS OF CLAIM 35

Similar to the Dehdashtian/Walther non-patent literature, in Russel, a combination of a product shown in Levi with a cloth seal such as shown in Dehdashtian was used in a mitral valve repair. Representative images are shown below:





Just as with the Walther NPL, Russel provided a valve with such a large profile that excision of the native leaflets was required, and a large delivery system was also required. Thus, the Russel valve, which Applicant submits is consistent with the proposed combination set forth by the USPTO in rejecting claim 35, is incapable of meeting either claim limitation of endovascular delivery through the femoral artery, and expansion of the valve assembly is configured to press the sealing material against native valve leaflets of an aorta of the patient as required by Claim 35.

In Russel, the leaflets were excised ("The anterior leaflet is excised, leaving a standard rim of tissue at the aortomitral curtain that will be used to place the pledgeted anchoring sutures (Figure 4A).") Russel maintained such a large profile, and due to the deployment being open heart, crimped the valve but did not disclose passing through a catheter.

Thus, Applicant submits that the non-patent literature of Russel makes it clear that the modification of Levi could not meet the claim limitations of claim 35.

FEDERAL CIRCUIT PRECEDENT IN THE SAME FIELD OF ART IS CONTROLLING IN THIS MATTER

Finally, the Federal Circuit has spoken to this exact issue in the exact same field of art. In *Snyders Heart Valve LLC v. St. Jude Medical, LLC*[1], the Federal Circuit determined that the prior art of Bessler (USPN 5,855,601) did not anticipate claim limitations in USPN 6,821,297 that the transcatheter valve had a "frame sized and shaped for insertion in [a plurality of cusps of the damaged heart valve." Bessler taught a valve where a cutting tool first excised the native leaflets of a patient to provide sufficient room for deployment of the Bessler valve. The claimed invention of the '297 thus required that the native leaflets remain in place.

Here, just as in *Snyders*, the claims require that *the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient*. As already discussed, the prior art is incapable of meeting these limitations, and just as in *Snyders*, when the prior art is incapable of meeting the claim limitations in this technical space, an anticipation rejection on

[1] https://cafc.uscourts.gov/opinions-orders/19-2111.OPINION.10-5-2021_1844521.pdf

that prior art is improper. Put simply, as Spenser recites, a 24F catheter size is the maximal size of an endovascular deployment through the femoral artery.

An Applicant provided chart detailing the crimp profile of the various valves and references discussed herein is shown below:

Reference	Walther	Russel	Dahdashtian
Valve Diameter	29 (26mm valve + ~3.0 mm cloth)	29.3 (26mm valve + ~3.3 mm^2 cloth)	Valve diameter + *added ~2.0 - 10.00 mm cloth thickness*
Outer Seal	Outer seal of non-porous cloth with fibers attached to the surface thereof. The cloth as shown in the image appears to show a non-porous felt graft.	Outer seal of non-porous cloth with fibers attached to the surface thereof. The cloth as shown in the image is a non-porous felt graft.	Outer expandable seal cloth with fibers attached to the surface thereof. The seal in image 22 is solid and appears to show a non-porous cloth/ graft.
Application	Mitral ViV	Native Mitral valve	
Delivery Technology/ Method	Open chest surgical delivery	Open chest surgical delivery. Requires surgical removal of mitral leaflets	As described in remarks, not capable of implanting through endovascular femoral access.
Delivery Profile	33F	Not placed in a catheter, but likely large profile.	As described in remarks, >24F

Furthermore, the claims each require *expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient*. Applicant submits that the prior art of record, as proposed to be combined, is not capable of meeting these claim limitations.

The parallels to *Snyder* are striking. In *Snyder* the claims were construed in a manner consistent with Applicant's claim language--- that the expansion of the valve pressed into engagement with native leaflets of the aorta of a patient. However, in *Snyder*, the primary reference taught removing the native leaflets in order to provide sufficient space for delivery in the annulus. In determining that the Bessler reference did not anticipate the claims, the Board stated "*Of particular note, the specification expressly describes Bessler as presenting problems that the Snyders invention overcomes, stating that the procedure disclosed in Bessler is too*

[2] Here, the cloth thickness represents the total increase in expanded profile, thus a 3.3 mm cloth is representative of a 1.65 mm cloth wrapped around the valve diameter.

*invasive because it "**includes excision, vacuum removal of the native valve**, cardiopulmonary bypass and backflushing of the coronary arterial tree."* (emphasis added).

Just as in *Snyder*, the references of record proposed by the USPTO, when put into practice as shown in the NPL of Walther and Russel, all required removal of the native leaflets. Put simply, the proposed combination by the USPTO was too large to be deployed within the native leaflets of the aorta and the scientific papers presented herein show that to be the case.

Thus, it is clear that the proposed combination by the USPTO is incapable of meeting the claim limitation of *expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient.* As such, the claims are patentable for at least this reason.

Applicant submits that the claims are patentable over the references of record as presented herein.

35 USC 112 SUPPORT

The broadening of the independent claims to recite that the inner frame is a graft covering is well supported in paragraph [0089] of the application as filed:

> *In the illustrative embodiment, the outer surface **248** of the stent **244** is covered with low-profile polyester, ePTFE, or other nonporous covering material **250** that prevents fluid from passing through the outer surface **248**. However, it should be appreciated that the stent **244 may be covered with standard polyester**, ePTFE or other nonporous materials.*

Additionally, FIG. 11 of the Application as filed clearly shows a graft covering inwardly of the metallic/outer frame.

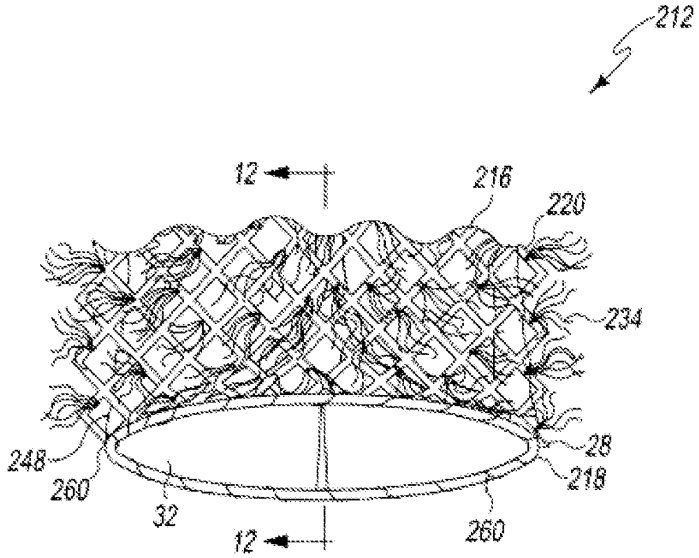


Fig. 11

DEPOSIT ACCOUNT

The Commissioner is hereby authorized to charge any otherwise unpaid fees associated with the filing of this correspondence to Deposit Account No. **50-6191**.

Respectfully submitted,

Date: November 4, 2021

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Electronic Acknowledgement Receipt	
EFS ID:	44208195
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	175373
Filer:	Justin Robert Nifong
Filer Authorized By:	
Attorney Docket Number:	426/2/12 UTIL
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		426-2-12-UTIL-resp-to-oa-filed.pdf	1120138 b187470e7b43d7846b0892ecbe13ab2f80853e80	yes	17

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	3
	Applicant Arguments/Remarks Made in an Amendment	4	17
Warnings:			
Information:			
	Total Files Size (in bytes):	1120138	

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
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)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/941,117	Filing Date 07/28/2020	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ 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) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	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	

	11/04/2021	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	Total (37 CFR 1.16(i))	* 2	Minus	** 20	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $240 =	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

* 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".	/Ruby Johnson/
*** 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 NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/941,117	07/28/2020	Ali Shahriari	426/2/12 UTIL	1876

175373 7590 10/26/2021

Aortic Innovations, LLC
4917 Waters Edge Drive, Suite 275
Raleigh, NC 27606

EXAMINER	
SHIPMON, TIFFANY P	

ART UNIT	PAPER NUMBER
3774	

NOTIFICATION DATE	DELIVERY MODE
10/26/2021	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):

usptomail@nkpatentlaw.com

Office Action Summary	**Application No.** 16/941,117	**Applicant(s)** Shahriari, Ali	
	Examiner TIFFANY P SHIPMON	**Art Unit** 3774	**AIA (FITF) Status** No

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

Period for Reply

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

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

Status

1)☑ Responsive to communication(s) filed on 12 October 2021.

☐ 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) 31-35 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) 31-35 is/are rejected.

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

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

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

Application Papers

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

11)☑ The drawing(s) filed on 28 July 2020 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

1. The present application is being examined under the pre-AIA first to invent provisions.

Claim Objections

2. The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

Misnumbered claims 32-35 been renumbered 33-36.

Claim Rejections - 35 USC § 112

3. The following is a quotation of 35 U.S.C. 112(b):
(b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 32-34 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor (or for applications subject to pre-AIA 35 U.S.C. 112, the applicant), regards as the invention.

5. Claim 32 recites “wherein the graft covering extends over an area of the outer frame that is larger than the area of the outer frame that the sealing member extends over”.

6. It is unclear which area of the frame the graft is supposed to cover. For example, 'larger than the area of the outer frame" does not contain clear language with what location the graft covers. Larger in what way? Appropriate clarification is required.

Claim Rejections - 35 USC § 103

7. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claim 31 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Spenser et al. (US 7,510,575) in view of Dehdashtian et al.(WO 2006/005015).

9. Referring to claim 31, Spenser et al. discloses a transcatheter heart valve assembly comprising:

10. an inner frame(additional piece of PET 571) comprising a graft covering housing a prosthetic heart valve(col. 26, lines 30-34), wherein the graft covering(571) extends around the prosthetic heart valve(leaflets, 570) for providing sealing to the heart valve(col. 26, lines 30-34);

11. an outer frame(575) formed from a metallic material(col. 12, lines 28-31) and defining an gridded open cell configuration(Fig. 44a-b), and being secured to the graft covering by a plurality of stitches(col. 26, lines 35-47, suture, 576);

12. and wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer(PET is a polymer and polyester, col. 26, lines 30-54),

13. wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient(the device of the prior art is fully capable of being crimped and later expanded for delivery),

14. and wherein the heart valve assembly has a radially compressed and a radially expanded orientation (col. 12, lines 31-36).

15. Additionally, several other embodiments of Spenser et al. discloses wherein the outer frame extends distally further than the prosthetic heart valve. (See Fig. 14, region 232, marker extends further distally than the valve).

16. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the embodiment of Fig. 44 of Spenser et al. to have the distal region of the outer frame extend further than the prosthetic valve as taught in the embodiment of Fig. 14 in order to allow visualization of the stent during delivery.

17. Spenser et al. lacks a detailed description of a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks, wherein the sealing material is attached to the outer frame, wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame; and wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient.

18. Dehdashtian et al. discloses a heart valve in the same field of endeavor with a sealing material (256) positioned externally to an outer frame(252) for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks(paragraph 145), wherein the sealing material is attached to the outer frame(Fig. 22), wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame(paragraph 145); wherein expansion of the

heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient(paragraph 145, discloses the compressible material 256, is compressible and expands after deployment).

19. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the heart valve assembly of Spenser et al. to include a sealing member positioned externally to an outer frame as taught in Dehdashtian et al. in order to provide additional sealing against leakage. Additionally, Spenser et al. teaches an outer sealing member (21) in the embodiment of Fig. 1.

20. Claims 32-34 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Spenser et al. (US 7,510,575) in view of Dehdashtian et al.(WO 2006/005015) and Bahler et al. (US 2005/0273155).

21. Referring to claim 32, Spenser et al. discloses a transcatheter heart valve assembly comprising:

22. an inner frame(additional piece of PET 571) comprising a graft covering housing a prosthetic heart valve(col. 26, lines 30-34), wherein the graft covering(571) extends around the prosthetic heart valve(leaflets, 570) for providing sealing to the heart valve(col. 26, lines 30-34);

23. an outer frame(575) formed from a metallic material(col. 12, lines 28-31) and defining an gridded open cell configuration(Fig. 44a-b), and being secured to the graft covering by a plurality of stitches(col. 26, lines 35-47, suture, 576);

24. and wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer(PET is a polymer and polyester, col. 26, lines 30-54),

25. wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient(the device of the prior art is fully capable of being crimped and later expanded for delivery),

26. wherein the heart valve assembly has a radially compressed and a radially expanded orientation (col. 12, lines 31-36).

27. Additionally, several other embodiments of Spenser et al. discloses wherein the outer frame extends distally further than the prosthetic heart valve (See Fig. 14, region 232, marker extends further distally than the valve).

28. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the embodiment of Fig. 44 of Spenser et al. to have the distal region of the outer frame extend further than the prosthetic valve as taught in the embodiment of Fig. 14 in order to allow visualization of the stent during delivery.

29. Spenser et al. lacks a detailed description of a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks, wherein the sealing material is attached to the outer frame, wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame; and wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient.

30. Dehdashtian et al. discloses a heart valve in the same field of endeavor with a sealing material (256) positioned externally to an outer frame(252) for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks(paragraph 145), wherein the sealing material is attached to the outer frame(Fig. 22), wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame(paragraph 145); wherein expansion of the

heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient(paragraph 145, discloses the compressible material 256, is compressible and expands after deployment).

31. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the heart valve assembly of Spenser et al. to include a sealing member positioned externally to an outer frame as taught in Dehdashtian et al. in order to provide additional sealing against leakage. Additionally, Spenser et al. teaches an outer sealing member (21) in the embodiment of Fig. 1.

32. Modified Spenser et al. lacks a detailed description of the graft covering extending over an area of the outer frame that is larger than the area of the outer frame that the sealing material extends over and wherein the graft covering extends distally further than the sealing material.

33. Bahler et al. teaches a stent graft in the same field of endeavor, where the graft covering extends over an area of the outer frame (Fig. 8, graft material 11 extends over the frame of body 12) that is larger than the area of the outer frame that the sealing material (sealing zone 21, paragraph 148)) covers, and wherein the graft covering extends distally further than the sealing material (Fig. 8) for the purpose of helping to provide a better seal graft portion and walls of the vessel in which the device is placed (paragraph 148).

34. It would have been obvious to a person of ordinary skill in the art at the time of the invention to further modify the graft covering of modified Spenser et al. as taught in Bahler et al. in order to provide a better seal graft portion and walls of the vessel in which the device is placed.

35. Referring to claim 33, as modified in claim 31 above, Spenser et al. discloses the heart valve assembly includes a delivery assembly(col. 12, lines 4-17), wherein the delivery assembly includes a catheter that the valve assembly is contained therewithin when in the compressed orientation(col. 12, lines 4-17), and a balloon within the radially compressed heart valve assembly for expanding the heart

valve assembly from the radially compressed orientation to the radially expanded orientation(col. 12, lines 4-17).

36. Claims 35-36 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Spenser et al. (US 7,510,575) in view of Dehdashtian et al.(WO 2006/005015) and Levi et al. (US 9,393,110).

37. Referring to claims 35-36, Spenser et al. discloses a transcatheter heart valve assembly comprising: an inner frame(additional piece of PET 571) comprising a graft covering housing a prosthetic heart valve(col. 26, lines 30-34), wherein the graft covering extends radially outwardly around the prosthetic heart valve(leaflets, 570) and radially inwardly of the outer frame for providing sealing to the heart valve(Fig.44B);

38. an outer frame(575) formed from a metallic material(col. 12, lines 28-31) and defining an gridded open cell configuration(Fig. 44a-b), and being secured to the graft covering by a plurality of stitches(col. 26, lines 35-47, suture, 576); and

39. and wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer(PET is a polymer and polyester, col. 26, lines 30-54),

40. wherein the valve assembly is balloon expandable during endovascular deployment (col. 12, lines 4-8).

41. Spenser et al. lacks a detailed description of a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks, wherein the sealing material is attached to the outer frame, wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame;

wherein the sealing material includes a plurality of radially extending fibers that form a circumferential surface that extends outwardly of the outer frame; wherein the fibers cover at least two circumferentially extending rows of grids formed in the open cell configuration and the at least two circumferentially extending rows radially overlap with the prosthetic leaflets and wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient.

42. Dehdashtian et al. discloses a heart valve in the same field of endeavor with a sealing material (256) positioned externally to an outer frame(252) for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks(paragraph 145), wherein the sealing material is attached to the outer frame(Fig. 22), wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame(paragraph 145); wherein the sealing material(256) includes a plurality of radially extending fibers that form a circumferential surface that extends outwardly of the outer frame(paragraph 145); wherein the fibers cover at least two circumferentially extending rows of grids formed in the open cell configuration and the at least two circumferentially extending rows radially overlap with the prosthetic leaflets (Fig. 22, two rows of stent 252 covered) wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient(paragraph 145, discloses the compressible material 256, is compressible and expands after deployment; the material is held against the outer frame).

43. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the heart valve assembly of Spenser et al. to include a sealing member positioned externally to an outer frame as taught in Dehdashtian et al. in order to provide additional sealing against leakage. Additionally, Spenser et al. teaches an outer sealing member (21) in the embodiment of Fig. 1.

44. Modified Spenser et al. lacks a detailed description of the graft covering extends beyond the proximal end of the outer frame and over the proximal end thereof to cover the proximal end of the outer frame.

45. Levi et al. discloses a graft covering (18) that extends beyond the proximal end of the outer frame and over the proximal end thereof to cover the proximal end of the outer frame for the purpose of fill in gaps between the frame 12 and the surrounding native annulus to assist in forming a good fluid-tight seal between the valve and the native annulus.

46. It would have been obvious to a person of ordinary skill in the art before the effective filing date of the invention to modify the graft covering of modified Spenser et al. to extend beyond the proximal end of the outer frame and over the proximal end thereof to cover the proximal end of the outer frame for the purpose of filling in gaps between the frame and the surround native annulus to assist in forming a good fluid-tight seal between the valve and the native annulus.

Conclusion

47. Any inquiry concerning this communication or earlier communications from the examiner should be directed to TIFFANY P SHIPMON whose telephone number is (571)270-1448. The examiner can normally be reached MONDAY-FRIDAY.

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, Jennifer Dieterle can be reached on 571-270-7872. 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.

/TIFFANY P SHIPMON/
Examiner, Art Unit 3774

/JERRAH EDWARDS/
Supervisory Patent Examiner, Art Unit 3774

Notice of References Cited	Application/Control No. 16/941,117	Applicant(s)/Patent Under Reexamination Shahriari, Ali	
	Examiner TIFFANY P SHIPMON	Art Unit 3774	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20050273155-A1	12-2005	Bahler, Clinton D.	A61F2/07	623/1.13
*	B	US-7510575-B2	03-2009	Spenser; Benjamin	A61F2/9524	623/2.18
*	C	US-9393110-B2	07-2016	Levi; Tamir S.	A61F2/2433	1/1
	D					
	E					
	F					
	G					
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	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N	wo 2006/005015	01-2006	wo	DEHDASHTIAN MARK	a61f2/2472
	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 MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/941,117	Shahriari, Ali
	Examiner	Art Unit
	TIFFANY P SHIPMON	3774

CPC - Searched*		
Symbol	Date	Examiner
A61F 2/856,07,2418,82,90, 2210/0014	10/21/2021	T.S.

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
IPR2021-01527 Reviewed Petition for Inter Partes Review of US Patent No. 10,792,172 on 10/20/2021	10/21/2021	T.S.
EAST Search History	10/21/2021	T.S.

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

	/TIFFANY P SHIPMON/ Examiner, Art Unit 3774

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S2	3	(("7799072") or ("8002826") or ("7947074")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2014/06/28 22:05
S3	21	("20120046726" | "7018404" | "7799072" | "8016877" | "20070250146" | "6334868" | "7510574" | "8002826" | "20070276464" | "6752829" | "5102417" | "7947074" | "20070095283" | "20110257731" | "7393360" | "7914569" | "8226710" | "20040210304" | "5397355" | "7780726" | "20050197687" | "20060149351" | "20090198315" | "20100042202" | "7252682" | "20030040771" | "20120089218" | "5716393" | "6254632" | "20090125098" | "6582462" | "7771467" | "8206438" | "20080132999" | "20090099644" | "8425584").PN.	USPAT	OR	OFF	2014/06/28 23:06
S4	36	("20120046726" | "7018404" | "7799072" | "8016877" | "20070250146" | "6334868" | "7510574" | "8002826" | "20070276464" | "6752829" | "5102417" | "7947074" | "20070095283" | "20110257731" | "7393360" | "7914569" | "8226710" | "20040210304" | "5397355" | "7780726" | "20050197687" | "20060149351" | "20090198315" | "20100042202" | "7252682" | "20030040771" | "20120089218" | "5716393" | "6254632" | "20090125098" | "6582462" | "7771467" | "8206438" | "20080132999" | "20090099644" | "8425584").PN.	US-PGPUB; USPAT	OR	OFF	2014/06/28 23:24
S5	317	(623/2.14).CCLS.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	OFF	2014/06/28 23:30
S7	38	a61f2/2418	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/06/28 23:31
S8	59	a61f2/2412	US-PGPUB; USPAT;	OR	OFF	2014/06/28 23:31

			EPO; JPO; DERWENT			
S9	41	a61f2/2436	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/06/28 23:31
S10	17	a61f2/2433	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/06/28 23:31
S11	11	a61f2/2475	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/06/28 23:31
S12	1	"13706896"	US-PGPUB; USPAT	OR	OFF	2014/06/29 16:46
S13	2,346	623/1.12	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:07
S14	401	S13 and fibers	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:07
S15	3	S13 and ((fibers with collagen) same migration)	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:12
S16	30	S13 and ((fibers with collagen))	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:13
S17	74	623/1.13 and ((fibers with collagen))	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:43
S18	2,377	stent and graft and fibers and migration	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:48
S19	317	(623/2.14).CCLS.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	OFF	2014/06/29 18:49
S20	19	S19 and S18	US-PGPUB; USPAT	OR	OFF	2014/06/29 18:49
S21	21	("20120046726" | "7018404" | "7799072" | "8016877" | "20070250146" | "6334868" | "7510574" | "8002826" | "20070276464" | "6752829" | "5102417" | "7947074" | "20070095283" | "20110257731" | "7393360" | "7914569" | "8226710" | "20040210304" | "5397355" | "7780726" | "20050197687" | "20060149351" | "20090198315" | "20100042202" | "7252682" | "20030040771" | "20120089218" | "5716393" | "6254632" | "20090125098"	USPAT	OR	OFF	2014/06/29 18:52

		| "6582462" | "7771467" | "8206438" | "20080132999" | "20090099644" | "8425584").PN.				
S22	1	S21 and fibers	USPAT	OR	OFF	2014/06/29 18:52
S23	3	S21 and fiber	USPAT	OR	OFF	2014/06/29 18:53
S24	3	S21 and fiber	US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT	OR	OFF	2014/06/29 18:53
S25	1	("7799072").PN.	USPAT; USOCR	OR	OFF	2014/07/14 09:28
S26	3	meretei.in.	USPAT	OR	OFF	2014/07/14 09:28
S27	14	(("7799072") or ("8002826") or ("7947074")).PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2014/07/14 09:28
S28	0	"13706896"	USPAT	OR	OFF	2014/11/30 19:33
S29	1	"13706896"	US-PGPUB; USPAT; USOCR	OR	OFF	2014/11/30 19:33
S30	7	"7799072"	US-PGPUB; USPAT; USOCR	OR	OFF	2014/11/30 19:34
S31	369	(623/2.14).CCLS.	US-PGPUB; USPAT; USOCR; JPO; DERWENT	OR	OFF	2014/11/30 19:47
S32	2,016	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/11/30 19:59
S33	915	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/11/30 19:59
S34	0	a61f2/2418.cpc	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2014/11/30 20:38

S35	2,002	(623/1.35-1.36).CCLS.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2014/12/01 10:28
S39	2,556	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2016/02/08 10:24
S40	3,379	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2016/02/08 11:47
S41	2	("13706869").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2016/02/08 11:49
S42	2	("13706896").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2016/02/08 11:51
S46	1	("14614628").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/03/20 19:27
S47	1	("7799072").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/05/15 06:58
S48	2	("7799072").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/05/15 08:28
S49	4	("20080132993" | "20140336749").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/05/15 08:29
S50	2	("7799072").PN.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/05/15 08:29
S51	0	("14445833").PN.	USPAT; USOCR	OR	OFF	2017/05/15 08:32
S52	18	("20050177222" | "20070067014" | "20100268318" | "6152956" | "20060276883" | "20070112411" |	US-PGPUB; USPAT; USOCR;	OR	OFF	2017/05/15 08:33

		"20030220683" | "20040106981" | "20100094409").PN.	EPO; JPO; DERWENT			
S53	651	623/2.14	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/05/15 08:35
S54	1	("20070067014").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/09/17 00:05
S55	4,867	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/09/17 00:12
S56	3,429	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/09/17 00:12
S57	2,489	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/09/17 00:13
S58	1,308	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/09/17 00:13
S59	1,182	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2017/09/17 00:13
S60	1	("14614628").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/09/17 16:01
S61	1	("20070067014").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/09/17 16:11
S62	1	("20080132993").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/09/18 08:47
S63	1,461	carpentier.in.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2018/01/11 08:54
S64	61	carpentier.in. and aorta	US-PGPUB; USPAT; USOCR;	OR	OFF	2018/01/11 09:32

			EPO; JPO; DERWENT			
S65	3	"20050102018"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2018/01/11 09:39
S66	6	(US-20070168013-$ | US-20140172064-$ | US-20140316513-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:13
S67	1	("7799072").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/02/05 09:42
S68	6,135	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58
S69	4,276	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58
S70	3,295	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58
S71	1,674	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58
S72	1,322	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58
S73	9,150	S68 S69 S70 S71 S72	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/02/05 09:58
S74	6,389	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
S75	4,396	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04

S76	3,436	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
S77	1,760	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
S78	1,352	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
S79	9,503	S74 S75 S76 S77 S78	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
S80	9,503	S74 S75 S76 S77 S78 S79	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/04/15 09:04
S81	4,461	S80 and (artery arteries)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/04/15 09:06
S82	1,118	S80 and (artery arteries) and (aortic near arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/04/15 09:09
S83	6,421	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S84	4,413	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S85	3,462	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S86	1,773	a61f2/2433.cpc.	US-PGPUB; USPAT;	OR	OFF	2019/04/29 11:05

			EPO; JPO; DERWENT			
S87	1,354	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S88	9,549	S83 S84 S85 S86 S87	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S89	9,549	S83 S84 S85 S86 S87 S88	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/04/29 11:05
S90	1,126	S89 and (artery arteries) and (aortic near arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/04/29 11:05
S91	1	("20090254172").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2019/05/14 15:40
S92	9	("20060155366" | "20100049313" | "6258117").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:09
S93	2	("20080262592").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:10
S94	6	("20070168013" | "20140172064" | "20140316513").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:10
S95	6	("20020177890" | "5976179").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:10

S96	3	"20140316513"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:19
S97	2	"20070168013"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:20
S98	4	"20140172065"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:21
S99	6	"20100049313"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:26
S100	2	"20060155366"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:29
S101	6,666	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S102	4,593	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S103	3,601	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S104	1,864	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S105	1,380	a61f2/2475.cpc.	US-PGPUB; USPAT;	OR	OFF	2019/07/21 10:35

			EPO; JPO; DERWENT			
S106	9,898	S101 S102 S103 S104 S105	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S107	9,898	S101 S102 S103 S104 S105 S106	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/07/21 10:35
S108	1,179	S107 and (artery arteries) and (aortic near arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/07/21 10:35
S109	4	"20070067014"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/07/21 11:44
S110	4	"14614628"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/07/21 12:36
S111	7,098	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S112	4,889	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S113	3,856	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S114	1,965	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S115	1,422	a61f2/2475.cpc.	US-PGPUB; USPAT;	OR	OFF	2019/12/08 16:15

			EPO; JPO; DERWENT			
S116	10,508	S111 S112 S113 S114 S115	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S117	10,508	S111 S112 S113 S114 S115 S116	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2019/12/08 16:15
S118	1,256	S117 and (artery arteries) and (aortic near arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2019/12/08 16:15
S120	7,401	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S121	5,076	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S122	4,040	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S123	2,043	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S124	1,443	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S125	10,919	S120 S121 S122 S123 S124	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45
S126	10,919	S120 S121 S122 S123 S124 S125	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 11:45

S127	1,305	S126 and (artery arteries) and (aortic near arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	ON	2020/03/13 11:45
S128	7,401	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S129	5,076	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S130	4,040	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S131	2,043	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S132	1,443	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S133	10,919	S128 S129 S130 S131 S132	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S134	10,919	S128 S129 S130 S131 S132 S133	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:54
S135	966	S134 and (stent and artery and seal$4 and arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 14:56
S136	5,500	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01

S137	24,545	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S138	15,139	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S139	16,719	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S140	3,555	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S141	11,168	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:01
S142	1,881	(S136 S137 S138 S139 S140 S141) and (stent and artery and seal$4 and arch)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/03/13 19:02
S143	1	("9044311").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/03/13 20:21
S144	25	(US-10034784-$ | US-10065824-$ | US-16788806-$ | US-19857887-$ | US-20010044650-$ | US-20020082684-$ | US-20040249399-$ | US-20070219613-$ | US-20090036977-$ | US-20090099650-$ | US-20100087907-$ | US-20130013050-$ | US-3002816-$ | US-3025694-$ | US-3220613-$ | US-3289282-$ | US-3482228-$ | US-3506622-$ | US-3545549-$ | US-3562673-$ | US-3652198-$ | US-	US-PGPUB; USPAT	OR	OFF	2020/03/13 21:45

		3715337-$ | US-3757263-$ | US-5464721-$ | US-5609627-$ | US-5773457-$ | US-5814752-$).DID.				
S145	0	(DE-10065824-$ | DE-19857887-$ | AI-20010044650-$ | AI-20020082684-$ | AI-20040249399-$ | AI-20070219613-$ | AI-20090036977-$ | AI-20090099650-$ | AI-20100087907-$ | AI-20130013050-$ | NO-2013040663-$ | NO-2013059596-$ | NO-2014072501-$ | BI-3482228-$ | VA-223131450-$).DID.	US-PGPUB; USPAT	OR	OFF	2020/03/13 21:46
S146	0	"16788806"	US-PGPUB; USPAT	OR	OFF	2020/03/13 21:47
S147	1	("20080132993").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/04/11 20:50
S148	4	"20070067014"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 10:30
S149	5	"20080132993"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 11:39
S150	14	"13706896"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 12:11
S151	1	"16788806"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 12:11
S152	15	(US-10478320-$ | US-16788806-$ | US-20050010277-$ | US-20080082159-$ | US-20090264993-$ | US-3226814-$ | US-3402751-$ | US-3408731-$ | US-3574284-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 14:46
S153	13	(US-16788806-$ | US-20040230287-$ | US-20080275548-$ | US-20110257731-$	US-PGPUB; USPAT; USOCR;	OR	OFF	2020/04/13 14:46

		| US-20120158121-$ | US-3125764-$ | US-3314328-$ | US-3668892-$).DID.	FPRS; EPO; JPO; DERWENT			
S154	0	(AI-20040230287-$ | AI-20080275548-$ | AI-20110257731-$ | AI-20120158121-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/04/13 14:47
S155	3,758	623/1.12	US-PGPUB; USPAT	OR	OFF	2020/06/06 14:43
S156	51	S155 and ((fibers with collagen))	US-PGPUB; USPAT	OR	OFF	2020/06/06 14:43
S157	7,650	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S158	5,220	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S159	4,196	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S160	2,120	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S161	1,463	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:43
S162	11,262	S157 S158 S159 S160 S161	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/06 14:44
S163	282	S162 and ((fibers with collagen))	US-PGPUB; USPAT	OR	OFF	2020/06/06 14:44
S164	1	"20040256759"	US-PGPUB; USPAT	OR	OFF	2020/06/06 15:28
S165	119	(US-10028848-$ | US-10034784-$ | US-10065824-$ | US-10321985-$ | US-16808137-$ | US-18153473-$ | US-19857887-$ | US-2858390-$ | US-20010044650-$ | US-20020082684-$ | US-20020177890-$ | US-20030040771-$	US-PGPUB; USPAT	OR	OFF	2020/06/06 16:05

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S167	34	(US-16808137-$ | US-20020052649-$ | US-20040243221-$ | US-20040256759-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20090105805-$ | US-20100204781-$ | US-20120123529-$ | US-20120296418-$ | US-20130090729-$ | US-3370418-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; DERWENT	OR	OFF	2020/06/06 16:07
S168	1	(AI-20020052649-$ | AI-20040243221-$ | AI-20040256759-$ | JP-2005124959-$	US-PGPUB; USPAT;	OR	OFF	2020/06/06 16:07

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S169	6	((frame with (inner and outer) same seal$4) same graft) and (heart with valve)	US-PGPUB; USPAT	OR	OFF	2020/06/06 16:53
S170	7	((frame same (inner and outer) same seal$4) same graft) and (heart with valve)	US-PGPUB; USPAT	OR	OFF	2020/06/06 17:50
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S175	3,550	a61f2/2409.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/07 10:04
S176	1,905	S175 and (seal$4)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/07 10:04
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S181	3,557	a61f2/2409.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:52
S182	7,673	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S183	5,229	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S184	4,210	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S185	2,127	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S186	1,467	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S187	11,297	S182 S183 S184 S185 S186	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S188	2,885	S181 and S187	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/06/17 09:59
S189	1	("7799072").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 10:48
S190	4	"16736879"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 13:27
S191	1	("20170014228").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 14:00
S192	182	(US-10028848-$ | US-10321985-$ | US-16736879-$ | US-20020177890-$ | US-20030040771-$ | US-20040210304-$ | US-20050043790-$ | US-20050197687-$	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2020/06/17 14:36

		| US-20060149351-$ | US-20060155366-$ | US-20070067014-$ | US-20070095283-$ | US-20070168013-$ | US-20070203559-$ | US-20070250146-$ | US-20070276464-$ | US-20080132993-$ | US-20080132999-$ | US-20080262592-$ | US-20080275548-$ | US-20090099644-$ | US-20090125098-$ | US-20090171456-$ | US-20090198315-$ | US-20090312834-$ | US-20100042202-$ | US-20100049313-$ | US-20100094409-$ | US-20110257731-$ | US-20120046726-$ | US-20120089218-$ | US-20130144373-$ | US-20140046428-$ | US-20140172064-$ | US-20140316513-$ | US-20140336749-$ | US-20160022450-$ | US-20160270935-$ | US-20170209254-$ | US-3002826-$ | US-3005270-$ | US-3016877-$ | US-3021408-$ | US-3034007-$ | US-3095343-$ | US-3102417-$ | US-3114001-$ | US-3157174-$ | US-3179931-$ | US-3206438-$ | US-3220899-$ | US-3226710-$ | US-3258117-$ | US-3269739-$ | US-3314324-$ | US-3358140-$ | US-3393021-$ | US-3393136-$ | US-3394119-$ | US-3397355-$ | US-3398701-$ | US-3414635-$ | US-3419788-$ | US-3425584-$ | US-3452070-$ | US-3561102-$ | US-3582462-$ | US-3603156-$ | US-3617234-$ | US-3623067-$ | US-3629739-$ | US-3715317-$ | US-3721676-$ | US-3833341-$ | US-3864808-$ | US-3911490-$ | US-3940040-$ | US-3943427-$ | US-3976179-$ | US-5004346-$ | US-5061275-$ | US-5254632-$ | US-5334868-$ | US-5716393-$ | US-5718159-$ | US-5752829-$ | US-5918925-$ | US-5957974-$ | US-7018404-$ | US-7771467-$ | US-7799072-$ | US-7914569-$).DID.	JPO; DERWENT			
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		| AI-20080262592-$ | AI-20080275548-$ | AI-20090099644-$ | AI-20090125098-$ | AI-20090171456-$ | AI-20090198315-$ | AI-20090312834-$ | AI-20100042202-$ | AI-20100049313-$ | AI-20100094409-$ | AI-20110257731-$ | AI-20120046726-$ | AI-20120089218-$ | NO-2012147675-$ | AI-20130144373-$ | NO-2013086132-$ | AI-20140046428-$ | AI-20140172064-$ | AI-20140316513-$ | AI-20140336749-$ | AI-20160022450-$ | AI-20160270935-$ | AI-20170209254-$ | BI-3582462-$ | BI-5254632-$ | BI-5334868-$).DID.				
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S195	10	(CN-102014805-$ | NO-2005087117-$ | NO-2006127412-$ | NO-2010006627-$ | NO-2010031060-$ | NO-2010105195-$ | NO-2011035154-$ | JP-2011502628-$ | JP-2011507658-$ | EP-2787925-$ | JS-2012068165-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 14:37
S196	50	(US-10034784-$ | US-10065824-$ | US-16736879-$ | US-19857887-$ | US-20010044650-$ | US-20020082684-$ | US-20040249399-$ | US-20070219613-$ | US-20090036977-$ | US-20090099650-$ | US-20100087907-$ | US-20130013050-$ | US-3002816-$ | US-3025694-$ | US-3220613-$ | US-3289282-$ | US-3482228-$ | US-3506622-$ | US-3545549-$ | US-3562673-$ | US-3652198-$ | US-3715337-$ | US-3757263-$ | US-5464721-$ | US-5609627-$ | US-5773457-$ | US-5814752-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 14:41
S197	8	(DE-10065824-$ | DE-19857887-$ | AI-20010044650-$ | AI-20020082684-$ | AI-20040249399-$ | AI-20070219613-$ | AI-20090036977-$ | AI-20090099650-$ | AI-20100087907-$ | AI-20130013050-$ | NO-2013040663-$ | NO-2013059596-$ | NO-2014072501-$ | BI-3482228-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 14:41
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S200	75	(mclean.in.) and stent	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 16:22
S201	108	(vidlund.in.) and stent	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 16:23
S202	1	("20080275548").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 16:47
S203	1	("20120283820").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/17 16:48
S204	1,050	salahieh.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 16:48

S205	516	salahieh.in. and valve	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/06/17 16:48
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S207	7,776	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/07/20 11:59
S208	5,285	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/07/20 11:59
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S210	2,147	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/07/20 11:59
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S215	56	2006/124649	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 09:23
S216	0	wo2006/124649	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 09:23
S217	0	(2006/124649).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 09:23

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S220	1	"16808137"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 09:55
S221	4	"20090125098"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 11:29
S222	7	"20030040771"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/07/29 11:30
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S225	1	(spense.in.) and valve	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 12:22
S226	573	(spence.in.) and valve	US-PGPUB; USPAT; USOCR	OR	OFF	2020/07/29 12:22
S227	10	(US-20070288087-$ | US-20100217382-$ | US-20100249916-$ | US-20120123529-$ | US-20200197199-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/04 10:17

S228	16	(US-3370418-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-7175652-$ | US-7470284-$ | US-7740656-$ | US-7972370-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/04 10:19
S229	34	(US-16910189-$ | US-20020052649-$ | US-20040243221-$ | US-20040256759-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20090105805-$ | US-20100204781-$ | US-20120123529-$ | US-20120296418-$ | US-20130090729-$ | US-3370418-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/04 10:19
S230	5	(AI-20020052649-$ | AI-20040243221-$ | AI-20040256759-$ | JP-2005124959-$ | WO-2006005015-$ | AI-20070179591-$ | AI-20070213815-$ | AI-20070219620-$ | AI-20080021547-$ | AI-20090105805-$ | AI-20100204781-$ | AI-20120123529-$ | AI-20120296418-$ | AI-20130090729-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/04 10:20
S231	7,889	a61f2/2418.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S232	5,349	a61f2/2412.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S233	4,324	a61f2/2436.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S234	2,182	a61f2/2433.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S235	1,479	a61f2/2475.cpc.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53
S236	11,602	S231 S232 S233 S234 S235	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:53

S237	22	S236 and ((fibers with collagen) same migration)	US-PGPUB; USPAT	OR	OFF	2020/08/28 15:54
S238	1,634	S236 and ((fibers))	US-PGPUB; USPAT	OR	OFF	2020/08/28 15:55
S239	1,688	S236 and ((fibers))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:55
S240	332	S236 and ((fibers)) and (frame and graft)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/08/28 15:55
S245	4	(US-10716662-$ | US-16910189-$ | US-20090143855-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/09/27 23:02
S246	3	(wO-2001049213-$ | wO-2004032987-$ | AI-20090143855-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/09/27 23:04
S247	361	"4164046"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/09/27 23:09
S248	1	("4164046").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/09/27 23:09
S249	1	("20070142907").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/09/27 23:11
S256	85	(shahriari near ali).in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 14:07
S257	51	"2006124649"	US-PGPUB; USPAT;	OR	OFF	2020/11/06 15:17

			USOCR; FPRS; EPO; JPO; DERWENT			
S258	0	("2006124649").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 15:17
S259	25	"12882605"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:02
S260	0	"12882605.app"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:03
S261	0	"12882605".app.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:03
S262	0	("12882605").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 16:03
S263	0	("2006018514").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 16:03
S264	1	("20060018514").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 16:03
S265	7	"20060018514"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:04
S266	30	"2006018514"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 16:04
S267	16	(US-10716662-$ | US-17024060-$ | US-20070288087-$ | US-20090143855-$ |	US-PGPUB; USPAT;	OR	OFF	2020/11/06 19:25

		US-20100217382-$ | US-20100249916-$ | US-20120123529-$ | US-20200197199-$ | US-3992608-$).DID.	USOCR; FPRS; EPO; JPO; DERWENT			
S268	0	("(NO-2001049213-$\|NO-2004032987-$|AI-20070288087-$\|AI-20090143855-$|AI-20100217382-$\|AI-20100249916-$|NO-2011069048-$\|AI-20120123529-$|AI-20200197199-$\|VA-223131450-$).DID.").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/11/06 19:25
S269	0	(WO-2001049213-$ | NO-2004032987-$ | AI-20070288087-$ | AI-20090143855-$ | AI-20100217382-$ | AI-20100249916-$ | NO-2011069048-$ | AI-20120123529-$ | AI-20200197199-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2020/11/06 19:26
S272	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:22
S273	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:23
S274	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:24
S275	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:25
S276	5,725	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:26
S277	26,012	A61F2/07.CPC.	US-PGPUB; USPAT;	OR	OFF	2021/01/16 10:26

			USOCR; FPRS; EPO; JPO; DERWENT			
S278	17,240	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:26
S279	17,642	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:26
S280	3,934	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S281	5,886	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S282	7,416	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S283	11,668	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S284	18,724	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S285	5,565	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR;	OR	OFF	2021/01/16 10:27

			FPRS; EPO; JPO; DERWENT			
S286	4,782	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S287	535	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:27
S288	12,232	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S289	1,710	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S290	11,758	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S291	15,314	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S292	32,596	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S293	9,253	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/01/16 10:28

			JPO; DERWENT			
S294	17,878	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:28
S295	3,437	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S296	3,130	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S297	14,644	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S298	1,594	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S299	3,931	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:29
S300	2,511	(S272 S273 S274 S275 S276 S277 S278 S279 S280 S281 S282 S283 S284 S285 S286 S287 S288 S289 S290 S291 S292 S293 S294 S295 S296 S297 S298 S299) and (heart adj3 valve) and (fiber$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/16 10:31
S301	1,676	S300 and (seal$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/01/16 10:33

			JPO; DERWENT			
S302	48	((("SHAHRIARI") near3 ("Ali"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2021/01/16 11:48
S303	13	((("AORTIC") near3 ("INNOVATIONS") near3 ("LLC"))).AS,AANM.	USPAT	OR	OFF	2021/01/16 11:49
S304	13	(US-10258464-$ | US-20110218619-$ | US-20110319991-$ | US-3339377-$ | US-3408214-$ | US-3532868-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/26 17:20
S305	2	(US-20120123529-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/26 17:21
S306	4	"16910189"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/26 18:34
S307	2	"17060557"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/01/26 18:35
S309	8	(US-10792172-$ | US-20020052649-$ | US-3333075-$ | US-3370418-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:46
S310	3	(("9333075") or ("7921678") or ("9370418")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/11 17:48
S311	15	(US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:48

S312	0	("(us-20130304196-$).DID.").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/11 17:49
S313	2	(us-20130304196-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:49
S315	1	("20120123529").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/11 17:50
S317	0	(AI-20020052649-$ | AI-20060276813-$ | AI-20080077236-$ | AI-20080188929-$ | AI-20080319521-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:51
S318	10	(US-20020052649-$ | US-20060276813-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:52
S319	2	(US-20110009948-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:54
S320	5	"20060005015"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:55
S321	96	"2006005015"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/11 17:55
S322	5	"15876053"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:11

S323	2	("2018/0206982").URPN.	USPAT	OR	OFF	2021/02/13 09:12
S324	0	"20010049555"	USPAT	OR	OFF	2021/02/13 09:14
S325	4	"20010049555"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:14
S326	3	"20070233228"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:16
S327	3	"20120296418"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:16
S328	822	("20010021872" | "20020026094" | "20020032481" | "20020138135" | "20020173842" | "20030050694" | "20030100939" | "20030158597" | "20030212454" | "20040039436" | "20040186563" | "20040186565" | "20050075728" | "20050096736" | "20050188525" | "20050203614" | "20050203617" | "20050234546" | "20060004469" | "20060025857" | "20060058872" | "20060149350" | "20060183383" | "20060229719" | "20060259137" | "20070005131" | "20070010876" | "20070010877" | "20070112422" | "20070162102" | "20070203503" | "20070203575" | "20070203576" | "20070213813" | "20070260305" | "20070265700" | "20080114442" | "20080125853" | "20080154355" | "20080183271" | "20090125118" | "20090157175" | "20090276040" | "20090281619" | "20090299452" | "20090319037" | "20100049313" | "20100168844" | "20100198347" | "20100204781" | "20110015729" | "20110319991" | "20120259409" | "20130023985" | "20130190857" | "20130274873" | "20130310926" | "20130317598" |	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:25

		"20130331929" | "20140194981" | "20140200661" | "20140209238" | "20140277417" | "20140277419" | "20140277424" | "20140330372" | "20140343671" | "20150073545" | "20150073546" | "3409013" | "3548417" | "3587115" | "3657744" | "3671979" | "3714671" | "3755823" | "4035849" | "4056854" | "4106129" | "4222126" | "4265694" | "4297749" | "4339831" | "4343048" | "4345340" | "4373216" | "4406022" | "4441216" | "4470157" | "4535483" | "4574803" | "4592340" | "4605407" | "4612011" | "4643732" | "4655771" | "4692164" | "4733665" | "4759758" | "4762128" | "4777951" | "4787899" | "4787901" | "4796629" | "4820299" | "4829990" | "4851001" | "4856516" | "4878495" | "4878906" | "4883458" | "4922905" | "4966604" | "4979939" | "4986830" | "4994077" | "5007896" | "5026366" | "5032128" | "5037434" | "5047041" | "5059177" | "5080668" | "5085635" | "5089015" | "5152771" | "5163953" | "5167628" | "5192297" | "5266073" | "5282847" | "5295958" | "5332402" | "5360444" | "5370685" | "5397351" | "5411055" | "5411552" | "5443446" | "5480424" | "5500014" | "5545209" | "5545214" | "5549665" | "5554185" | "5558644" | "5571175" | "5584803" | "5591185" | "5591195" | "5607464" | "5609626" | "5628792" | "5639274" | "5665115" | "5716417" | "5728068" | "5749890" | "5756476" | "5769812" | "5800508" | "5840081" | "5855597" | "5855601" | "5855602" | "5925063" | "5957949" | "6027525" | "6132473" | "6168614" | "6171335" | "6174327" | "6210408" | "6217585" | "6221091" | "6231602" | "6245102" | "6299637" | "6302906" | "6350277" | "6352547" | "6425916" | "6440764" | "6454799" | "6458153" | "6461382" | "6468660" | "6482228" | "6488704" | "6527979" | "6569196" | "6582462" | "6605112" | "6652578" | "6689123" | "6716244" | "6730118" | "6733525" | "6767362" | "6769161" | "6783542" | "6830584" | "6878162" | "6893460" | "6908481" | "6936067" | "7018406" | "7018408" | "7096554" | "7225518" | "7276078" | "7276084" |			

		"7318278" | "7374571" | "7393360" | "7462191" | "7510575" | "7563280" | "7585321" | "7618446" | "7618447" | "7655034" | "7785366" | "7959672" | "7993394" | "8029556" | "8167932" | "8291570" | "8449606" | "8454685" | "8652203" | "8747463" | "9078781").PN.				
S329	4	("20130190862" | "20160317305").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:26
S330	4	("20070233228" | "20120296418").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:27
S331	835	("20020173842" | "20030100939" | "20040186563" | "20050203617" | "20070162102" | "20080183271" | "20100204781" | "20130274873" | "20140200661" | "20150073546" | "4222126" | "4733665" | "4759758" | "4777951" | "5026366" | "5032128" | "5332402" | "5411055" | "5558644" | "5571175" | "5609626" | "6231602" | "6425916" | "6440764" | "6689123" | "6893460" | "6936067" | "7655034" | "7993394" | "8652203" | "20030212454" | "20050075728" | "20070112422" | "20100168844" | "20100198347" | "4829990" | "5397351" | "5545214" | "5549665" | "5584803" | "5855602" | "6027525" | "6132473" | "6168614" | "6221091" | "6302906" | "6350277" | "6454799" | "6605112" | "6908481" | "7510575" | "7563280" | "20070233228" | "20020138135" | "20050203614" | "20050234546" | "20060149350" | "20070260305" | "3714671" | "4297749" | "4441216" | "4692164" | "4762128" | "4883458" | "4994077" | "5007896" | "5163953" | "5360444" | "5411552" | "5591185" | "5639274" | "5665115" | "5716417" | "5749890" | "5756476" | "5855601" | "6171335" | "6245102" | "6299637" | "6488704" | "6569196" | "6769161" | "7393360" | "7585321" | "7959672" | "8167932" | "8747463" |	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 09:27

		"9078781" | "20130190862" | "20010049555" | "20040186565" | "20060058872" | "20060229719" | "20070213813" | "20090299452" | "20120259409" | "20130023985" | "20130310926" | "20130317598" | "20130331929" | "20140209238" | "20140277417" | "20140343671" | "4265694" | "4339831" | "4373216" | "4470157" | "4592340" | "4643732" | "4796629" | "4820299" | "4856516" | "4966604" | "5047041" | "5089015" | "5266073" | "5295958" | "5591195" | "5607464" | "5957949" | "6716244" | "6767362" | "7018406" | "7096554" | "7276084" | "7374571" | "8029556" | "20020026094" | "20050096736" | "20060259137" | "20070005131" | "20090125118" | "20090157175" | "20090319037" | "20110319991" | "20140194981" | "20140277424" | "3587115" | "3657744" | "3671979" | "4343048" | "4612011" | "4787899" | "4787901" | "4878495" | "4878906" | "4979939" | "4986830" | "5059177" | "5085635" | "5152771" | "5370685" | "5500014" | "5554185" | "5728068" | "6210408" | "6352547" | "6527979" | "6783542" | "7618446" | "20030050694" | "20030158597" | "20050188525" | "20060004469" | "20070203503" | "20080114442" | "20080154355" | "20100049313" | "20110015729" | "20140277419" | "20150073545" | "3409013" | "3548417" | "4035849" | "4056854" | "4106129" | "4406022" | "4535483" | "4922905" | "5037434" | "5080668" | "5282847" | "5769812" | "5840081" | "5855597" | "6174327" | "6458153" | "6468660" | "6652578" | "6830584" | "6878162" | "7018408" | "7225518" | "7785366" | "8454685" | "20120296418" | "20010021872" | "20040039436" | "20070010877" | "20070265700" | "20080125853" | "20090281619" | "20130190857" | "20140330372" | "4345340" | "4605407" | "5545209" | "5628792" | "6217585" | "6461382" | "6730118" | "7318278" | "7462191" | "7618447" | "8449606" | "20170014229" | "20020032481" | "20060025857" | "20060183383" | "20070010876" | "20070203575" |			

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S332	11	WO2006124649	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 10:13
S333	53	"2006124649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 10:14
S334	0	"17131869"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 11:12
S335	2	"17060557"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 11:12
S336	13	S328 and (outer$4 with (graft))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 11:49
S337	27	S328 and ((outer$4 exter$4 outsid$$)with (graft))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:00
S338	36,075	l11and ((outer$4 exter$4 outsid$$)with (graft))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:14

S339	27	S331 and ((outer$4 exter$4 outsid$$)with (graft))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:14
S340	13	(US-10258464-$ | US-20110218619-$ | US-20110319991-$ | US-3339377-$ | US-3408214-$ | US-3532868-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:56
S341	12	(US-20020052649-$ | US-20060276813-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-3333075-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 12:57
S342	4	"20110098802"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/13 15:10
S343	1	("9333075").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/17 05:33
S344	10	(US-20020052649-$ | US-20060276813-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/02/17 05:40
S345	70	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17007373-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 12:07

		5665117-$ | US-5824037-$ | US-20130144373-$).DID.				
S346	10	"16808137"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 14:38
S347	34	"10555823"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 14:50
S348	2	"16983196"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 15:15
S349	1	("10881538").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/03/21 15:20
S350	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S351	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S352	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S353	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03

S354	5,771	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S355	26,423	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S356	17,810	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S357	17,863	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S358	4,039	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S359	6,081	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S360	7,540	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S361	11,779	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03

S362	18,985	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S363	5,683	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S364	4,850	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S365	554	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S366	12,658	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S367	1,774	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S368	12,050	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S369	15,676	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03

S370	32,778	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S371	9,317	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S372	18,227	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S373	3,573	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S374	3,174	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S375	14,799	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S376	1,655	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03
S377	4,153	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 18:03

S378	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S379	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S380	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S381	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S382	5,771	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S383	26,423	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S384	17,810	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S385	17,863	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13

S386	4,039	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S387	6,081	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S388	7,540	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S389	11,779	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S390	18,985	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S391	5,683	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S392	4,850	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S393	554	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13

S394	12,658	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S395	1,774	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S396	12,050	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S397	15,676	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S398	32,778	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S399	9,317	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S400	18,227	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S401	3,573	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13

S402	3,174	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S403	14,799	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S404	1,655	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S405	4,153	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S406	2,578	(S378 S379 S380 S381 S382 S383 S384 S385 S386 S387 S388 S389 S390 S391 S392 S393 S394 S395 S396 S397 S398 S399 S400 S401 S402 S403 S404 S405) and (heart adj3 valve) and (fiber$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/21 21:13
S407	15	((frame same (inner and outer) same seal$4) same graft) and (heart with valve)	US-PGPUB; USPAT	OR	OFF	2021/03/25 16:13
S408	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S409	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S410	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/25 16:13

		$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	JPO; DERWENT			
S411	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S412	5,773	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S413	26,431	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S414	17,826	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S415	17,867	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S416	4,044	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S417	6,084	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S418	7,541	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/25 16:13

			JPO; DERWENT			
S419	11,784	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S420	18,994	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S421	5,686	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S422	4,852	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S423	554	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S424	12,667	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S425	1,775	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S426	12,059	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/25 16:13

			JPO; DERWENT			
S427	15,690	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S428	32,783	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S429	9,318	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S430	18,235	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S431	3,576	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S432	3,174	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S433	14,804	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S434	1,655	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/25 16:13

			JPO; DERWENT			
S435	4,158	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S436	2,585	(S408 S409 S410 S411 S412 S413 S414 S415 S416 S417 S418 S419 S420 S421 S422 S423 S424 S425 S426 S427 S428 S429 S430 S431 S432 S433 S434 S435) and (heart adj3 valve) and (fiber$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/25 16:13
S438	0	("13706896").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/03/27 09:37
S439	34	"13706896"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 09:37
S440	1	("7799072").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/03/27 09:58
S441	70	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17170957-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:38
S442	14	(US-10792172-$ | US-17096253-$ | US-20040082989-$ | US-20040256759-$ | US-20120123529-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/27 10:39

			JPO; DERWENT			
S443	9	(US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | US-20120123529-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S444	23	(US-10792172-$ | US-17096253-$ | US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | US-3333075-$ | US-3370418-$ | US-3829057-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S445	21	(US-20020052649-$ | US-20030153974-$ | US-20040082989-$ | US-20040256759-$ | WO-2006005015-$ | WO-2006124649-$ | US-20110098802-$ | US-20120123529-$ | US-20130304196-$ | WO-3829057-$ | WO-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S446	5,776	A61F2/856.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S447	26,437	A61F2/07.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S448	17,841	A61F2/2418.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S449	17,872	A61F2/82.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S450	4,046	A61F2/962.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/27 10:39

			JPO; DERWENT			
S451	6,089	A61F2/24.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S452	7,542	A61F2/86.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S453	11,785	A61F2/89.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S454	18,999	A61F2/90.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S455	5,689	A61F2002/061.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S456	4,854	A61F2002/067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S457	555	A61F2210/00.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S458	12,674	A61F2210/0014.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/27 10:39

			JPO; DERWENT			
S459	1,777	A61F2210/0057.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S460	12,063	A61F2220/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S461	15,695	A61F2220/0016.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S462	32,786	A61F2220/0025.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S463	9,323	A61F2220/0058.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S464	18,239	A61F2220/0075.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S465	3,579	A61F2230/001.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S466	3,175	A61F2230/0034.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/03/27 10:39

			JPO; DERWENT			
S467	14,810	A61F2230/0067.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S468	1,657	A61F2250/0048.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S469	4,160	A61F2250/0069.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S470	2,587	(S442 S443 S444 S445 S446 S447 S448 S449 S450 S451 S452 S453 S454 S455 S456 S457 S458 S459 S460 S461 S462 S463 S464 S465 S466 S467 S468 S469) and (heart adj3 valve) and (fiber$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/03/27 10:39
S471	0	("16910189").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/04/08 16:49
S472	6	"16910189"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 16:49
S473	11	"16808137"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 17:22
S474	1	("10881538").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/04/08 18:29
S475	2	"16941117"	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/04/08 18:36

			JPO; DERWENT			
S476	72	(US-10016271-$ | US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17006793-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 23:48
S477	0	(AI-20020052649-$ | AI-20030153974-$ | AI-20040243221-$ | AI-20040256759-$ | NO-2006005015-$ | AI-20060276813-$ | NO-2006124649-$ | AI-20070179591-$ | AI-20070213815-$ | AI-20070219620-$ | AI-20080021547-$ | AI-20080077236-$ | AI-20080188929-$ | AI-20080319521-$ | AI-20090105805-$ | AI-20100204781-$ | AI-20110009948-$ | AI-20110098802-$ | AI-20110218619-$ | AI-20110319991-$ | AI-20120123529-$ | AI-20120296418-$ | AI-20130304196-$ | NO-3829057-$ | IF-617622-$ | SO-0225223-$ | VA-223131450-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/08 23:48
S478	54	"2006124649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/09 09:42
S479	3	"20060259136"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/09 14:18
S480	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/04/09 16:30

		20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.				
S481	28	S480 and (mitral)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/09 16:37
S482	6	"20020052649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/10 11:44
S483	2	"17170957"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/10 15:48
S484	2	"17170957"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/24 09:59

S485	5	"17060557"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/24 09:59
S486	6	"20020052649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/24 10:57
S487	55	"2006124649"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 10:15
S488	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/04/27 10:19
S489	39	S488 and (seal with3 (inflow and outflow))	US-PGPUB; USPAT;	OR	OFF	2021/04/27 10:19

			USOCR; FPRS; EPO; JPO; DERWENT			
S490	41	S488 and (seal$4 with3 (inflow and outflow))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 10:23
S491	21	("2014/0316513").URPN.	USPAT	OR	OFF	2021/04/27 10:28
S492	0	"17006793"	USPAT	OR	OFF	2021/04/27 10:32
S493	1	"16792197"	USPAT	OR	OFF	2021/04/27 10:32
S494	4	"20110098802"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 11:19
S496	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/04/27 19:42

		US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.				
S497	41	S496 and (seal$4 with3 (inflow and outflow))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/04/27 19:42
S498	4	"20110098802"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/05/24 12:23
S499	15	((("AORTIC") near3 ("INNOVATIONS") near3 ("LLC"))).AS,AANM.	USPAT	OR	OFF	2021/05/25 08:57
S500	54	((("SHAHRIARI") near3 ("Ali"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2021/05/25 08:57
S503	22	(US-17170957-$ | US-20050240137-$ | US-20060013863-$ | US-20140277424-$ | US-20150148889-$ | US-20150335424-$ | US-20150335429-$ | US-20160022444-$ | US-20190192286-$ | US-20200352707-$ | US-3039757-$ | US-3421098-$ | US-3834552-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/05/30 17:02
S504	74	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17213251-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-20150335429-$ | US-20160022444-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/02 13:20

S505	3	"17007373"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/02 16:13
S506	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or (WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/06/03 13:29
S507	15	S506 and (collagen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:29
S508	22	(US-17170957-$ | US-20050240137-$ | US-20060013863-$ | US-20140277424-$ | US-20150148889-$ | US-20150335424-$ | US-20150335429-$ | US-20160022444-$ | US-20190192286-$ | US-20200352707-$ | US-3039757-$ | US-3421098-$ | US-3834552-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:55

S509	74	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17213251-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100204781-$ | US-20110009948-$ | US-20110098802-$ | US-20110218619-$ | US-20110319991-$ | US-20120123529-$ | US-20120296418-$ | US-20130304196-$ | US-20150335429-$ | US-20160022444-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:55
S510	92	S508 S509	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:55
S511	10	S510 and (collagen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 13:55
S512	232	(collagen same fibers same graft) and (heart and valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/03 14:01
S513	1	("7921678").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/06/03 14:08
S514	35	(US-17170957-$ | US-20030153974-$ | US-20060025857-$ | US-20060074484-$ | US-20070282436-$ | US-20100036484-$ | US-20110040367-$ | US-20110098802-$ | US-20110125244-$ | US-20110166636-$ | US-20120022633-$ | US-20120071969-$ | US-20120310328-$ | US-20130018458-$ | US-20130073030-$ | US-20140018915-$ |	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/06/18 10:36

		US-20140155997-$ | US-20170128209-$).DID.				
S518	6	(("20130018458") or ("20110125244") or ("20110166636") or ("20110098802") or ("20060074484") or ("20120310328")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/01 09:32
S520	102	(US-10258464-$ | US-10792172-$ | US-1164046-$ | US-17327673-$ | US-20020052649-$ | US-20030153974-$ | US-20040243221-$ | US-20040256759-$ | US-20060025857-$ | US-20060074484-$ | US-20060276813-$ | US-20070179591-$ | US-20070213815-$ | US-20070219620-$ | US-20070282436-$ | US-20080021547-$ | US-20080077236-$ | US-20080188929-$ | US-20080319521-$ | US-20090105805-$ | US-20100036484-$ | US-20100204781-$ | US-20110009948-$ | US-20110040367-$ | US-20110098802-$ | US-20110125244-$ | US-20110166636-$ | US-20110218619-$ | US-20110319991-$ | US-20120022633-$ | US-20120071969-$ | US-20120123529-$ | US-20120296418-$ | US-20120310328-$ | US-20130018458-$ | US-20130073030-$ | US-20130304196-$ | US-20140018915-$ | US-20140155997-$ | US-20150335429-$ | US-20160022444-$ | US-20170128209-$ | US-3333075-$ | US-3339377-$ | US-3370418-$ | US-3408214-$ | US-3532868-$ | US-3829057-$ | US-5663667-$ | US-5665117-$ | US-5824037-$ | US-20130144373-$).DID.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/21 16:59
S521	0	(AI-20020052649-$ | AI-20030153974-$ | AI-20040243221-$ | AI-20040256759-$ | AI-20060025857-$ | NO-2006005015-$ | AI-20060074484-$ | AI-20060276813-$ | NO-2006124649-$ | AI-20070179591-$ | AI-20070213815-$ | AI-20070219620-$ | AI-20070282436-$ | AI-20080021547-$ | AI-20080077236-$ | AI-20080188929-$ | AI-20080319521-$ | AI-20090105805-$ | AI-20100036484-$ | AI-20100204781-$ | AI-20110009948-$ | AI-20110040367-$ | AI-20110098802-$ | AI-20110125244-$ | AI-20110166636-$ | AI-20110218619-$ | AI-20110319991-$ | AI-20120022633-$ | AI-20120071969-$ | AI-20120123529-$ | AI-20120296418-$ | AI-20120310328-$	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/21 17:17

		| NO-2012068175-$ | AI-20130018458-$ | AI-20130073030-$ | AI-20130304196-$ | AI-20140018915-$ | AI-20140155997-$ | AI-20150335429-$ | AI-20160022444-$ | AI-20170128209-$ | NO-3829057-$ | SO-0225223-$ | VA-223131450-$).DID.				
S522	0	"17327673"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/22 11:09
S523	4	"17096253"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/22 11:10
S526	17	((("AORTIC") near3 ("INNOVATIONS") near3 ("LLC"))).AS,AANM.	USPAT	OR	OFF	2021/07/22 15:41
S527	58	((("SHAHRIARI") near3 ("Ali"))).INV.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2021/07/22 15:41
S528	52	(US-20140046426-$ or US-20060074484-$ or US-20130144373-$ or US-20140316513-$ or US-20070168013-$ or US-20060155366-$ or US-20130131787-$ or US-20200000579-$ or US-20190029848-$ or US-20150148896-$ or US-20020082684-$ or US-20130090729-$ or US-20040256759-$ or US-20020052649-$ or US-20050027348-$ or US-20170000604-$ or US-20140155997-$ or US-20140222144-$ or US-20110098802-$ or US-20100185277-$ or US-20170014228-$ or US-20050043790-$ or US-20090276040-$ or US-20110218619-$ or US-20050137695-$ or US-20140277417-$).did. or (US-20200179143-$ or US-20160354201-$ or US-20160310268-$ or US-20150190227-$ or US-20070239265-$ or US-20070233228-$ or US-20130317598-$ or US-20080319521-$).did. or (US-7252682-$ or US-7771467-$ or US-8016877-$ or US-10034784-$ or US-5824037-$ or US-6846325-$ or US-5713953-$ or US-7914569-$ or US-9867697-$ or US-9370418-$).did. or	US-PGPUB; USPAT; FPRS; DERWENT	OR	OFF	2021/07/25 16:50

		(WO-2006124649-$).did. or (US-20070067014-$ or US-20190029848-$ or US-20180325703-$ or US-20040256759-$ or US-20020052649-$ or WO-9719653-$).did.				
S529	15	S528 and collagen	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/25 16:50
S530	4	"20110098802"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/25 17:00
S531	23	"2005023584"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/25 17:16
S532	12	"20050023584"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/07/25 17:17
S533	0	("2005023584").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/25 17:18
S534	1	("20050023584").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/25 17:18
S535	1	("20060004442").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/25 17:19
S536	398	("2006/0004442").URPN.	USPAT	OR	OFF	2021/07/25 17:20
S537	1	("20130018458").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/07/25 17:28
S539	41	"13706896"	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/07/30 11:20

			JPO; DERWENT			
S542	22	"10299917"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/08/23 10:08
S545	234	(collagen same fibers same graft) and (heart and valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/08/25 14:20
S546	3	"20060276813"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/08/26 12:46
S547	25	"2011143263"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/08/26 12:47
S548	0	WO2005115275	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 09:38
S549	19	"2005115275"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 09:38
S550	3	"20050273155"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 09:39
S551	17	"2005112821"	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	2021/10/19 09:39

			JPO; DERWENT			
S552	9	("20030153974" | "20060276813" | "3365728" | "5411552" | "6893460" | "7393360" | "7510575" | "9393110" | "9829057").PN.	US-PGPUB; USPAT	OR	OFF	2021/10/19 09:56
S553	17	("20030153974" | "20060276813" | "3365728" | "5411552" | "6893460" | "7393360" | "7510575" | "9393110" | "9829057" | "10716662" | "20070288087" | "20090143855" | "20100217382" | "20100249916" | "20120123529" | "20200197199" | "8992608").PN.	US-PGPUB; USPAT	OR	OFF	2021/10/19 09:56
S554	8	("20030153974" | "3365728" | "5411552" | "6893460" | "7393360" | "7510575" | "9393110" | "9829057").PN.	US-PGPUB; USPAT	OR	OFF	2021/10/19 10:09
S555	385	"03047468"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 10:52
S556	17	WO03047468	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 10:53
S557	1	("8992608").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/19 11:07
S558	1	("10792172").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/19 11:16
S559	1	("7510575").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/19 12:31
S560	108	"2006005015"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/19 12:32
S561	1	("8992608").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 09:25

S562	6	(("8645300") or ("7827487") or ("6615226") or ("6912505") or ("7865455") or ("6266649")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 10:07
S563	1	("20080235204").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 10:09
S564	1	("8032506").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 10:10
S565	76	(fibers adj (stent frame) same (attach$4 secur$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 11:14
S566	262	(fiber$4 adj (stent frame) same (attach$4 secur$4))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 11:16
S567	24	"2005023584"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 13:42
S568	12	"20050023584"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 13:42
S569	12	"10883575"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 13:44
S570	0	"35116043"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 13:46
S571	0	("35116043").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 13:46

S572	1	("20060004442").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 13:54
S573	17	"1641117"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 16:23
S574	2	"16941117"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT	OR	OFF	2021/10/20 16:23
S575	1	("9393110").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 17:10
S576	2	(("7510575") or ("7510573")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/10/20 17:18

10/22/2021 12:08:58 AM
C:\Users\tshipmon\Documents\EAST\Workspaces\16941117.wsp

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. 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	16941117
Filing Date	2020-07-28
First Named Inventor	Ali Shahriari
Art Unit	3774
Examiner Name	-
Attorney Docket Number	426/2/12 UTIL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	8992608		2015-03-31	Haug et al.	
	2	10716662		2020-07-21	Delaloye et al.	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20070288087	A1	2007-12-13	Fearnot et al.	
	2	20100217382	A1	2010-08-26	Chau et al.	
	3	20100249916	A1	2010-09-30	Zhang	
	4	20120123529	A1	2012-05-17	Levi et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.P.S/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16941117
	Filing Date	2020-07-28
	First Named Inventor	Ali Shahriari
	Art Unit	3774
	Examiner Name	-
	Attorney Docket Number	426/2/12 UTIL

	5	20200197199	A1	2020-06-25	Shahriari	
	6	20090143855	A1	2009-06-04	Weber et al.	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2011069048	WO	A2	2011-06-09	Chau et al.		
	2	2001049213	WO	A1	2009-06-04	Bailey		
	3	2004032987	WO	A1	2004-04-22	Bechgaard et al.		

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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, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	BOBO, JR., DONALD E., Surgical Heart Valve Therapy, Edwards Lifesciences, 2011 Investor Conference, December 9, 2011, 12 Pages	

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EXAMINER SIGNATURE

Examiner Signature	/TIFFANY P SHIPMON/	Date Considered	10/19/2021

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16941117
	Filing Date	2020-07-28
	First Named Inventor	Ali Shahriari
	Art Unit	3774
	Examiner Name	-
	Attorney Docket Number	426/2/12 UTIL

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

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16941117
	Filing Date	2020-07-28
	First Named Inventor	Ali Shahriari
	Art Unit	3774
	Examiner Name	-
	Attorney Docket Number	426/2/12 UTIL

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).

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See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Justin R. Nifong/	Date (YYYY-MM-DD)	2020-10-21
Name/Print	Justin R. Nifong	Registration Number	59389

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

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

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

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

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
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(Not for submission under 37 CFR 1.99)

Application Number	16941117
Filing Date	2020-07-28
First Named Inventor	Ali Shahriari
Art Unit	OPAP
Examiner Name	CENTRAL, DOCKET
Attorney Docket Number	426/2/12 UTIL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	3365728	A	1968-01-30	Lowell et al.	
	2	5411552	A	1995-05-02	Andersen et al.	
	3	6893460	B2	2005-05-17	Spenser et al.	
	4	7393360	B2	2008-07-01	Spenser et al.	
	5	7510575	B2	2009-03-31	Spenser et al.	
	6	9393110	B2	2016-07-19	Levi et al.	
	7	9829057	B2	2017-11-28	Chung et al.	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20030153974	A1	2003-08-14	Spenser et al.	
	2	20060276813	A1	2006-12-07	Greenberg	

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	1	2011143263	WO	A2	2011-11-17	HEART LEAFLET TECHNOLOGIES, INC.		

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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, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	Inter Partes Review 2017-00060 of US Patent No. 8,992,608, and supporting declaration of Nigel Buller	
	2	Inter Partes Review 2021-01527 of US Patent No. 10,792,172, and supporting declaration of Nigel Buller	
	3	JPO, Office Action of corresponding Japanese Patent Application No. 2020-122656, mailed Aug. 17, 2021, 4 pages	X

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	First Named Inventor	Ali Shahriari
	Art Unit	OPAP
	Examiner Name	CENTRAL, DOCKET
	Attorney Docket Number	426/2/12 UTIL

	4	EPO, Office Action of corresponding European Patent Application No. 20172681.7, mailed Sep. 6, 2021, 6 pages	☐

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EXAMINER SIGNATURE

Examiner Signature	/TIFFANY P SHIPMON/	Date Considered	10/19/2021

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Signature	/Justin R. Nifong/	Date (YYYY-MM-DD)	2021-09-20
Name/Print	Justin R. Nifong	Registration Number	59389

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

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

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COMMUNICATION TO THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	16/941,117	Confirmation No.:	1876
Applicant	:	Aortic Innovations, LLC		
First Named Inventor	:	Ali Shahriari		
Filing Date	:	July 28, 2020		
TC/A.U.	:	3774		
Examiner	:	Shipmon, Tiffany		
Docket No.	:	426/2/12 UTIL		
Customer No.	:	175373		

Title of Invention: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

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

PRELIMINARY AMENDMENT

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 5 of this paper.

Amendments to the Claims:

The claims are amended as follows and will replace all previous versions and listings of claims:

Listing of Claims:

Claims 1-30 (Canceled)

31. (Currently Amended) A transcatheter heart valve assembly comprising:

[[a.]] an inner frame comprising a graft covering housing a prosthetic heart valve, wherein the graft covering extends around the prosthetic heart valve for providing sealing to the heart valve;

[[b.]] an outer frame formed from a metallic material and defining an ~~gridded~~ open cell configuration, and being secured to the graft covering by a plurality of stitches; and

[[c.]] a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks,

wherein the sealing material is attached to the outer frame,

wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame;

wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer,

wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,

wherein the heart valve assembly has a radially compressed and a radially expanded orientation,

wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient,

wherein the outer frame extends distally further than the prosthetic heart valve.

32. (New) A transcatheter heart valve assembly comprising:

an inner frame comprising a graft covering housing a prosthetic heart valve, wherein the graft covering extends around the prosthetic heart valve for providing sealing to the heart valve;

an outer frame formed from a metallic material and defining an ~~gridded~~ open cell configuration, and being secured to the graft covering by a plurality of stitches; and

a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks,

wherein the sealing material is attached to the outer frame,

wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame;

wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer,

wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient,

wherein the heart valve assembly has a radially compressed and a radially expanded orientation,

wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient,

wherein the outer frame extends distally further than the prosthetic heart valve,

wherein the graft covering extends over an area of the outer frame that is larger than the area of the outer frame that the sealing material extends over.

32. (New) The transcatheter heart valve assembly of claim 31, wherein the heart valve assembly includes a delivery assembly, wherein the delivery assembly includes a catheter that the valve assembly is contained therewithin when in the compressed orientation, and a balloon within the radially compressed heart valve assembly for expanding the heart valve assembly from the radially compressed orientation to the radially expanded orientation.

33. (New) The transcatheter heart valve assembly of claim 31, wherein the graft covering extends distally further than the sealing material.

34. (New) A transcatheter heart valve assembly comprising:

an inner frame comprising a graft covering housing a prosthetic heart valve, wherein the graft covering extends radially outwardly around the prosthetic heart valve and radially inwardly of the outer frame for providing sealing to the heart valve;

an outer frame formed from a metallic material and defining an ~~gridded~~ open cell configuration, and being secured to the graft covering by a plurality of stitches; and

a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks,

wherein the sealing material is attached to the outer frame,

wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame,

wherein the graft covering extends beyond the proximal end of the outer frame and over the proximal end thereof to cover the proximal end of the outer frame,

wherein the sealing material includes a plurality of radially extending fibers that form a circumferential surface that extends outwardly of the outer frame;

wherein the fibers cover at least two circumferentially extending rows of grids formed in the open cell configuration and the at least two circumferentially extending rows radially overlap with the prosthetic leaflets,

wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer,

wherein the valve assembly is balloon expandable during endovascular deployment,

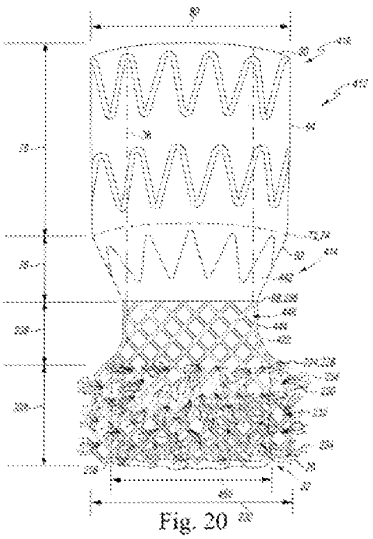
wherein expansion of the valve assembly is configured to press the sealing material against native valve leaflets of an aorta of the patient.

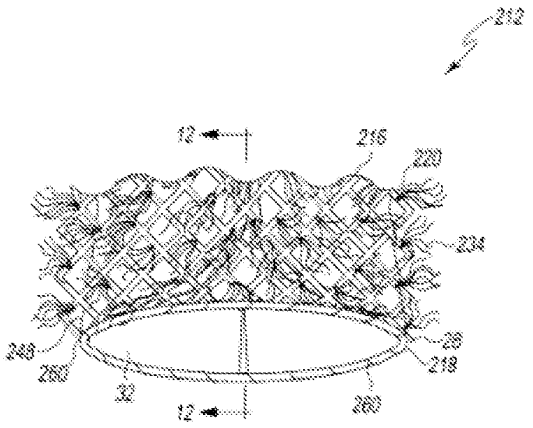
35. (New) The transcatheter heart valve assembly of claim 34, wherein the sealing material is held against the outer frame as the valve expands from the radially compressed orientation to the radially expanded orientation.

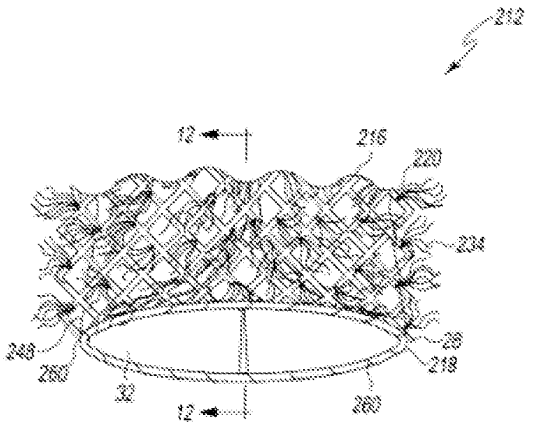
REMARKS

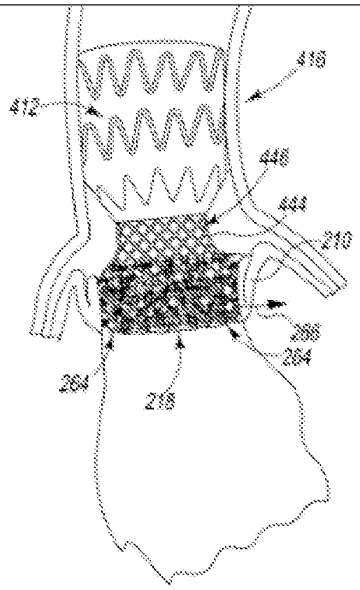
Applicant submits claims for consideration herein. Each of the claims includes the general limitations of the claim indicated as allowable in the corresponding Canadian Patent Application that forms the basis for the Patent Prosecution Highway request.

A support chart for claim 31 is provided herein.

Claims	
30. A transcatheter heart valve assembly comprising:	A transcatheter heart valve assembly is illustrated throughout the figures. One example is shown in FIG. 20.  Fig. 20
an inner frame comprising a graft covering housing a prosthetic heart valve, wherein the graft covering extends around the prosthetic heart valve for providing sealing to the heart valve;	An inner frame 26 carries a prosthetic heart valve 32. The inner frame 26 is illustrated in FIG. 11 as a graft covering.

	 Fig. 11 The specification discloses *"the outer surface **42** of the stent **38** is covered with low-profile polyester, ePTFE, or other nonporous covering material **44** that prevents fluid from passing through the outer surface **42**. However, it should be appreciated that the stent **38** may be covered with standard polyester or other nonporous materials."*
an outer frame formed from a metallic material and defining an open cell configuration, and being secured to the graft covering by a plurality of stitches; and	The outer frame is illustrated with an open cell configuration, and is formed from a metallic material. *Referring now to FIG. 11, the inner frame **218** of the dual-frame component **214** is secured to the outer frame **216** via a plurality of stitches **260**.*
a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks, wherein the sealing material is attached to the outer frame, wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame;	There is provided a sealing material, and the sealing material includes a plurality of radially extending fibers that extend outwardly of the frame. The fibers are illustrated as 234:

	 Fig. 11
wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer,	*In the illustrative embodiment, the outer surface **42** of the stent **38** is covered with low-profile polyester, ePTFE, or other nonporous covering material **44** that prevents fluid from passing through the outer surface **42**. However, it should be appreciated that the stent **38** may be covered with standard polyester, ePTFE or other nonporous materials.*
wherein the heart valve assembly is configured to be deployed endovascularly through a femoral artery of the patient, wherein the heart valve assembly has a radially compressed and a radially expanded orientation,	*Such a valve may be introduced transfemorally or through the subclavian artery or the apex of the heart.*

wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation is configured to press the radially extending fibers into engagement with native leaflets of the aorta of a patient,	 Fig. 21
wherein the outer frame extends distally further than the prosthetic heart valve.	Outer surface 444 as an example extends further than the prosthetic heart valve and provides blood flow therethrough.

The claims are directed towards an improved transcatheter aortic valve replacement (TAVR) that address paravalvular leaks (PVL). Namely, by having an inner frame that is a graft covering around the heart valve, sealing aspects are provided to the valve against the metallic outer frame. This helps to provide a seal around an inner facing surface of the metallic frame, as well as to protect at least portions of the valve leaflets from contact with the metal frame. The outer seal provides sealing between the outer frame and the patient's anatomical wall, while avoiding problems associated with conventional TAVR devices that will be discussed further herein.

PROBLEMS WITH EXISTING TAVR DEVICES

TAVR devices have competing design forces at all times. The TAVR must maximize valve leaflet size, provide sealing characteristics to reduce PVL and PVR[1], yet, must maintain a small overall crimped profile as the compressed TAVR must be delivered endovascularly through an access artery and cross the native heart valve of the patient[2], maintain appropriate asymmetric foreshortening characteristics[3], and maintain appropriate hoop stresses and forces so that undue pressure is not required to inflate the balloon for balloon expandable valves or for self-expansion for self-expanding valves, or underexpansion of the valve assembly can occur[4].

US Patent Publication No. 20120123529 ("Levi"), which is discussed further herein, well describes this problem of crimp profile with respect to the inner skirt:

> *[0066] Known fabric skirts comprise a weave of warp and weft fibers that extend perpendicular to each other and with one set of fibers extending perpendicularly to the upper and lower edges of the skirt. When the metal frame, to which the fabric skirt is secured, is radially compressed, the overall axial length of the frame increases. Unfortunately, a fabric skirt, which inherently has limited elasticity, cannot elongate along with the frame and therefore tends to deform the struts of the frame and prevents uniform crimping.*

While this was in reference to the inner skirt, the same concerns are presented with an outer skirt where conformability to the native annulus is even more pronounced. Thus, it should be evident that a balloon expandable outer frame (which is thus subject to higher compressive forces) having an outer graft covering of sufficient height, along with an inner graft covering, presented significant engineering design challenges. Designing an outer seal that would effectively seal and limit PVL for a balloon expandable frame is thus desirable.

The issue with the outer seal is particularly relevant because paravalvular leaks and regurgitation are a persistent problem with TAVR. For example, a recent study found that the CoreValve prosthesis, one of the few available TAVR devices in the United States market, had moderate or severe PVR of 11.4% and 9.0% at 30 days. From the study involving 60 patients:

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[1] https://www.acc.org/latest-in-cardiology/articles/2017/02/02/08/25/transcatheter-management-of-paravalvular-leaks
[2] https://www.sciencedirect.com/science/article/pii/S2666084919304760
[3] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6551197/
[4] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5300953/

The primary efficacy endpoint was defined as the proportion of patients with less-than-mild prosthetic valve regurgitation at 30 days and amounted to 72.4%, with no patient showing evidence for moderate or severe regurgitation. Of the patients without a pacemaker at baseline, 11.8% required implantation of a permanent pacemaker within 30 days after TAVR. The mean transprosthetic gradient was low with 6.4 mm Hg as typical for a supra-annular valve design, though acknowledging that no patient requiring a 23-mm device was included. The pre-defined primary safety endpoints, all-cause mortality and disabling stroke at 30 days, amounted to 1.7% each in a patient population with a mean Society of Thoracic Surgeons score of 6.4%. Thirty-day rates of major vascular complications and life-threatening or disabling bleeding were 10.0% and 11.7%, respectively.

The presented data are promising and support the concept to mimic surgical-like outcomes as it relates to PVR by the addition of an external seal that compensates for incomplete stent-landing zone apposition...[5]

From another study:

Moderate to severe regurgitation after TAVR confers a poor prognosis and is associated with an increased risk of all-cause mortality Even mild PVL has been shown to have a negative impact on survival. Kodali et al reported on the outcomes of patients who underwent TAVR from the randomized cohorts of the PARTNER trial and continued access registries. Data were analyzed from a total of 2,434 patients. PVL was reported as mild in 38% and moderate/severe in 9.1% of patients after TAVR. There was no difference in 30-day mortality. Instead, the adverse effect was expressed later with a significant increase in 1-year all-cause and cardiac mortality and repeat hospitalization in those with worsening PVL.[6]

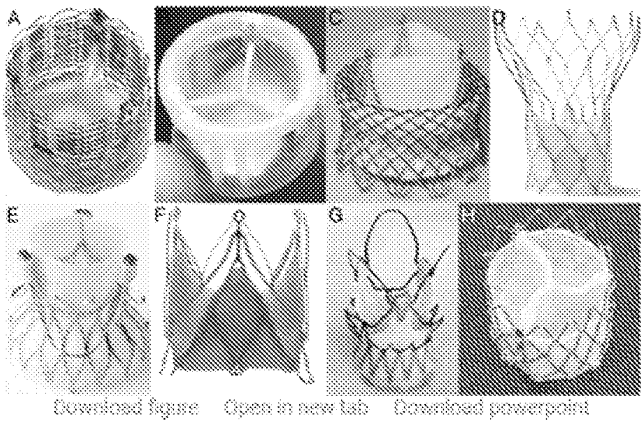
[5] http://interventions.onlinejacc.org/content/jint/11/2/169.full.pdf

[6] https://citoday.com/articles/2015-july-aug/managing-paravalvular-leaks-after-tavr

Thus, as these studies show, PVL is a long-felt problem and a method of addressing them has been needed. Studies show high one year mortality and rehospitalization rates of 35% and 31% may be attributed to PVL, and reducing PVL will thus reduce mortality and rehospitalization rates. According to this study, an external seal helps to address PVL and PVR. Surgical valves, as will be discussed herein, did not traditionally have significant PVL concerns because the valve leaflets were removed from the patient, and a sealing ring or similar could be stitchably engaged with the aorta in an open heart procedure. However, a robust outer seal system on a TAVR presents problems with expansion forces, foreshortening, underexpansion, and crossing of the aorta. The claimed invention addresses these problems.

A LONG-FELT NEED EXISTED TO REDUCE PVL WHILE MAINTAINING SMALL VALVE PROFILE, AND MULTIPLE ATTEMPTS TO DO SO WERE NOT LEADING TOWARDS THE CLAIMED INVENTION

There were multiple TAVRs available in 2012 at the effective filing date of this application, however, none of TAVRs known to Applicant taught a fiber outer seal. As an example, consider the following image depicting one example of the state of the art for TAVRs in 2012:



Download figure Open in new tab Download powerpoint

Figure 4
Valves Undergoing Early Evaluation

(A) Lotus (Boston Scientific Inc., Natick, Massachusetts), (B) Direct Flow (Direct Flow Medical Inc., Santa Rosa, California), (C) HLT (Bracco Inc., Princeton, New Jersey), (D) Portico (St. Jude Medical Inc., St. Paul, Minnesota), (E) Engager (Medtronic Inc., Minneapolis Minnesota), (F) JenaClip (JenaValve Inc., Munich, Germany), (G) Acurate valve (Symetis Inc., Ecublens, Switzerland), and (H) Inovare (Braile Biomedica Inc., São José do Rio Preto, Brazil) valves. [7]

In this image, there are eight (8) distinct transcatheter valves shown. Four (4) of the eight (8) appear to teach an outer seal, and several of the ones that do not teach an outer seal had later variations of their product lines that do teach an outer seal. None of them teach a fiber based outer seal. Much of the art taught an outer seal that was largely non-compliant in structure, and sealed by having an initial density or non–porosity conducive to sealing. None of the seals worked by having a group of fibers that would work to seal against PVL once the fibers were compressed from implantation.

A DISCUSSION OF SOME OF THE PRIOR ART FOLLOWS:

TRANSCATHETER VALVE TECHNOLOGY

An example of a transcutaneous valve having an inner and outer seal is shown in at least WO98/29057 ("Cribier '057"). See for example FIG. 6D that shows a cover extending from an inner surface to an outer surface of the stent frame.

[7] https://pubmed.ncbi.nlm.nih.gov/22749306/

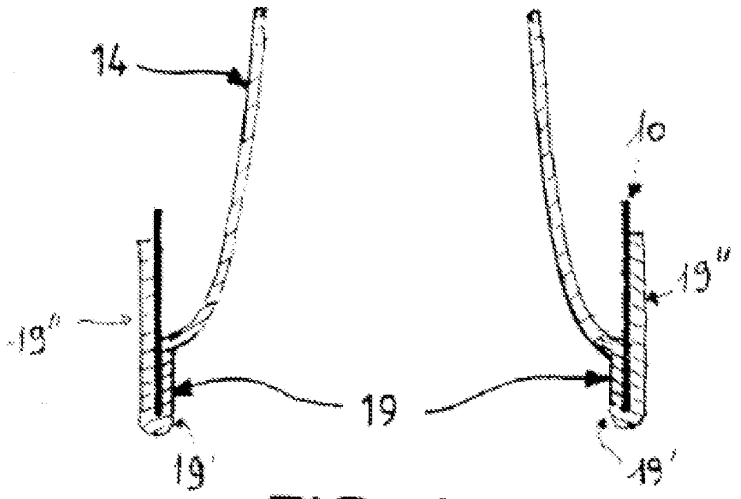


FIG_6d

US Patent No. 7,585,321 ("Cribier '321") also teaches a TAVR with similar disclosure.

WO2006/005015 ("Spenser II") appears to teach a thick band with fibers emanating therefrom in FIG. 22, however, there is no graft forming the inner frame, thus the inner sealing is missing. FIG. 22 is reproduced below:

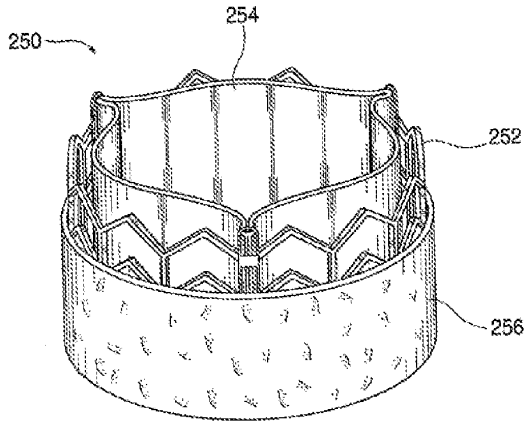
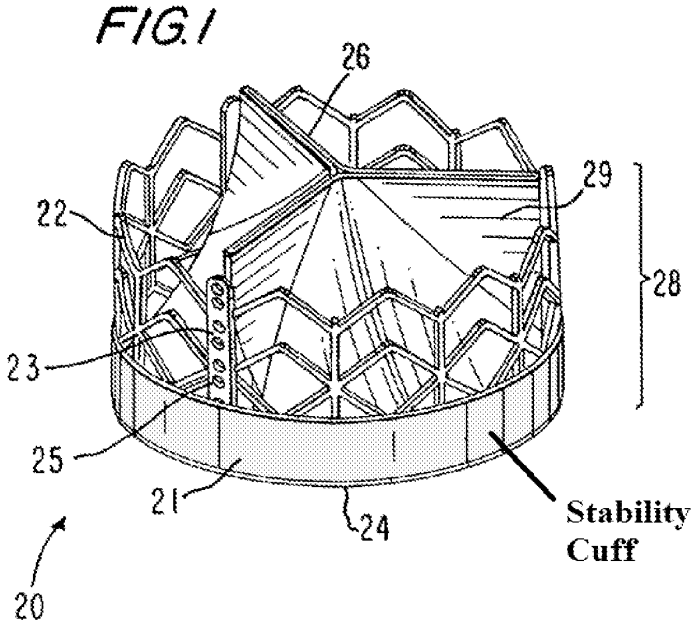


FIG. 22

US Patent No. 7510575 ("Spenser I"), includes a rigid commissure supports to which the leaflets were sutured. Spenser I was crimped into a catheter and deployed with a balloon. A cuff 21 was provided on the proximal end that enhances the stability of the device. (Spenser II, para 0009-0010)



Spenser II, WIPO WO2006005015A2, recognized that Spenser I did not address paravalvular leaks. (Spenser II, para 0009-0010, *"Spenser et al. also do not address leaks that can occur around the implanted valve"*). Spenser II included many embodiments for paravalvular repairs, including one transcatheter valve illustrated in FIG. 22 as shown below:

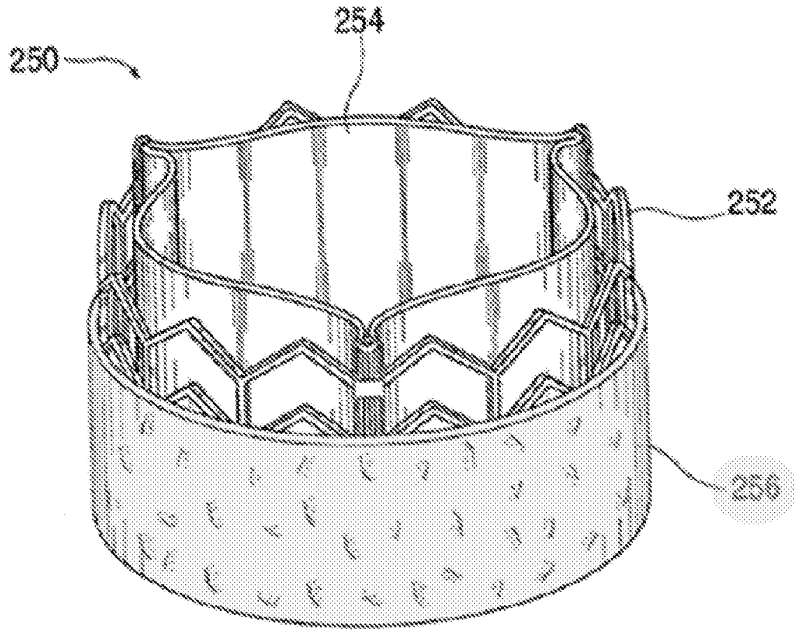


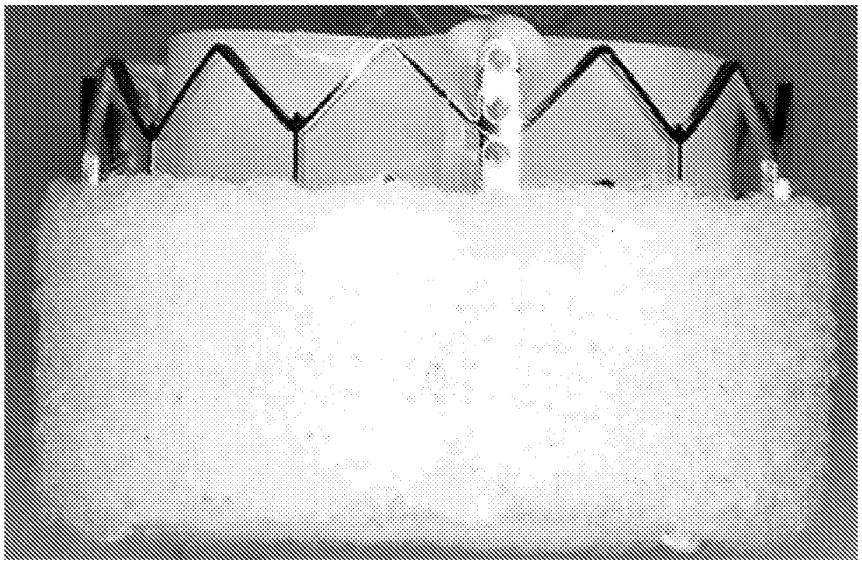
FIG. 22

Spenser II teaches a compressible material 256 that may resemble a cloth or fabric functioning as a band having small fibers extending from the surface of the band. The compressible material of the band expands after deployment at a treatment site. The large, bulky outer seal is described to have a thickness of 1-5mm.

It appears that the Spenser II disclosure or a generally similar valve was later prototyped with the compressible cloth of Spenser II. In fact, this valve was called the "Cloth Valve," the same "cloth" language used in Spenser II. The cloth valve was published in a clinical paper by Walther.[8] The valve was designed for valve-in-valve procedures in a mitral position where previously an open surgical valve had been implanted (hence the name valve-in-valve). The previously implanted surgical valve provided a landing zone for implantation of the new cloth valve. The design of the valve was mainly tested and directed towards replacing previously implanted surgical valves in the mitral position. It does not appear that disclosure was ever made on any placement of this valve in the aortic position or to replace diseased native valves, and

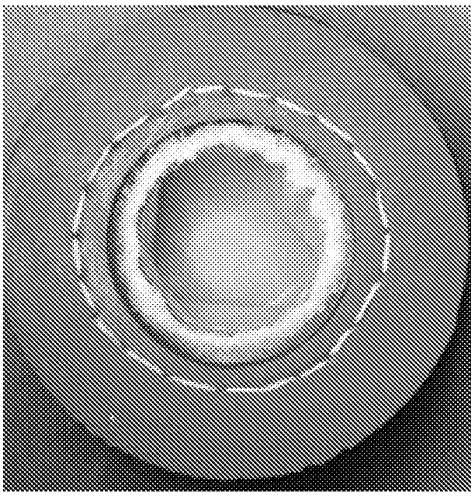
[8] https://academic.oup.com/ejcts/article/40/5/1120/446481

Applicant submits that this was not possible in an endovascular, aortic valve replacement procedure through the femoral artery due to the large profile size of the Walther valve. An image of this prototype is shown below:

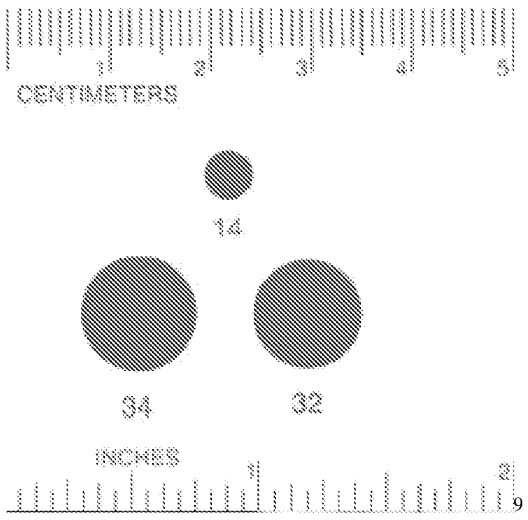


A valve-in-valve procedure is different from a first implant TVR. In a valve-in-valve procedure, the native valve has already been excised and replaced with a surgical valve. When the surgical valve begins to fail, a TVR is then implanted within the surgical valve. The surgical valve typically has a stiff sewing ring that is already stitched to the patient's annulus. Thus when the TVR is implanted within the surgical valve, the problems of irregularities and heavy calcifications of the native annulus are largely eliminated.

The cloth valve design of Walther had several shortcomings. One was a very large profile. The Cloth valve had a 33 Fr profile which made it highly unsuitable for us in the native annulus of patients with aortic stenosis, and likely impossible for femoral access. Comparatively, one can refer to the majority of TAVRs today having a profile of around 14 Fr, representing an over 6-mm decrease in crimp profile. Additionally, the outer compressible band is very bulky and does not allow effective foreshortening of the stent, to the extent that the cloth valve of Walther forshortens. Finally, the stiff outer band inhibits full expansion of the stent and can narrow the effective opening of the valve. This is demonstrated in the figures that were published in the Walther article.



Due to the size limitations of profile in Walther, Walther was deployed within a 33F catheter in a minimally invasive surgery where the patient's chest was cut open in a thoracotomy. The difference between a 33F catheter and the 14F catheters used today in endovascular, aortic repair are noticeable:



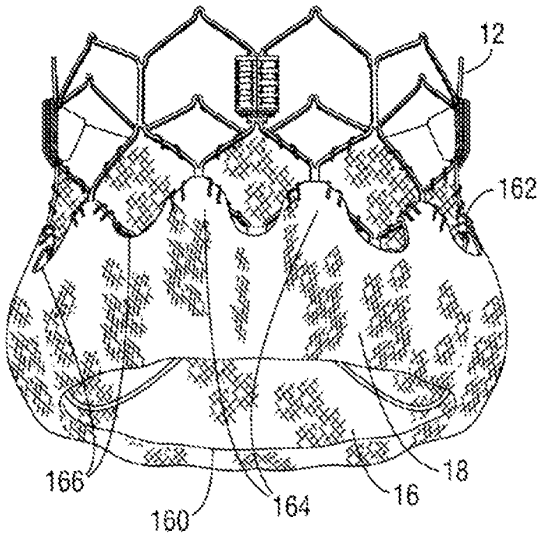
[9] https://memim.com/french-catheter-scale.html

Applicant submits that it was just not possible to deploy the Walther design as an endovascularly deployed, aortic valve replacement through the femoral artery due to the very large profile design of Walther. The same is true for Spenser II. Each of the claims requires endovascular deployment, through the femoral artery, and against the native leaflets of the patient. Applicant submits that this was not possible under Walther and Spenser II due to profile size. And the profile size issues are even more pronounced if an inner skirt is added to Walther and/or Spenser II.

Nor would it be obvious to reduce the overall size of the Walther seal to further reduce profile. Walther employed a thick, outer band or cloth for the compressibility of the cloth seal within a ring of an already implanted surgical valve, and Walther expressly teaches that "the rigid base does not easily conform to the profile of the expanded stent frame" and "You have four atmospheres and really it is just filling little gaps there." The implication from both of these teaches in Walther is that a larger overall, compressive band thickness is desired for "filling little gaps" and "conform[ing] to the profile of the expanded stent frame."

US Patent Publication No. 20120123529 ("Levi") appears to teach an inner and outer seal in FIG. 42.

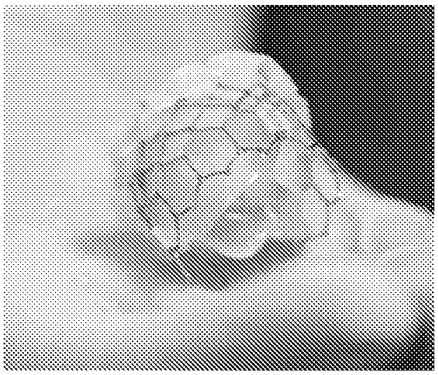
FIG. 42



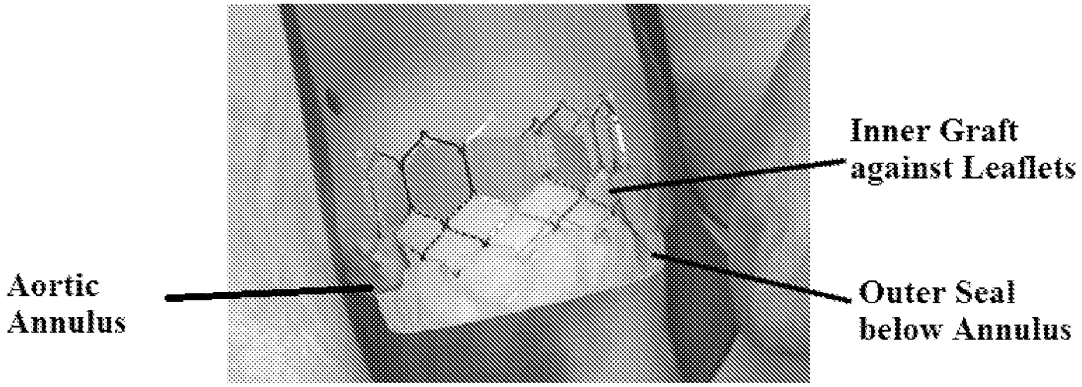
While Levi teaches "yarns" forming the outer graft, Applicant submits that this is not the same as radially extending fibers as claimed even under the most broad interpretation of the claims. And Levi discloses "fibers" that form the skirt material, however, the fibers are not radially extending as required by the claims.

By 2011 it was obvious that TAVR suffered serious shortcomings due to a high complication rate in form of PVL. The PVL is due to the fact that the irregular calcified annulus of the aortic valve will prevent a uniform expansion and contact with the frame of the TAVR causing a leak between the TAVR and the calcified annulus. Additionally, placement of stiff and thick cloth to on the external surface of the TAVR such as that in the Walther valve would result in: 1) significant inhibition of foreshortening of the TAVR that leads to under-expansion of the TAVR, 2) formation of pleats along the stiff outer seal component leading to further PVL, 4) possible under-expansion and narrowing of the inflow of the stent, and 4) high crossing profile which would inhibit the crossing and placement of the TAVR across the diseased and narrowed

aortic valve, in addition to inhibiting the passage of the TAVR through the femoral artery. Understanding these problems, rather than using a thick band or cloth, the Levi embodiment is designed to help reduce the PVL by adding extra loose cloth to the outside and the most proximal aspect of the TAVR's metallic frame *in order to seal against PVL not at the calcified annular level, but at the level below the annulus (subannular)*. The loose outer cloth also provides more "give" in the cloth, allowing foreshortening and effective expansion of the TAVR. A commercially available embodiment of Levi is shown below:



The commercial embodiment of Levi was a product termed SAPIEN 3. The SAPIEN 3 had significant foreshortening compared with the prior valves. As an example, on the 26 mm diameter frame version of SAPIEN 3, the crimped length of the valve was 28-mm, whereas the valve foreshortened to 20-mm upon expansion. In practice, the SAPIEN 3 seal did reduce overall PVL rates by having the inner graft of the SAPIEN 3 press against the aortic annulus, and the bulging seal placed below the annulus.



While the PVL rates were decreasing, they were still significant. In a study reviewing the SAPIEN 3, it was found that grade 1 and higher PVL still existed in 35.7% of implants.[10] Additionally, the SAPIEN 3 had a very narrow band of landing zone where the device could be deployed. Too high of deployment may not provide a proper seal, and too low of deployment could impinge on the and be associated with an increased pacemaker implant rate.[11]

STENT GRAFT TECHNOLOGY

Various stent grafts have also been developed that include one or more seals. US Patent Publication No. 2004/0256759 ("Hartley") teaches a velour band at a distal end of the stent graft.

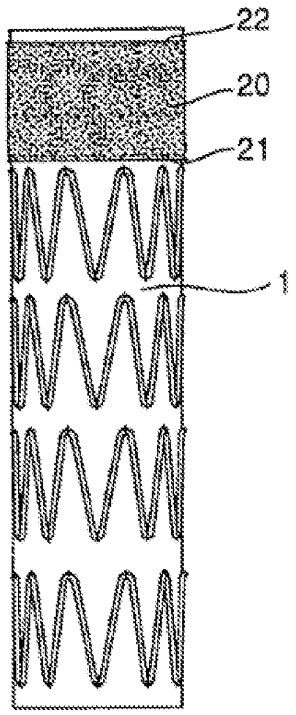


Fig 2

[10] https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwiMgcfVrIPzAhX5ElkFHaQTC04QFnoECAQQAQ&url=https%3A%2F%2Fwww.ahajournals.org%2Fdoi%2Fpdf%2F10.1161%2FCIRCULATIONAHA.116.022797%3Fdownload%3Dtrue&usg=AOvVaw1XLGl2PmRzTo35Y76ELjB7

[11] https://www.thecardiologyadvisor.com/home/topics/vascular-medicine/optimal-implantation-depth-in-less-than-30-of-transcatheter-aortic-valve-replacement-procedures/

Similarly, US Patent No. 7,921,678 ("Norris") teaches a stent graft with loops of outwardly extending material.

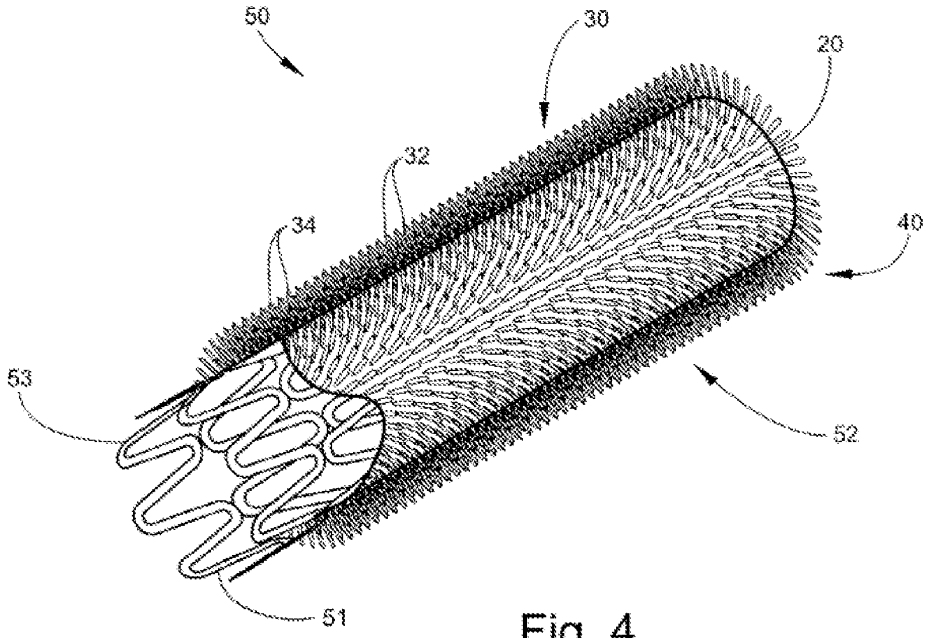


Fig. 4

US Patent Publication No. 2004/0082989 ("Cook") teaches a cuff portion with a frayed portion 22:

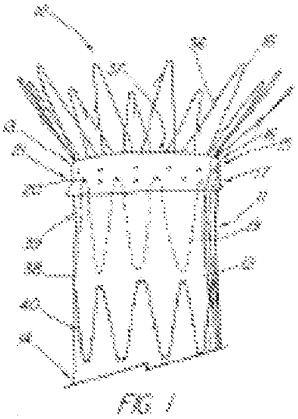


FIG. 1

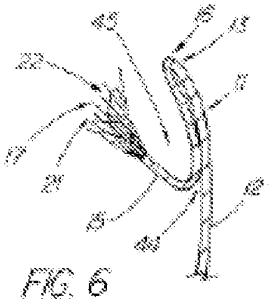


FIG. 6

US Patent Publication No. US 2002/0052649 ("Greenhalgh") teaches a stent graft with fibers emanating therefrom:

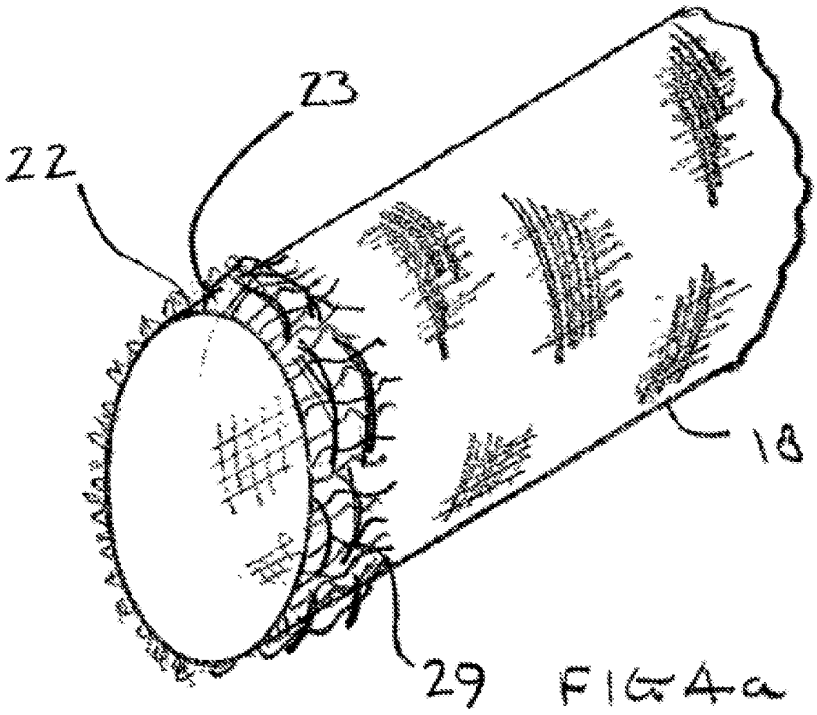
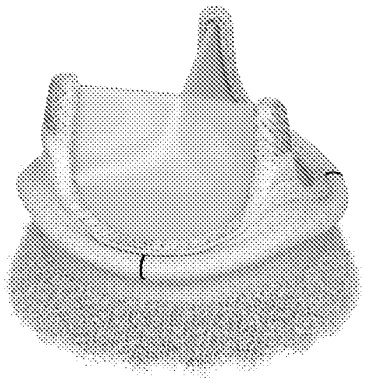


FIG 4a

SURGICAL VALVES

The non-patent literature of Intuity does appear to teach an external seal that includes fibers. Intuity appears to show a surgical valve from 2011 that has a plush outer seal similar to the valve shown in US Patent No. 9,370,418, which has been discussed in prosecution of Application No. 16/808,137 in front of Examiner Shipmon and that is related to this pending application.



This surgical valve would appear to teach a seal that seals below the leaflets, and not against native valve leaflets of the patient. In fact, typically the native leaflets are surgically removed during surgical heart valve replacement. Additionally, because a surgical valve does not have the access issues associated with transcatheter valves, the increased overall profile of a surgical valve such as Intuity is not as problematic.

THE CLAIMED INVENTION IS AN IMPROVEMENT OVER THE PRIOR ART

Claim 31 recites:

A transcatheter heart valve assembly comprising:
[[a.]] an inner frame comprising a graft covering housing a prosthetic heart valve, wherein the graft covering extends around the prosthetic heart valve for providing sealing to the heart valve;
[[b.]] an outer frame formed from a metallic material and defining an open cell configuration, and being secured to the graft covering by a plurality of stitches; and
[[c.]] a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks,
wherein the sealing material is attached to the outer frame,
wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame;
wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer,
wherein the heart valve assembly is configured to be deployed endovascularly through an access artery of the patient,
wherein the heart valve assembly has a radially compressed and a radially expanded orientation,

wherein expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation presses the radially extending fibers into engagement with native leaflets of the aorta of a patient,

wherein the outer frame extends distally further than the prosthetic heart valve.

As detailed, none of the prior art anticipates or renders obvious the claimed invention. The stent graft technology in combination with a transcatheter valve would appear to produce at best the Walther or Spenser II design. However, this design is not capable of being deployed endovascularly as a transcatheter aortic valve replacement, or where expansion of the heart valve assembly from the radially compressed orientation to the radially expanded orientation presses the radially extending fibers into engagement with native leaflets of the aorta of the patient.

DEPOSIT ACCOUNT

The Commissioner is hereby authorized to charge any otherwise unpaid fees associated with the filing of this correspondence to Deposit Account No. **50-6191**.

Respectfully submitted,

Date: October 12, 2021

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Customer No. 175373

Electronic Acknowledgement Receipt

EFS ID:	44004023
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	175373
Filer:	Justin Robert Nifong/Jana Passe
Filer Authorized By:	Justin Robert Nifong
Attorney Docket Number:	426/2/12 UTIL
Receipt Date:	12-OCT-2021
Filing Date:	28-JUL-2020
Time Stamp:	11:30:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		426-2-12UTIL-20211012-Preliminary-Amendment.pdf	1352088 cdfd16b13f9a86937cd1f2e6dbb61c920935c556	yes	25

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Preliminary Amendment	1	1
	Claims	2	4
	Applicant Arguments/Remarks Made in an Amendment	5	25
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National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
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.

Doc Code: DIST.E.FILE **Document Description: Electronic Terminal Disclaimer - Filed**	PTO/SB/25 PTO/SB/26 U.S. Patent and Trademark Office Department of Commerce

Electronic Petition Request	**TERMINAL DISCLAIMER TO OBVIATE A PROVISIONAL DOUBLE PATENTING REJECTION OVER A PENDING "REFERENCE" APPLICATION AND TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT**
Application Number	16941117
Filing Date	28-Jul-2020
First Named Inventor	Ali Shahriari
Attorney Docket Number	426/2/12 UTIL
Title of Invention	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

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

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

Owner	Percent Interest
Aortic Innovations, LLC	100 %

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

17213251 filed on 03/26/2021

17327673 filed on 05/22/2021

17469391 filed on 09/08/2021

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

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11129735

11045335

11026817

10966846

10888441

10881538

10857011

10792172

as the term of said prior patent is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patent are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

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- expires for failure to pay a maintenance fee;
- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

◉ Terminal disclaimer fee under 37 CFR 1.20(d) is included with Electronic Terminal Disclaimer request.

○ I certify, in accordance with 37 CFR 1.4(d)(4), that the terminal disclaimer fee under 37 CFR 1.20(d) required for this terminal disclaimer has already been paid in the above-identified application.

Applicants claims the following fee status:

◉ Small Entity

○ Micro Entity

○ Regular Undiscounted

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

THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES

I certify, in accordance with 37 CFR 1.4(d)(4) that I am:

- (●) An attorney or agent registered to practice before the Patent and Trademark Office who is of record in this application

  Registration Number 59389

- ( ) A sole inventor
- ( ) A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application
- ( ) A joint inventor; all of whom are signing this request

Signature	/Justin R. Nifong/
Name	Justin R. Nifong

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

Electronic Patent Application Fee Transmittal

Application Number:	16941117
Filing Date:	28-Jul-2020
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Filer:	Justin Robert Nifong
Attorney Docket Number:	426/2/12 UTIL

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
STATUTORY OR TERMINAL DISCLAIMER	2814	1	170	170
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**170**

Doc Code: DISQ.E.FILE
Document Description: Electronic Terminal Disclaimer – Approved

Application No.: 16941117

Filing Date: 28-Jul-2020

Applicant/Patent under Reexamination: Shahriari

Electronic Terminal Disclaimer filed on October 12, 2021

☒ APPROVED

This patent is subject to a terminal disclaimer

☐ DISAPPROVED

Approved/Disapproved by: Electronic Terminal Disclaimer automatically approved by EFS-Web

U.S. Patent and Trademark Office

Electronic Acknowledgement Receipt	
EFS ID:	44003600
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	175373
Filer:	Justin Robert Nifong
Filer Authorized By:	
Attorney Docket Number:	426/2/12 UTIL
Receipt Date:	12-OCT-2021
Filing Date:	28-JUL-2020
Time Stamp:	11:09:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$170
RAM confirmation Number	E20210BB09360627
Deposit Account	506191
Authorized User	Justin Nifong
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Terminal Disclaimer-Filed (Electronic)	eTerminal-Disclaimer.pdf	50851 00d855da324cfbaf44633924b136afbf35b3fbf2	no	3
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	37849 6948ba15b90b132cc180f76bcf0c540719169d04	no	2
Warnings:					
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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/941,117	07/28/2020	Ali Shahriari	426/2/12 UTIL	1876

175373 7590 09/21/2021

Aortic Innovations, LLC
4917 Waters Edge Drive, Suite 275
Raleigh, NC 27606

EXAMINER
CENTRAL, DOCKET

ART UNIT	PAPER NUMBER
OPAP	

NOTIFICATION DATE	DELIVERY MODE
09/21/2021	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):

usptomail@nkpatentlaw.com

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Commissioner for Patents
United States Patent and Trademark Office
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In re Application of	:	
Shahriari, Ali	:	
Application No. 16/941,117	:	DECISION ON PETITION
Filed: 28 Jul 2020	:	
For: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME	:	

This is a decision on the renewed request to participate in the Patent Prosecution Highway (PPH) program and the petition under 37 CFR 1.102(a), filed September 13, 2021, to make the above-identified application special.

The request and petition are **GRANTED**.

DISCUSSION

A grantable request to participate in the PPH pilot program and petition to make special require:

1. The U.S. application for which participation in the Global/IP5 PPH pilot program is requested must have the same earliest date, whether this is the priority date or filing date, as that of a corresponding national or regional application filed with another Global/IP5 PPH participating office or a corresponding PCT international application for which one of the Global/IP5 PPH participating offices was the International Searching Authority (ISA) or the International Preliminary Examining Authority (IPEA).

2. Applicant must:
   a. Ensure all the claims in the U.S. application must sufficiently correspond or be amended to sufficiently correspond to the allowable/patentable claim(s) in the corresponding Office of Earlier Examination (OEE) application and
   b. Submit a claims correspondence table in English;

3. Examination of the U.S. application has not begun;

4. Applicant must submit:
    a. Documentation of prior office action:
        i. a copy of the office action(s) just prior to the "Decision to Grant a Patent" from each of the Global/IP5 PPH participating office application(s) containing the allowable/patentable claim(s) or
        ii. if the allowable/patentable claims(s) are from a "Notification of Reasons for Refusal" then the Notification of Reasons for Refusal or
        iii. if the Global/IP5 PPH participating office application is a first action allowance then no office action from the Global/IP5 PPH participating office is necessary should be indicated on the request/petition form or
        iv. the latest work product in the international phase of the OEE PCT application;
    b. An English language translation of the Global/IP5 PPH participating office action or work product from (4)(a)(i)-(ii) or (iv) above;
5. Applicant must submit:
    a. An IDS listing the documents cited by the Global/IP5 PPH participating office examiner in the Global/IP5 PPH participating office action or work product (unless already submitted in this application)
    b. Copies of the documents except U.S. patents or U.S. patent application publications (unless already submitted in this application);

The request to participate in the PPH pilot program and petition comply with the above requirements. Accordingly, the above-identified application has been accorded "special" status.

Telephone inquiries concerning this decision should be directed to Kimberly Inabinet at (571) 272-4618.

This application will be forwarded to the examiner for action on the merits commensurate with this decision.

/KIMBERLY A INABINET/
Paralegal Specialist, OPET

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. 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	16941117
	Filing Date	2020-07-28
	First Named Inventor	Ali Shahriari
	Art Unit	OPAP
	Examiner Name	CENTRAL, DOCKET
	Attorney Docket Number	426/2/12 UTIL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	3365728	A	1968-01-30	Lowell et al.	
	2	5411552	A	1995-05-02	Andersen et al.	
	3	6893460	B2	2005-05-17	Spenser et al.	
	4	7393360	B2	2008-07-01	Spenser et al.	
	5	7510575	B2	2009-03-31	Spenser et al.	
	6	9393110	B2	2016-07-19	Levi et al.	
	7	9829057	B2	2017-11-28	Chung et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16941117
	Filing Date	2020-07-28
	First Named Inventor	Ali Shahriari
	Art Unit	OPAP
	Examiner Name	CENTRAL, DOCKET
	Attorney Docket Number	426/2/12 UTIL

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20030153974	A1	2003-08-14	Spenser et al.	
	2	20060276813	A1	2006-12-07	Greenberg	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2011143263	WO	A2	2011-11-17	HEART LEAFLET TECHNOLOGIES, INC.		

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NON-PATENT LITERATURE DOCUMENTS Remove

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, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	Inter Partes Review 2017-00060 of US Patent No. 8,992,608, and supporting declaration of Nigel Buller	
	2	Inter Partes Review 2021-01527 of US Patent No. 10,792,172, and supporting declaration of Nigel Buller	
	3	JPO, Office Action of corresponding Japanese Patent Application No. 2020-122656, mailed Aug. 17, 2021, 4 pages	X

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16941117
	Filing Date	2020-07-28
	First Named Inventor	Ali Shahriari
	Art Unit	OPAP
	Examiner Name	CENTRAL, DOCKET
	Attorney Docket Number	426/2/12 UTIL

	4	EPO, Office Action of corresponding European Patent Application No. 20172681.7, mailed Sep. 6, 2021, 6 pages	☐

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16941117
	Filing Date	2020-07-28
	First Named Inventor	Ali Shahriari
	Art Unit	OPAP
	Examiner Name	CENTRAL, DOCKET
	Attorney Docket Number	426/2/12 UTIL

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.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Justin R. Nifong/	Date (YYYY-MM-DD)	2021-09-20
Name/Print	Justin R. Nifong	Registration Number	59389

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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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 record s.

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

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

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

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

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

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

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
17 November 2011 (17.11.2011)

PCT

(10) International Publication Number
WO 2011/143263 A2

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A61M 25/01 (2006.01)

(21) International Application Number:
PCT/US2011/035983

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10 May 2011 (10.05.2011)

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(26) Publication Language: English

(30) Priority Data:
61/333,200 10 May 2010 (10.05.2010) US

(71) Applicant *(for all designated States except US)*: **HEART LEAFLET TECHNOLOGIES, INC.** [US/US]; 7351 Kirkwood Lane North, Suite 104, Maple Grove, MN 55369 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **GAINOR, John** [US/US]; 1396 Knollwood Lane, Mendota Heights, MN 55118 (US). **THILL, Gary, A.** [US/US]; 3741 Centerville, Road, Vadnais Heights, MN 55127 (US). **WILSON, Robert, Foster** [US/US]; 3107 West Owasso Blvd., Roseville, MN 55113 (US). **BANICK, Christopher, M.** [US/US]; 1490 Sunnybrook Drive, Minnetrista, MN 55364 (US).

(74) Agent: **MCKINLEY, David, J.**; Inskeep Intellectual Property Group, Inc., 2281 W. 190th Street, Suite 200, Torrance, CA 90504 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

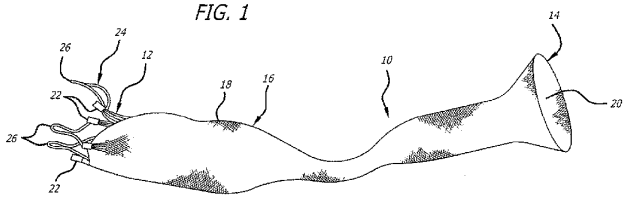
(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

(54) **Title**: STENTLESS SUPPORT STRUCTURE

FIG. 1



(57) **Abstract**: A stentless support structure capable of being at least partly assembled in situ. The support structure comprises a braided tube that is very flexible and, when elongated, becomes very long and very small in diameter, thereby being capable of placement within a small diameter catheter. The support structure is preferably constructed of one or more thin strands of a superelastic or shape memory material such as Nitinol. When released from the catheter, the support structure folds itself into a longitudinally compact configuration. The support structure thus gains significant strength as the number of folds increase. This radial strength obviates the need for a support stent. The support structure may include attachment points for a prosthetic valve.

WO 2011/143263 A2

STENTLESS SUPPORT STRUCTURE

PRIORITY CLAIM

[0001] This application claims priority to U.S. Provisional Patent Application Serial Number 61/333,200 entitled *Stentless Support Structure*, filed May 10, 2010, the entirety of which is hereby incorporated by reference.

REFERENCED DOCUMENTS

[0002] U.S. Patent Application Number 11/443,814 entitled *Stentless Support Structure*, filed May 30, 2006 is hereby incorporated by reference.

BACKGROUND OF THE INVENTION

[0003] There has been a significant movement toward developing and performing cardiovascular surgeries using a percutaneous approach. Through the use of one or more catheters that are introduced through, for example, the femoral artery, tools and devices can be delivered to a desired area in the cardiovascular system to perform many number of complicated procedures that normally otherwise require an invasive surgical procedure. Such approaches greatly reduce the trauma endured by the patient and can significantly reduce recovery periods. The percutaneous approach is particularly attractive as an alternative to performing open-heart surgery.

[0004] Valve replacement surgery provides one example of an area where percutaneous solutions are being developed. A number of diseases result in a thickening, and subsequent immobility or reduced mobility, of heart valve leaflets. Such immobility also may lead to a narrowing, or stenosis, of the passageway through the valve. The increased resistance to blood flow that a stenosed valve presents can eventually lead to heart failure and ultimately death.

[0005] Treating valve stenosis or regurgitation has heretofore involved complete removal of the existing native valve through an open-heart procedure followed by the implantation of a prosthetic valve. Naturally, this is a heavily invasive procedure and

inflicts great trauma on the body leading usually to great discomfort and considerable recovery time. It is also a sophisticated procedure that requires great expertise and talent to perform.

[0006] Historically, such valve replacement surgery has been performed using traditional open-heart surgery where the chest is opened, the heart stopped, the patient placed on cardiopulmonary bypass, the native valve excised and the replacement valve attached. A proposed percutaneous valve replacement alternative method on the other hand, is disclosed in U.S. Pat. No. 6,168,614 (the entire contents of which are hereby incorporated by reference) issued to Andersen et al. In this patent, the prosthetic valve is mounted on a stent that is collapsed to a size that fits within a catheter. The catheter is then inserted into the patient's vasculature and moved so as to position the collapsed stent at the location of the native valve. A deployment mechanism is activated that expands the stent containing the replacement valve against the valve cusps. The expanded structure includes a stent configured to have a valve shape with valve leaflet supports begins to take on the function of the native valve. As a result, a full valve replacement has been achieved but at a significantly reduced physical impact to the patient.

[0007] However, this approach has decided shortcomings. One particular drawback with the percutaneous approach disclosed in the Andersen '614 patent is the difficulty in preventing leakage around the perimeter of the new valve after implantation. Since the tissue of the native valve remains within the lumen, there is a strong likelihood that the commissural junctions and fusion points of the valve tissue (as pushed apart and fixed by the stent) will make sealing around the prosthetic valve difficult. In practice, this has often led to severe leakage of blood around the stent apparatus.

[0008] Other drawbacks of the Andersen '614 approach pertain to its reliance on stents as support scaffolding for the prosthetic valve. First, stents can create emboli when they expand. Second, stents are typically not effective at trapping the emboli they dislodge, either during or after deployment. Third, stents do not typically conform to the features of the native lumen in which they are placed, making a prosthetic valve housed within a stent subject to paravalvular leakage. Fourth, stents are subject to a tradeoff between strength and compressibility. Fifth, stents cannot be retrieved once deployed. Sixth, the inclusion of the valve within the stent necessarily increases the collapsed

diameter of the stent-valve complex and increases the caliber of the material that must be delivered into the vasculature.

[0009] As to the first drawback, stents usually fall into one of two categories: self-expanding stents and expandable stents. Self-expanding stents are compressed when loaded into a catheter and expand to their original, non-compressed size when released from the catheter. These are typically made of Nitinol. Balloon expandable stents are loaded into a catheter in a compressed but relaxed state. These are typically made from stainless steel or other malleable metals. A balloon is placed within the stent. Upon deployment, the catheter is retracted and the balloon inflated, thereby expanding the stent to a desired size. Both of these stent types exhibit significant force upon expansion. The force is usually strong enough to crack or pop thrombosis, thereby causing pieces of atherosclerotic plaque to dislodge and become emboli. If the stent is being implanted to treat a stenosed vessel, a certain degree of such expansion is desirable. However, if the stent is merely being implanted to displace native valves, less force may be desirable to reduce the chance of creating emboli.

[0010] As to the second drawback, if emboli are created, expanded stents usually have members that are too spaced apart to be effective to trap any dislodged material. Often, secondary precautions must be taken including the use of nets and irrigation ports.

[0011] The third drawback is due to the relative inflexibility of stents. Stents typically rely on the elastic nature of the native vessel to conform around the stent. Stents used to open a restricted vessel do not require a seal between the vessel and the stent. However, when using a stent to displace native valves and house a prosthetic valve, a seal between the stent and the vessel is necessary to prevent paravalvular leakage. Due to the non-conforming nature of stents, this seal is hard to achieve, especially when displacing stenosed valve leaflets.

[0012] The fourth drawback is the tradeoff between compressibility and strength. Stents are made stronger or larger by manufacturing them with thicker members. Stronger stents are thus not as compressible as weaker stents. Most stents suitable for use in a valve are not compressible enough to be placed in a small diameter catheter,

such as a 20Fr, 16Fr or even 14Fr catheter. Larger delivery catheters are more difficult to maneuver to a target area and also result in more trauma to the patient.

[0013] The fifth drawback of stents is that they are not easily retrievable. Once deployed, a stent may not be recompressed and drawn back into the catheter for repositioning due to the non-elastic deformation (stainless steel) or the radial force required to maintain the stent in place (Nitinol). Thus, if a physician is unsatisfied with the deployed location or orientation of a stent, there is little he or she can do to correct the problem.

[0014] The sixth drawback listed above is that the combination of the valve within the stent greatly increases the size of the system required to deliver the prosthetic device. As a result, the size of the entry hole into the vasculature is large and often precludes therapy, particularly in children, smaller adults or patients with pre-existing vascular disease.

[0015] It is thus an object of the present invention to address these drawbacks. Specifically, it is an object of the invention to provide a support structure that expands gently, with gradual force, thereby minimizing the generation of emboli.

[0016] It is further an object of the invention to provide a support structure that traps any emboli generated, thereby preventing the emboli from causing damage downstream.

[0017] It is yet another object of the invention to provide a support structure that conforms to the features of the lumen in which it is being deployed, thereby preventing paravalvular leakage.

[0018] It is still another object of the invention to provide a strong support structure capable of being deployed from a very small diameter catheter.

[0019] It is further an object of the invention to provide a support structure that is capable of being retracted back into a delivery catheter and redeployed therefrom.

[0020] It is another object of the invention to provide a device that is delivered with the valve distinctly separated from the inside diameter of the final configuration of the

support structure in order to reduce the amount of space required to deliver the device within the vasculature of the patient.

BRIEF SUMMARY OF THE INVENTION

[0021] The present invention accomplishes the aforementioned objects by providing a tubular mesh support structure for a native lumen that is capable of being delivered via a very small diameter delivery catheter. The tubular mesh is formed one or more fine strands braided together into an elongate tube. The strands may be fibrous, non-fibrous, multifilament, or monofilament. The strands exhibit shape memory such that the elongate tube may be formed into a desired folded shape, then stretched out into a very small diameter, elongated configuration. The small diameter, elongated configuration makes a very small diameter delivery catheter possible.

[0022] Upon deployment, the elongated tube is slowly pushed out of the delivery catheter, where it gradually regains its folded, constructed configuration. The tube conforms to the internal geometries of the target vessel. In addition, the braid effectively traps all emboli that may be released from the vessel walls.

[0023] As the tube continues to be pushed from the delivery catheter, it begins to fold in upon itself as it regains its constructed configuration. As it folds in upon itself, the forces exerted by each layer add together, making the structure incrementally stronger. Thus, varying levels of strength may be achieved without changing the elongated diameter of the device.

[0024] Using this folded tube, the valve can be attached such that the valve or other structure (such as a filter) in its elongated configuration within the delivery catheter does not reside within the elongated tube, but on deployment can be positioned in, above or below the tube.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] Figure 1 is a perspective view of a preferred embodiment of the present invention in an elongate configuration;

[0026] Figure 2 is a side view of a preferred embodiment of the present invention;

[0027] Figures 3-12 are a sequence of perspective views of a preferred embodiment of the present invention being deployed from a delivery catheter;

[0028] Figure 13 is a perspective view of a preferred embodiment of the present invention;

[0029] Figure 14 is a first end view of the preferred embodiment of Figure 13;

[0030] Figure 15 is a second end view of the preferred embodiment of Figure 13;

[0031] Figure 16 is a side view of a preferred embodiment of the present invention;

[0032] Figure 17 is a second end view of the preferred embodiment of Figure 16;

[0033] Figure 18 is a first end view of the preferred embodiment of Figure 16;

[0034] Figure 19 is a side view of a preferred embodiment of the present invention;

[0035] Figure 20 is a first end view of the preferred embodiment of Figure 19;

[0036] Figure 21 is a second end view of the preferred embodiment of Figure 19;

[0037] Figure 22 is a partial perspective view of a preferred embodiment of the present invention;

[0038] Figure 23 is a partial perspective view of a preferred embodiment of the present invention;

[0039] Figure 24 is a perspective view of a preferred embodiment of the present invention;

[0040] Figure 25 is a side elevation of the embodiment of Figure 24;

[0041] Figure 26 is a second end view of the embodiment of Figure 24;

[0042] Figures 27-36 are a sequence of perspective views of a preferred embodiment of the present invention being deployed from a delivery catheter against a clear plastic tube representing a native valve;

[0043] Figure 37 is a side elevation view of a preferred embodiment of the present invention;

[0044] Figure 38 is an end view of a downstream side of the embodiment of Figure 37;

[0045] Figure 39 is an end view of an upstream side of the embodiment of Figure 37;

[0046] Figure 40 is a side view of a transapical delivery procedure of a preferred embodiment of the present invention;

[0047] Figure 41 is a cross sectional view of a heart during the transapical delivery procedure of Figure 40;

[0048] Figure 42 is a cross sectional view of a heart during the transapical delivery procedure of Figure 40;

[0049] Figure 43 is a magnified view of a support structure during the transapical delivery procedure of Figure 40;

[0050] Figure 44 is a magnified view of a support structure during the transapical delivery procedure of Figure 40;

[0051] Figure 45 is a magnified view of a support structure during the transapical delivery procedure of Figure 40; and,

[0052] Figure 46 is a cross sectional view of a heart during the transapical delivery procedure of Figure 40.

DETAILED DESCRIPTION OF THE INVENTION

[0053] Referring now to the Figures and first to Figure 1, there is shown a stentless support structure 10 of the present invention in an extended configuration. The valve

support 10 includes a first end 12, a second end 14 and an elongate tubular body 16 extending between the first end 12 and the second end 14.

[0054] The elongate tubular body 16 is preferably formed from one or a plurality of braided strands 18. The braided strands 18 are strands of a super-elastic or shape memory material such as Nitinol. The strands are braided to form a tube having a central lumen 20 passing therethrough.

[0055] In one embodiment, the tubular body 16 is folded in half upon itself such that the second end 14 becomes a folded end and the first end 12 includes a plurality of unbraided strands. The tubular body 16 is thus two-ply. The unbraided strands of the first end 12 are gathered and joined together to form a plurality of gathered ends 22. The gathered ends 22 may be used as commissural points for attaching a prosthetic valve to the support structure 10. (See, e.g. Figure 2). Alternatively, as shown in Figure 1, the gathered ends 22 may be used as attachment points for a wireform 24 defining a plurality of commissural points 26.

[0056] Notably, the commissural points 26 are positioned such that, when a valve is attached to the support structure in the extended configuration, the valve is longitudinally juxtaposed with the support structure rather than being located within the support structure. This juxtaposition allows the support structure 10 and valve to be packed into a very small catheter without damaging the delicate valve. This longitudinal juxtaposition may be maintained when the support structure assumes a folded or constructed configuration (see Fig. 19 for example), or the valve may become folded within the support structure.

[0057] Figures 3-6 show the second end 14 emerging from the catheter 28 to expose a first layer 30. In Figure 7, the first layer 30 is completely exposed and has assumed its constructed configuration. Notably, the first layer 30 contracts longitudinally when fully deployed. Also shown in Figure 7 is a second layer 32 beginning to emerge from the catheter 28. As the second layer exits the catheter, the pre-set super-elastic fold inverts the mesh, such that a second, inner layer is formed within the first outer layer. Alternatively, the first layer can be deployed against the wall of the vascular structure (such as an artery, vein, valve or heart muscle). As the second layer exits the catheter,

the physician can aid inversion of the mesh my advancing the deployment system. In another embodiment, the mesh support structure can be advanced in the vasculature such that it is deployed in a reverse direction (such as deployment through the apex of the heart ventricle or from the venous system), where the mesh inversion occurs as a result of pulling or retracting the deployment system.

[0058] In Figure 10, the second layer 32 is fully deployed and the third layer 34 is fully exposed, but has not yet been inverted. Retracting the catheter 28, relative to the device 10, while advancing the catheter 28 slightly, relative to the target site, causes the third layer 34 to "pop" inwardly, thereby inverting itself against an inside surface of the second layer 32, as seen in Figure 11.

[0059] In Figure 12, additional material has been ejected from the catheter 28 such that the third layer 34 is fully expanded against the second layer. One skilled in the art will realize that numerous additional layers can be achieved in this manner, and that each layer adds additional radial strength to the resulting support structure 10.

[0060] Throughout the deployment process, the stentless support structure 10 emerges from the delivery catheter 28 gradually. This characteristic also allows the structure 10 to be pulled back into the delivery catheter 28, in the event that it is desired to relocate the support structure 10. Doing so causes the support structure 10 to reacquire its extended configuration.

[0061] Having described the mechanics of building a support structure in situ, attention can now be turned to various embodiments made possible by the present invention. Figures 13-15 show a support structure 10 having many layers 38 and a first end 12 with numerous gathered ends 22 formed from unbraided strands. Some of the gathered ends 22 are attached to a wireform 24 having three commissural points 26. A prosthetic valve 36, either harvested or manufactured, is attached to the wireform 24. Figure 15 shows the internal lumen 20 of the support structure 10.

[0062] Figures 16-18 show a support structure 10 having fewer layers 38 and a wireform 24 with a prosthetic valve 36 attached thereto. The first end 12 (hidden), to which the wireform 24 is attached, has been preformed to fold inwardly upon deployment. Thus, the wireform 24 and prosthetic valve 36, is located in the inner

lumen 20 of the support structure 10 when the support structure 10 is in a constructed configuration.

[0063] Figures 19-21 show a support structure 10 with several layers 38 and a first end 12 preformed to have a smaller diameter than the rest of the layers and the second end 14, which is folded. The terminal ends of the braided strands at the first end 12 have not been formed into gathered ends. Rather, the wireform 24 is attached to the braids. The prosthetic valve 36 is attached to the wireform 24 and has skirting tissue 40, which is placed around the outside of the end 12. The skirting tissue 40 may be adhered to the first end 12.

[0064] Figure 22 shows a stentless support structure 10 with a folded end 14, which has been folded back on itself, and a material 42 trapped between the two layers of the fold. The material 42 is provided to further improve the paravalvular leak prevention and embolic trapping characteristics of the stentless support structure 10. The material 42 could consist of a non-woven material, woven or braided fabric, a polymer or other material.

[0065] Figure 23 shows a stentless support structure 10 that includes a fiber 44 that is larger than the rest of the strands comprising the support structure 10. Thus, Figure 23 demonstrates that strands of different sizes may be used in the braided support structure 10 without significantly affecting the minimum delivery size of the device. Different sized strands may be used in order to improve strength, provide stiffness, create valve attachment points, provide radiopaque markers, and the like.

[0066] Figures 24-26 show a stentless support structure 10 that has a first end 12 that has had the unbraided strands trimmed such that they do not extend past the first end 12 of the folded structure 10. This embodiment may be used to create, preserve or enlarge a lumen. A prosthetic valve may or may not be attached to this embodiment.

[0067] Turning now to Figures 27-36, a deployment sequence of a preferred embodiment of the stentless support structure 10 is shown whereby a clear piece of tubing 46 is used to demonstrate a targeted location of a native vessel, such as a native valve. In Figure 27, the delivery catheter 28 is advanced beyond the targeted valve 46 and the stentless support 10 is starting to be ejected from the catheter 28.

[0068] In Figure 28, enough of the stentless support 10 has been ejected that the second, folded end 14 has begun to curl back on itself slightly, forming a cuff 48. In Figure 29, the cuff 48 is more visible and has assumed its full, deployed shape. The cuff 48 acts as a catch that a physician can use to visually or tactilely locate the targeted valve 46 and seat the stentless support 10 thereagainst. The cuff also acts to ensure the entire native lumen through the targeted valve 46 is now being filtered by the support 10. Unlike balloon expandable stents, blood flow is not significantly inhibited by the deployment of the stentless support structure 10. Also shown in Figure 29 is that the first layer 30 has been fully ejected from the catheter 28, as has much of the second layer 32. The first layer 30, being very flexible prior to reinforcement by subsequent layers, is able to conform to any shape of the targeted vessel. The second layer 32 has not yet inverted itself into the first layer 30.

[0069] In Figure 30, the first layer 30 is deployed, the cuff 48 is acting against the valve 46, and the second layer 32 has been inverted. In Figure 31, material forming the third layer 34 is ejected from the catheter 28 but the third layer 34 has not yet inverted.

[0070] In Figures 32-33, the catheter 28 is being advanced to allow the third layer 34 to invert into the second layer 32. The angle of Figure 32 shows the relatively low profile created by the first and second layers 30 and 32, and how little resistance to blood flow is presented by the support structure 10.

[0071] In Figure 34, the first end 12 has emerged from the catheter 12, and the gathered ends 22 are showing. A wireform 24 is attached to some of the gathered ends 22 and is nearly completely deployed from the delivery catheter 28. In Figures 35-36, the support structure 10 has been completely released from the catheter 28. Figure 36 shows the size of the lumen 20 of the support structure 10.

[0072] Figures 37-39 show a preferred embodiment 100 of the present invention including a mesh support structure 102, a wireform 104 and a valve 106. The support structure 102 differs slightly from support structure 10, described previously, as it is constructed from a two individual wires 108. Upon completion of the braiding process, the two free ends of the wire are spliced together. As such, there are no free wire ends and the structure can be loaded into a delivery catheter in a single-ply state (not shown).

In the deployed state shown in the Figures, the support structure 102 is folded once to form a two-ply device.

[0073] The support structure 102 is preferably formed of a memory alloy such as Nitinol. The single-wire construction allows the device to be compressed into an extremely small catheter, such as one sized 16Fr or smaller. Though the support structure gains rigidity by the two-ply deployed configuration, radial strength is a function of a several factors and can thus be varied widely.

[0074] First, as with the other embodiments, radial strength may be increased by incorporating more folds or layers into the deployed configuration of the support structure 102. The three-ply configuration shown in Figures 37-39 is the most preferred configuration because it only has to be folded in on itself twice, making deployment less complicated.

[0075] Second, strength may be increased by using a heavier wire. Because the support structure 102 is made from a single-wire, and can thus be loaded into a catheter in a single-ply configuration, a larger diameter wire may be used while maintaining a small diameter elongated profile. Support structures 102 have been constructed according to the present invention using single wires having diameters between 0.005 and 0.010 inches in diameter. Preferably, the diameter of the wire is between 0.007 and 0.008 inches.

[0076] Third, strength may be increased by increasing the braid density. A tighter braid will result in a stronger support.

[0077] Fourth, the strength may be increased by altering the heat setting parameters. Super-elastic and shape memory alloys, such as Nitinol, attain their deployed shape within the vasculature by being heat set. The wires are held in a desired configuration and heated to a predetermined temperature for a predetermined period of time. After the wires cool, they become set to the new configuration. If the wires are later disfigured, they will return to the set configuration upon heating or simply releasing the wires. The force with which a super-elastic or shape memory alloy returns to a set configuration can be increased by modifying the temperature at which the configuration is set, or by modifying the period of time the alloy is maintained at the elevated setting

temperature. For example, good results have been attained setting a Nitinol support structure of the present invention at 530ºC for 7 minutes. Stiffer support structures can be made using the same Nitinol wire by setting the structure at a temperature other than 530ºC or by setting the structure at 530ºC for a time other than 7 minutes, or both.

[0078] The device 100 includes a wireform 104, to which a valve 106 is attached. The wireform 104 form commissural points separated by arcuate portions 110. The arcuate portions 110 are attached to an inside surface of the support structure 102. The commissural points 109 facilitate natural and efficient opening and closing of the valve 106. Alternatively, the valve commissural points can be attached to an outer surface of the support structure (not shown).

[0079] The valve 106 may be any form of prosthetic or harvested biological valve. Preferably, as shown in the Figures, the valve 106 is a valve having three leaflets. The valve 106 is sutured or otherwise attached to the wireform 104. Preferably, the valve 106 is cut or constructed to include a skirt portion 112 which continues along the length of the support structure 102 in its deployed configuration.

[0080] Figures 40-46 illustrate the operation of another delivery technique according to the present invention in which the support structure 10 replaces a diseased valve. However, instead of advancing an elongated catheter through a remote vessel to reach a heart valve (e.g., through the femoral artery to the aortic valve), a relatively short delivery catheter 200 is advanced through the chest and heart wall to reach a desired native valve. Once the native valve is reached, the user can deploy and shape the support structure 10 in a manner similar to the previously described methods.

[0081] Turning now to Figure 40, a mini thoracotomy is performed on a patient, opening up a small passage in the chest between the ribs. A path is created from the chest incision, through the intervening tissue layers (e.g., cardial sacks) to the heart 204. A heart bypass procedure may also be performed to reduce any complications otherwise caused by creating an incision in the heart 204.

[0082] Referring to Figure 41, an incision 207 is created near the lower apex 201 of the heart 204 (i.e., a transapical approach into the heart) to access the left ventricle 203 and ultimately the native aortic valve 208. Preferably, purse-string sutures 202 are

sutured around the incision 207 shortly after its creation to minimize blood loss that may otherwise occur from the beating heart 204.

[0083] A guidewire (not shown) is advanced into the chest, through the incision 207 into the heart 204. In the present example, a distal end of the guidewire is advanced into the left ventricle 206 and through the native aortic valve 208. As seen in Figures 40 and 41, the delivery catheter 200 is slid over the guidewire, through the chest, into the incision 207 and through the left aortic valve 208.

[0084] Referring to Figure 42, the support structure 10 is oriented within the catheter 200 to have the first end 12 in a distal position and the second end 14 in a proximal position, allowing the first end 12 of the support structure 10 to be released first into the aorta 210. In this respect, the prosthetic valve 36 (not shown in Figure 42) is oriented to open as blood flow passes from the left ventricle 206 into the aorta 210 during a heart beat.

[0085] It should be noted, however, that the support structure 10 may be positioned within the delivery catheter 200 to initially deploy the first end 12 or the second end 14. The desired orientation will depend, in part, on the direction from which the delivery catheter 200 approaches the native valve and therefore the location where the delivery catheter enters the heart 204.

[0086] Referring to Figures 42 and 43 of the present example, the support structure 10 is pushed out of the delivery catheter 200 so that the first end 12 deploys into the aorta 210. The delivery catheter 200 is moved proximally back through the valve 208 as the support structure 10 continues to be pushed out of the distal end of the catheter.

[0087] Turning to Figure 44, the support structure 10 is seen fully deployed so that the second end 14 of the support structure 10 is positioned through the aortic valve 208 and within the left ventricle 206. As seen in this figure, the delivery catheter 200 includes a pull wire 220 positioned through the delivery catheter 200 and within the support structure 10. The pull wire 220 includes a distal end coupled to the first end 12 (i.e., the distal end) of the support structure 10 and a proximal end of the pull wire 220 which is accessible to the user at a proximal end of the delivery catheter 200.

[0088] Once the support structure 10 is deployed to a desired position, such as that seen in Figure 44, the user moves the pull wire 220 in a proximal direction, causing the first end 12 of the support structure 10 to invert or fold back on itself. Figures 45 and 46 illustrate an example inverted conformation of the support structure 10 in which the first end 12 moves within the center passage of the support structure 10.

[0089] When the user is satisfied that the support structure 10 has achieved a desired shape, the pull wire 220 is disconnected from the first end 12 of the support structure 10. The pull wire 220 may include different selectively releasable arrangements that allow the user to disconnect or uncouple the distal end of the pull wire 220 at a desired time. For example, the pull wire 220 may include selectively releasable jaws such as those seen on the connecting members in the U.S. Provisional Applications Number 60/827373 entitled Delivery Tool For Percutaneous Delivery Of A Prosthesis, filed September 28, 2006; the contents of which are hereby incorporated by reference. Alternately, the pull wire 220 may include hooks or detachable adhesives to release the pull wire 220 from the support structure 10.

[0090] Finally, as seen in Figure 46, the user removes the delivery catheter 200 and the guidewire from the heart 204 and fully closes the incision 207 with the purse string sutures 202. Any remaining incisions in the patient's chest are closed and the procedure is complete.

[0091] Although the invention has been described in terms of particular embodiments and applications, one of ordinary skill in the art, in light of this teaching, can generate additional embodiments and modifications without departing from the spirit of or exceeding the scope of the claimed invention. Accordingly, it is to be understood that the drawings and descriptions herein are proffered by way of example to facilitate comprehension of the invention and should not be construed to limit the scope thereof.

What is claimed is:

1. A method of delivering a support structure comprising:

providing a support structure;

positioning said support structure within a target location;

folding a portion of said support structure into itself;

wherein said folding is at least partially effected by acting on a distal portion of said support structure with a pull wire while pushing on a proximal portion.

2. The method of claim 1 wherein folding said support structure into itself comprises folding said distal portion into said proximal portion.

3. The method of claim 1 wherein positioning said support structure within a target location comprises navigating a catheter containing said support structure through the apex of a heart, through the left ventricle and positioning a distal end of the catheter within or near the aortic valve of the heart.

4. The method of claim 1 wherein positioning said support structure within a target location comprises pushing said distal portion out of a delivery catheter distal of said target location.

5. The method of claim 4 wherein folding said support structure into itself comprises folding said distal portion into said proximal portion, said proximal portion being located at said target location.

6. The method of claim 1 wherein positioning said support structure within a target location comprises sliding a delivery catheter containing said support structure over a guidewire leading to said target location.

7. The method of claim 1 wherein said folding said support structure into itself is at least partially effected by a preformed fold formed in said support structure.

8. The method of claim 1 wherein said acting on a distal portion of said support structure with a pull wire while pushing on a proximal portion comprises preventing proximal movement of said support structure with a catheter while pulling proximally with said pull wire.

9. The method of claim 1 wherein acting on a distal portion of said support structure with a pull wire comprises acting on a distal portion of said support structure with a pull wire that passes through at least a portion of said support structure.

10. The method of claim 1 further comprising releasing said support structure.

11. A delivery device for an invertible support structure comprising:

a delivery catheter configured to contain an invertible support structure in an unfolded, elongated state;

an inversion mechanism passing through said delivery catheter and releasably connected to said invertible support structure;

wherein said inversion mechanism is usable to initiate inversion of said support structure during delivery by acting on a distal portion of said support structure.

12. The delivery device of claim 11 wherein said inversion mechanism comprises a pull wire.

13. The delivery device of claim 11 wherein said inversion mechanism passes at least partially through said support structure.

14. The delivery device of claim 11 wherein said inversion mechanism is releasably connected to said invertible support structure distal of a preformed fold formed in said support structure.

15. The delivery device of claim 14 wherein said inversion mechanism is releasably connected to a distal end of said support structure.

16. The delivery device of claim 14 wherein said support structure comprises two axially spaced preformed folds and said inversion mechanism is releasably connected to said invertible support structure near a distal-most preformed fold.

17. The delivery device of claim 16 wherein said preformed folds cause said support structure to form a folded structure, upon inversion, having three plies in at some point along an axial length of said folded structure.

18. A method for initiating inversion of a support structure comprising:

pushing at least a distal portion of a support structure having a preformed fold formed therein out of a delivery catheter in an elongated, unfolded state, said distal portion being material at or distal of said preformed fold;

acting on said distal portion with an inversion mechanism in a direction opposite of a direction of said pushing until said support structure folds into itself along said preformed fold.

19. The method of claim 18 wherein pushing at least a distal portion of a support structure having a preformed fold formed therein out of a delivery catheter in an elongated, unfolded state, said distal portion being material at or distal of said preformed fold comprises pushing at least a distal portion of a support structure having at least two preformed folds formed therein out of a delivery catheter in an elongated, unfolded state, said distal portion being material at or distal of a distal-most preformed fold.

20. The method of claim 18 wherein said preformed folds are axially displaced such that, upon inversion, at least a part of the support structure becomes three-ply.

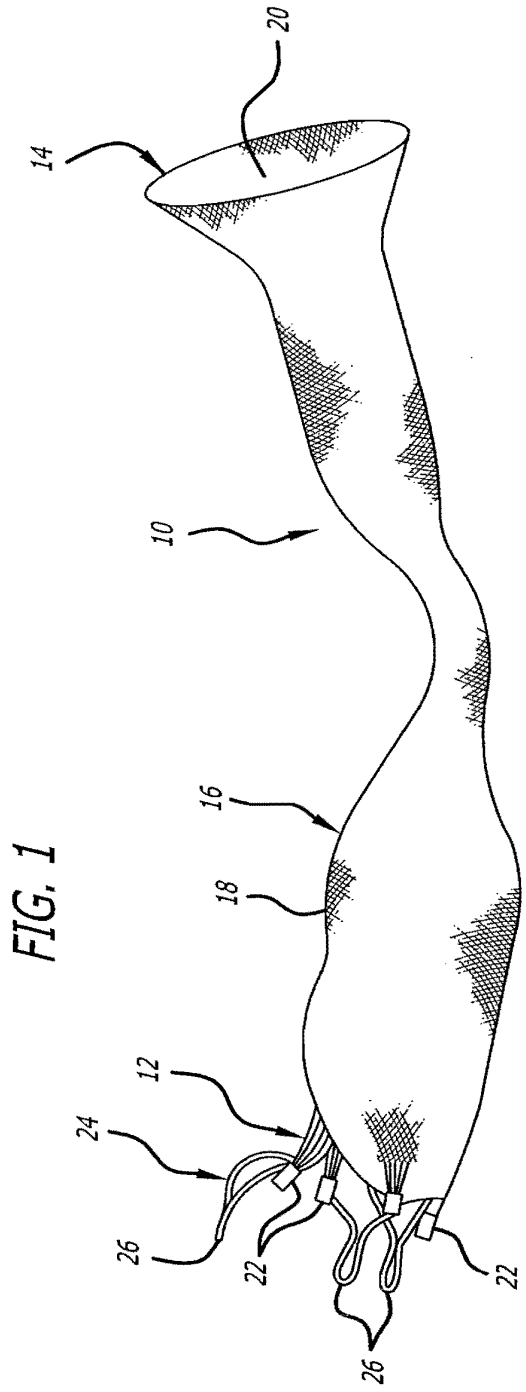


FIG. 1

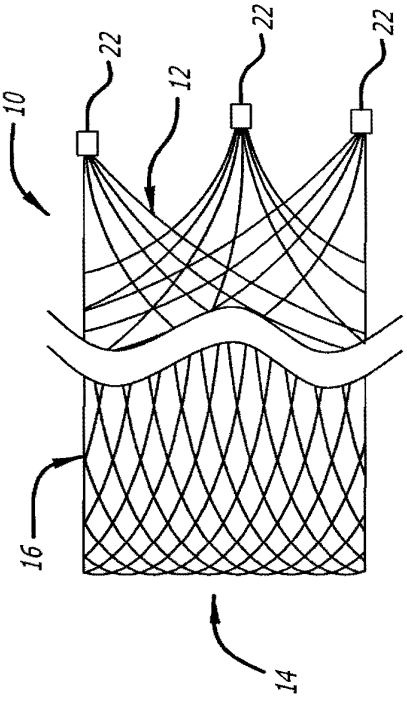
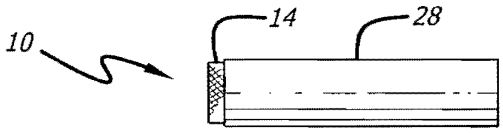


FIG. 2

FIG. 3



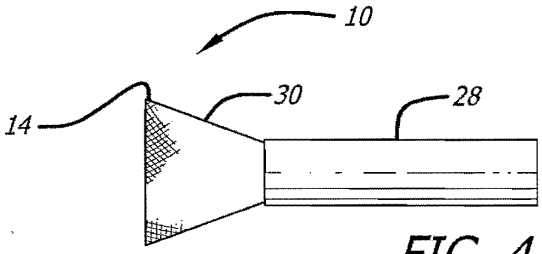


FIG. 4

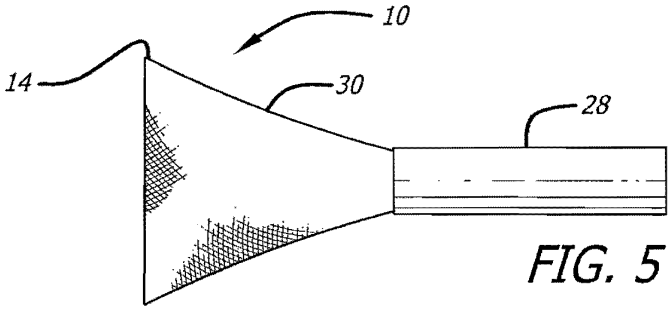


FIG. 5

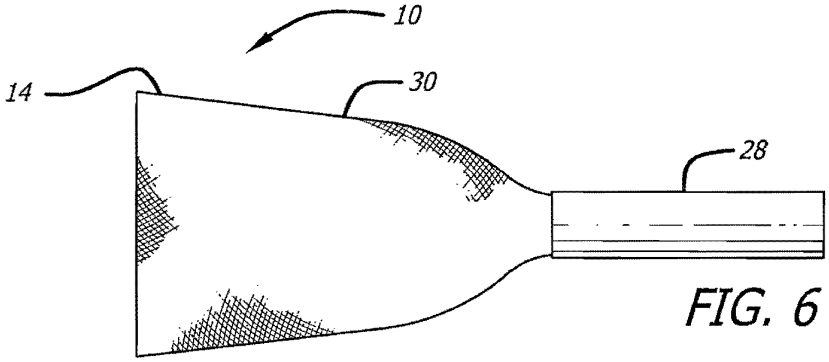


FIG. 6

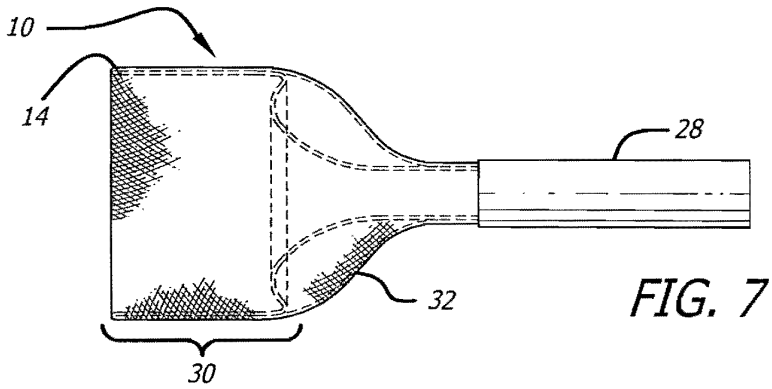


FIG. 7

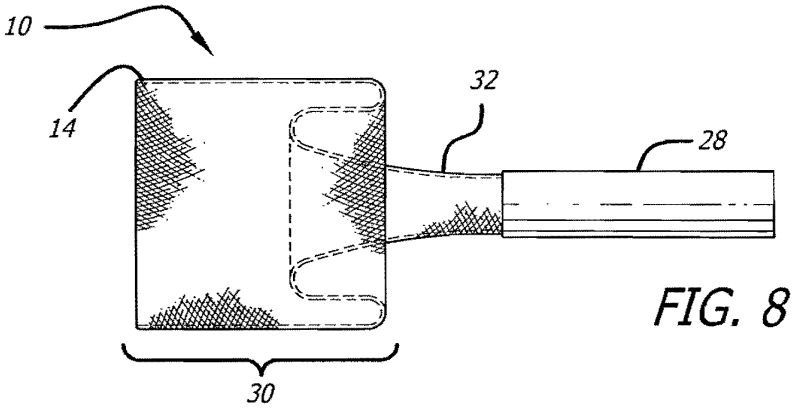


FIG. 8

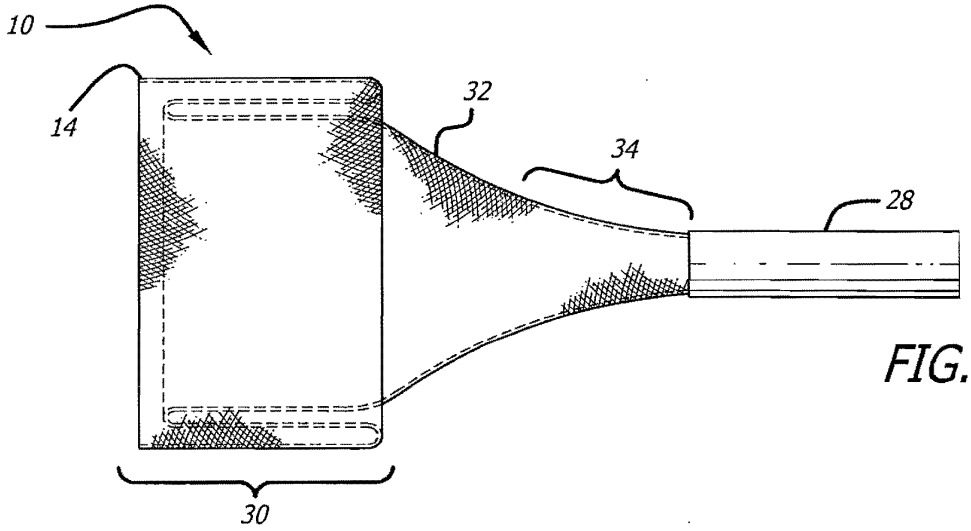


FIG. 9

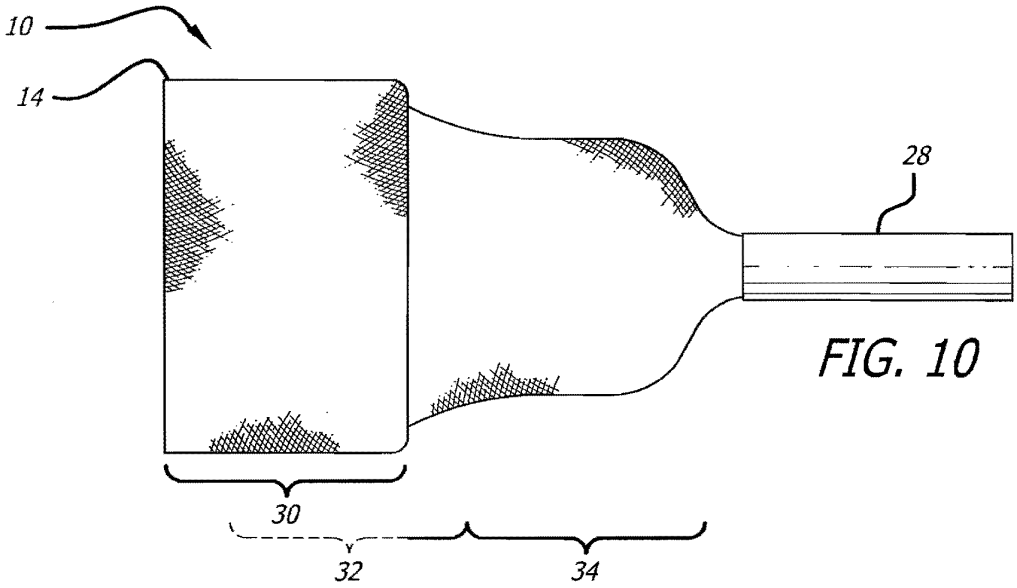


FIG. 10

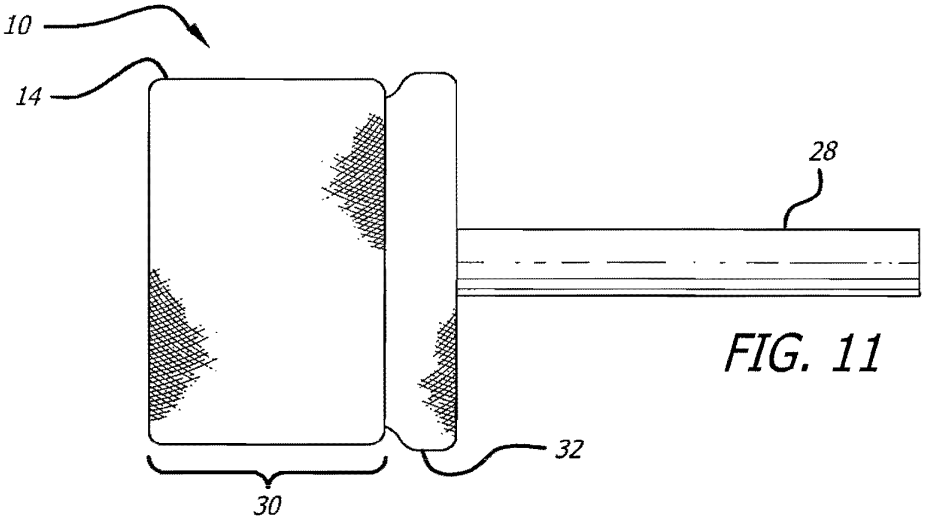


FIG. 11

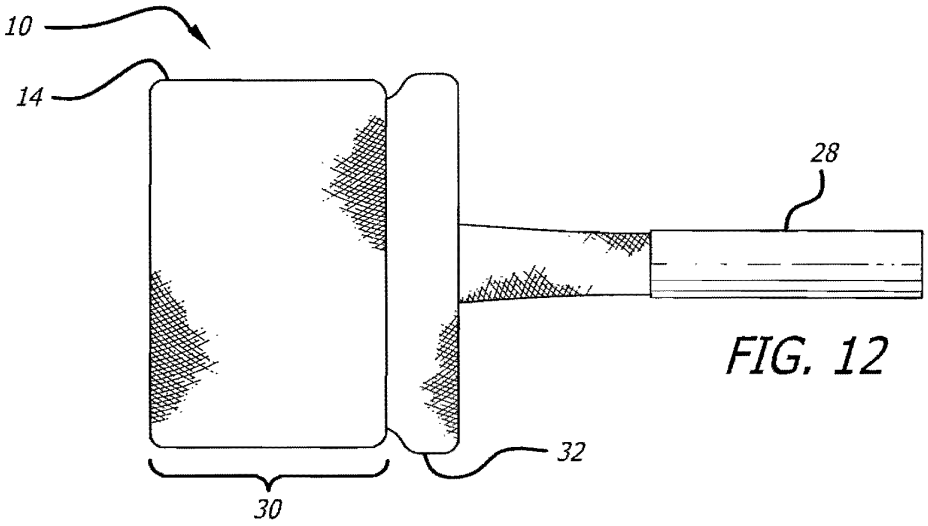


FIG. 12

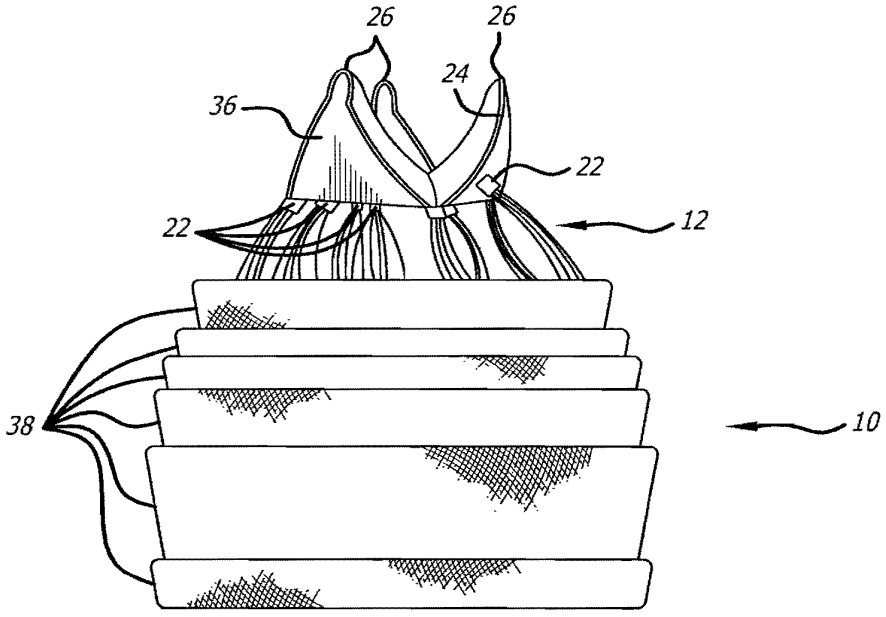


FIG. 13

FIG. 14

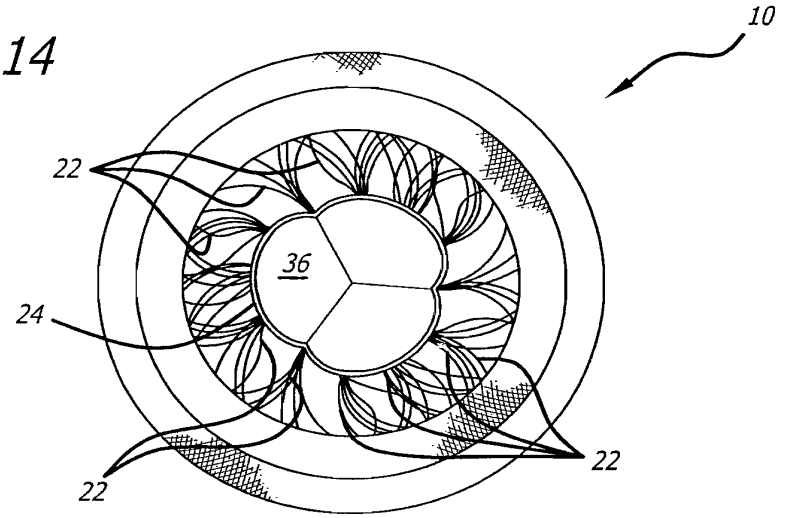
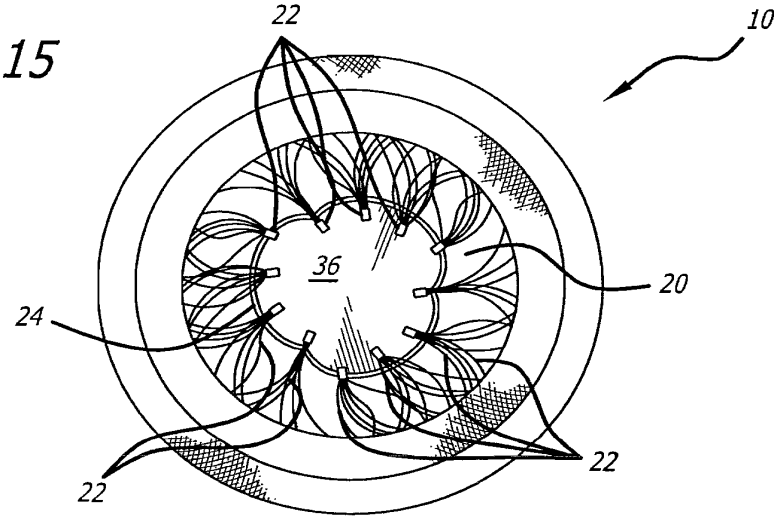


FIG. 15



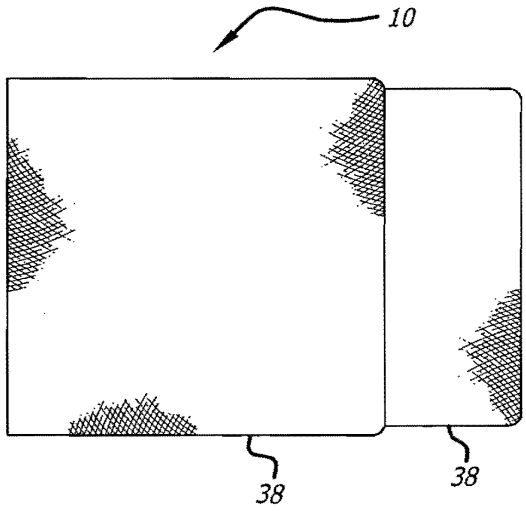


FIG. 16

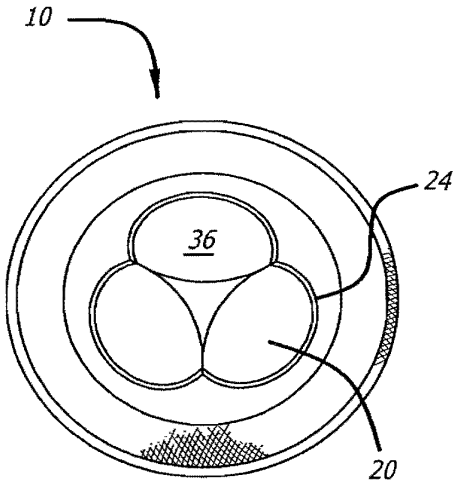


FIG. 17

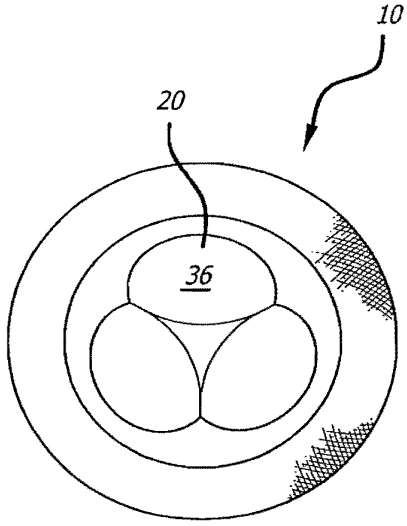


FIG. 18

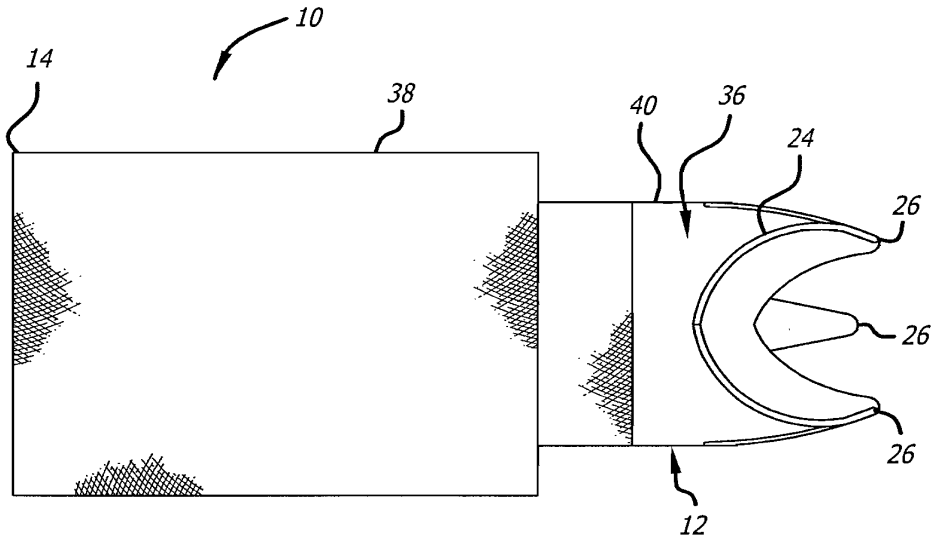


FIG. 19

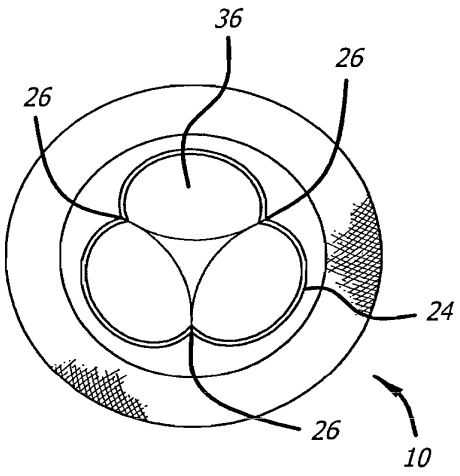


FIG. 20

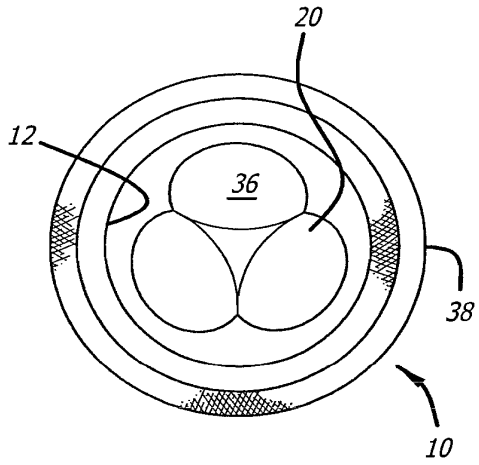


FIG. 21

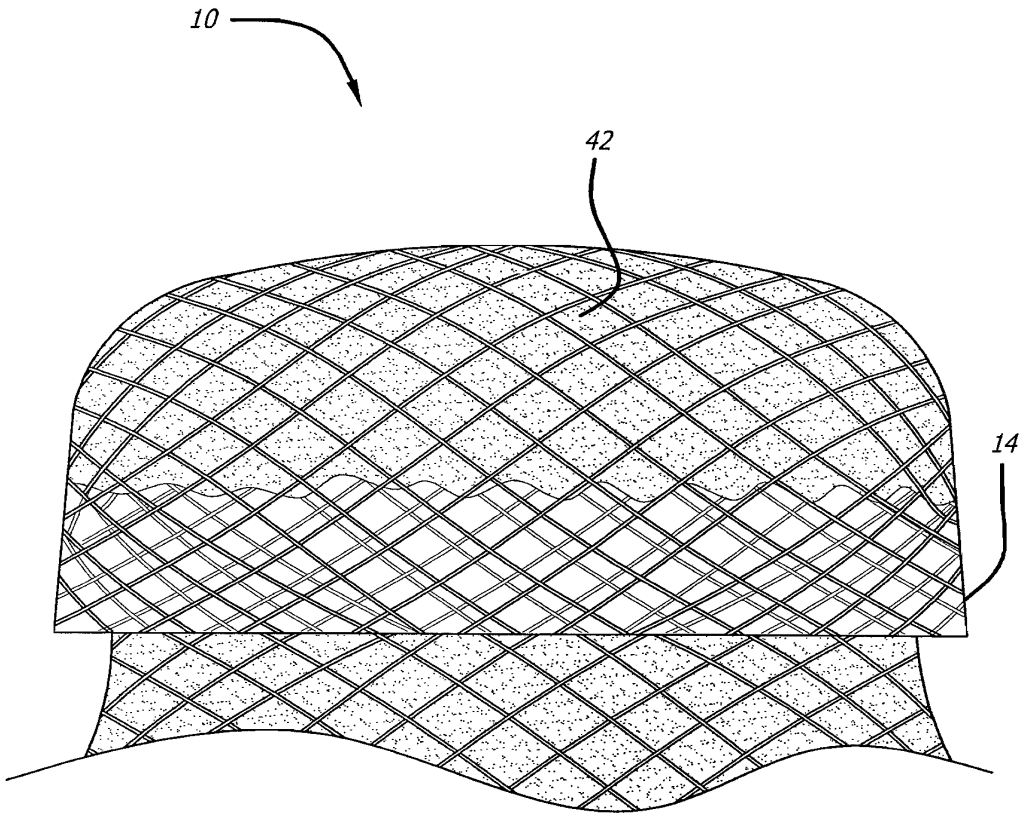


FIG. 22

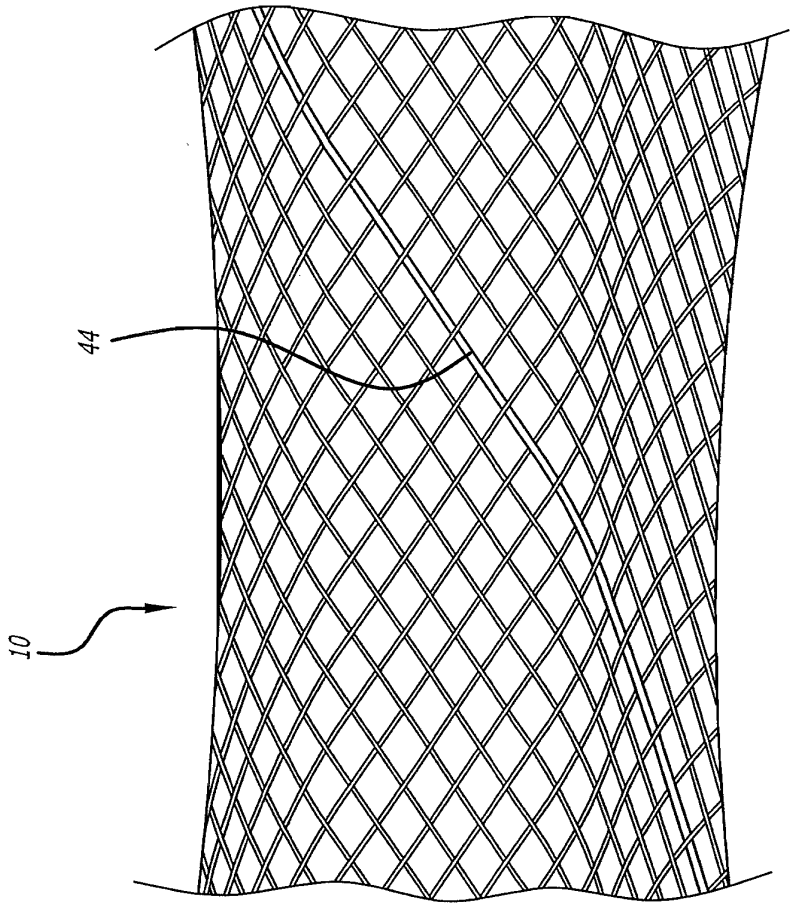


FIG. 23

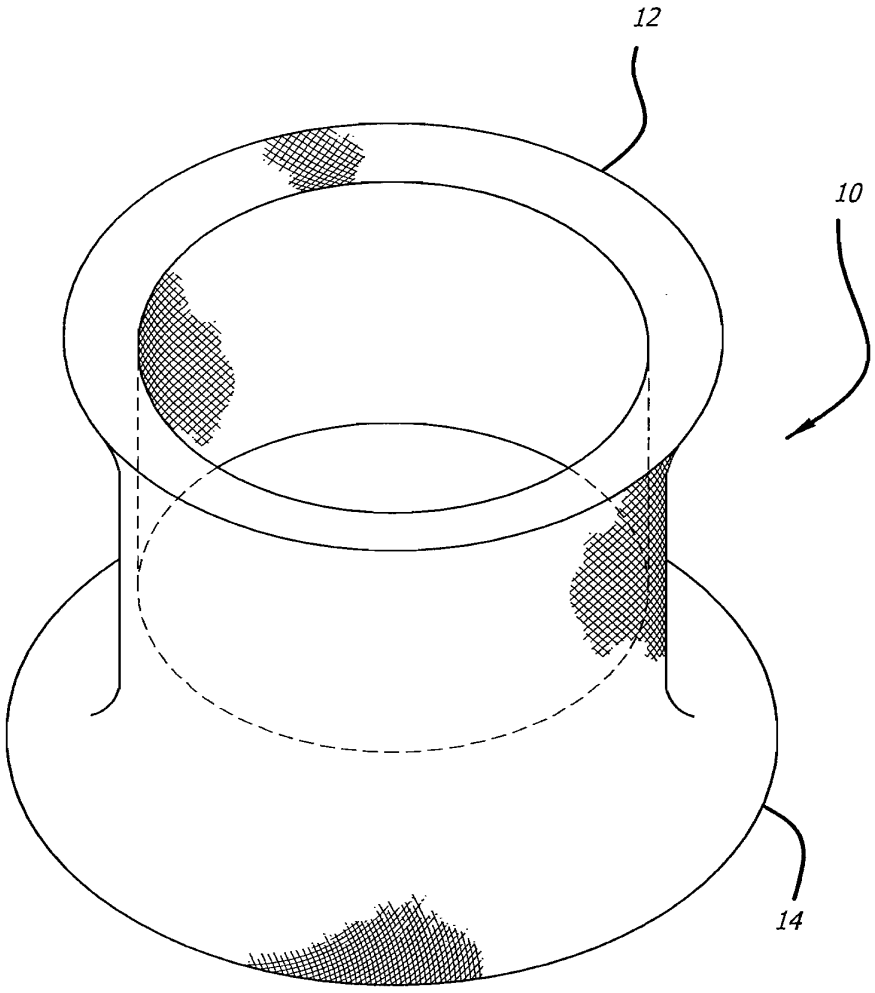


FIG. 24

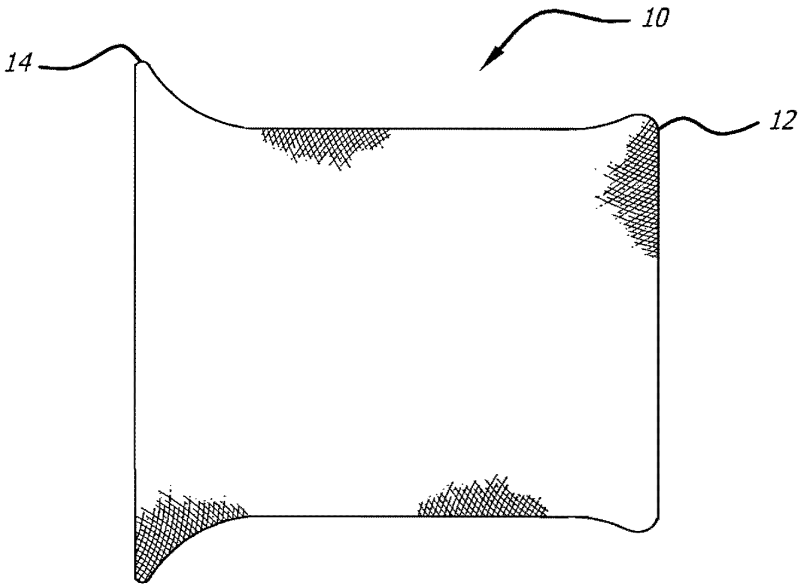


FIG. 25

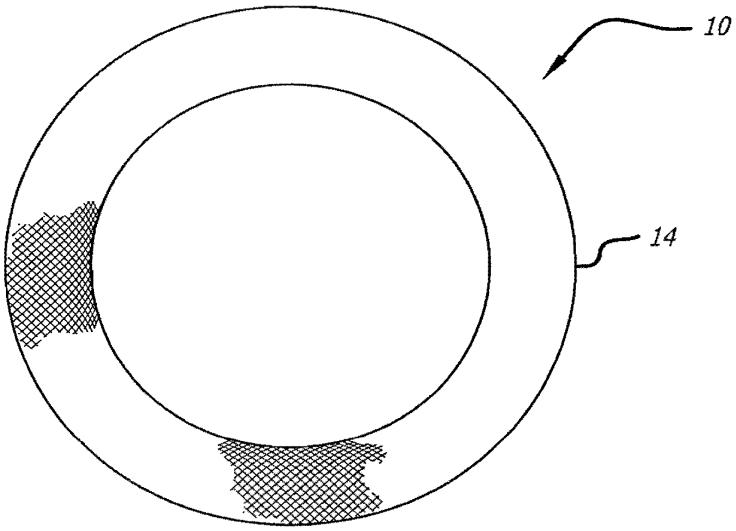


FIG. 26

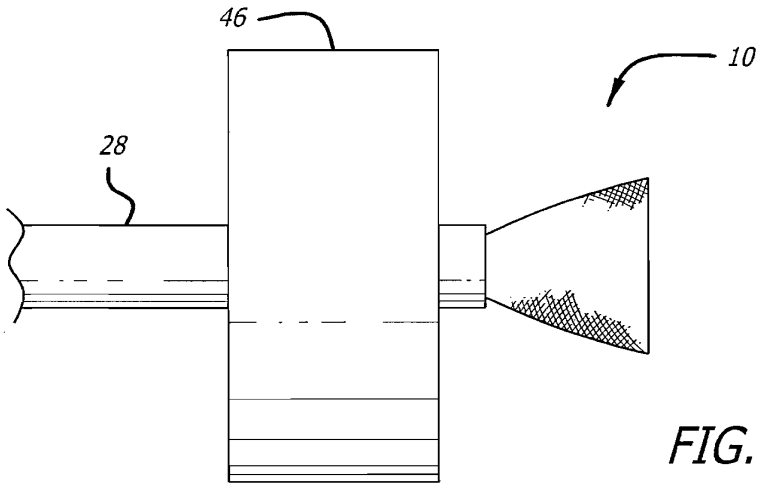


FIG. 27

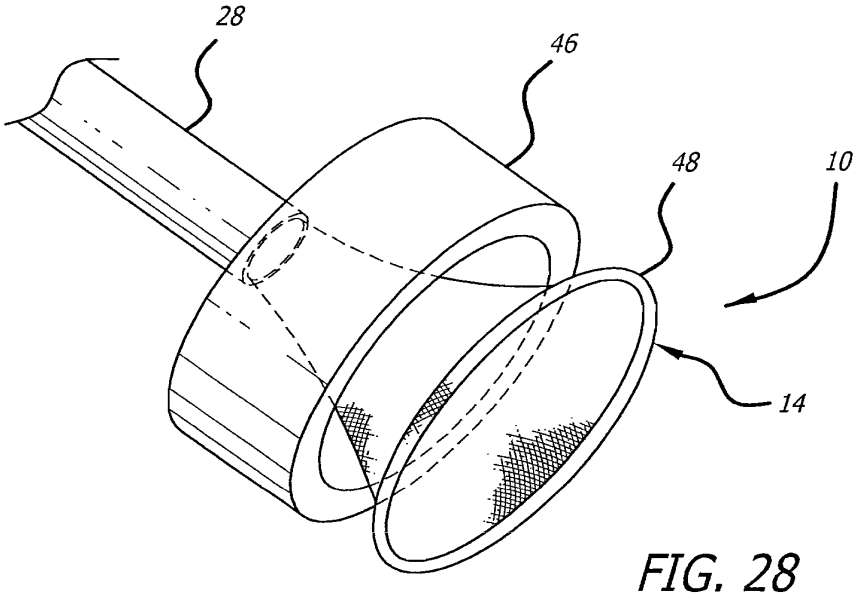


FIG. 28

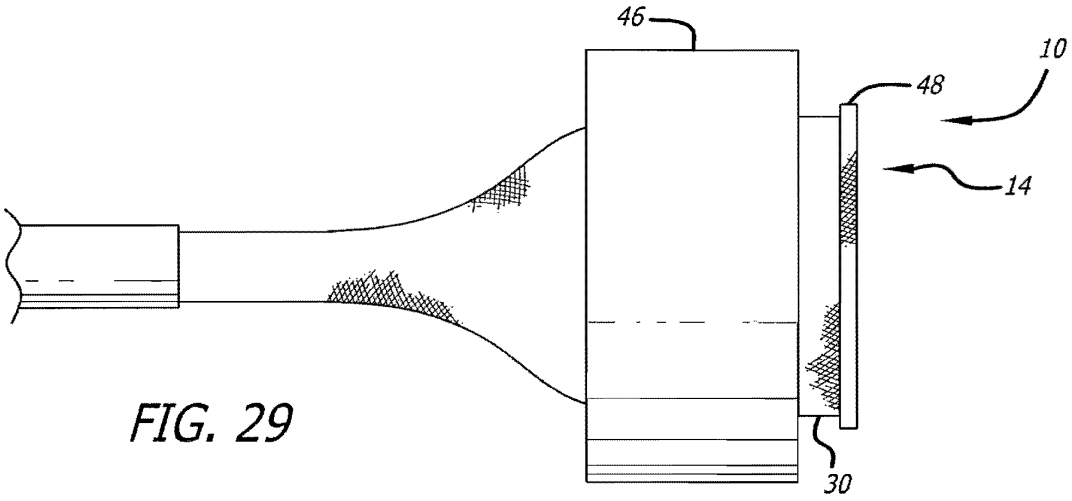


FIG. 29

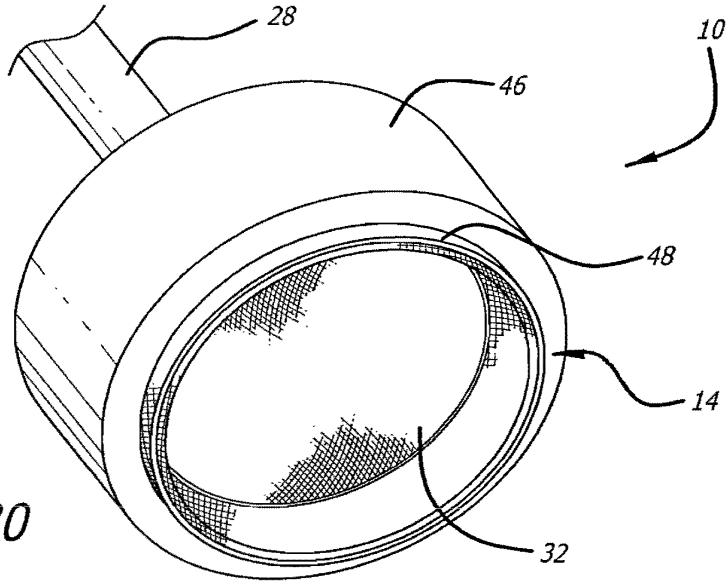


FIG. 30

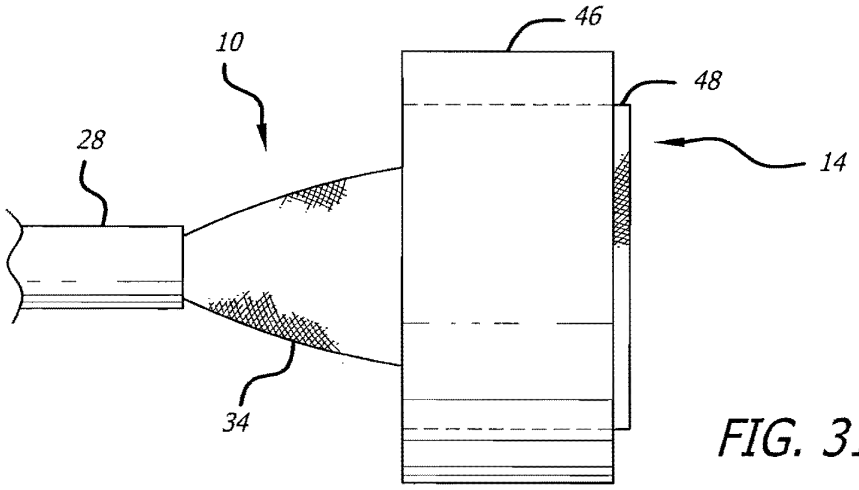


FIG. 31

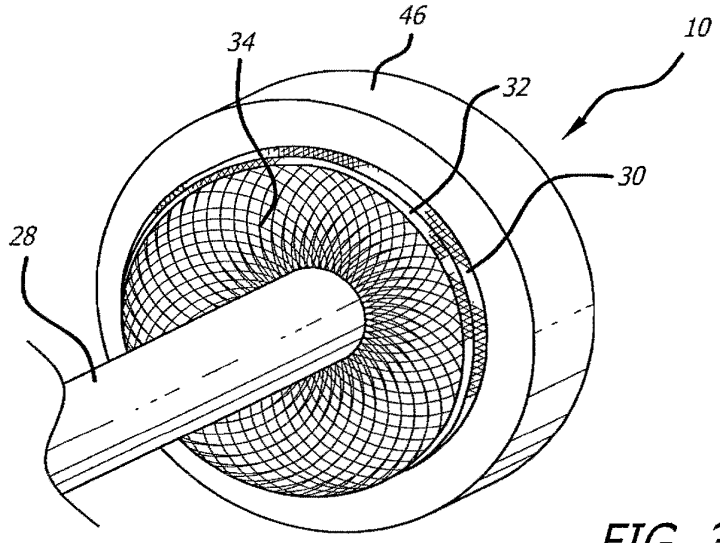


FIG. 32

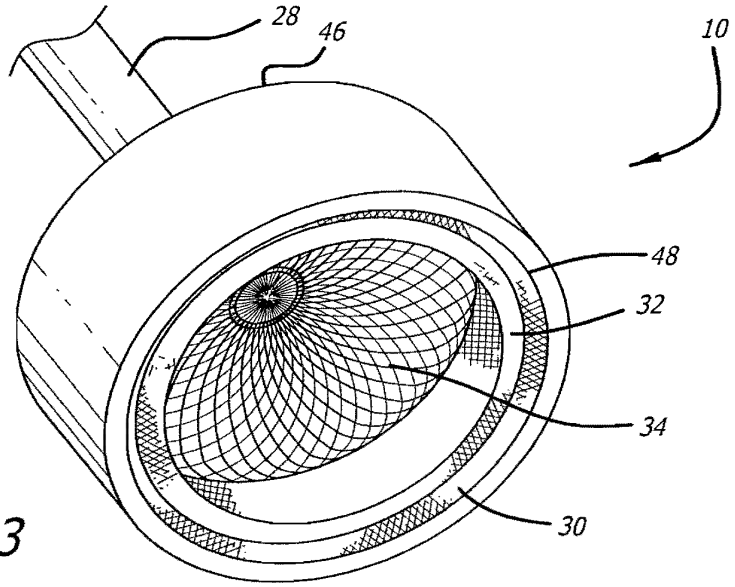


FIG. 33

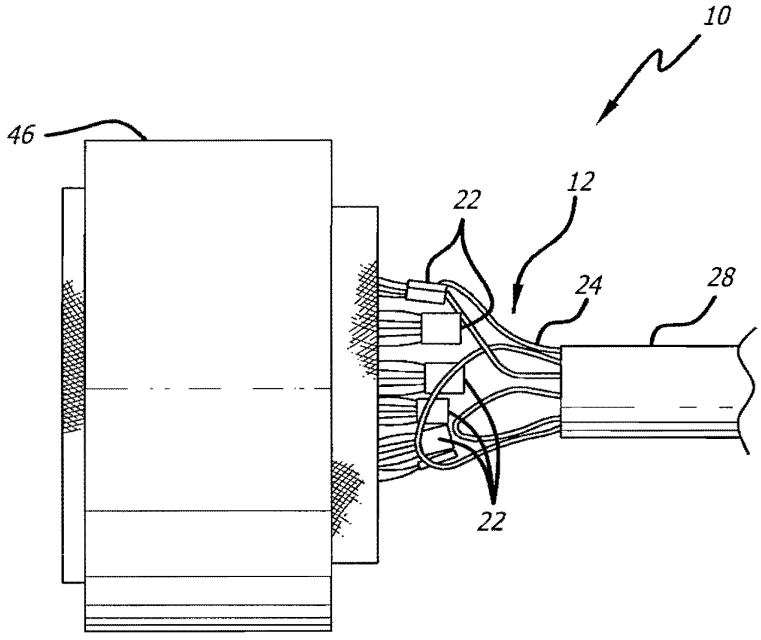


FIG. 34

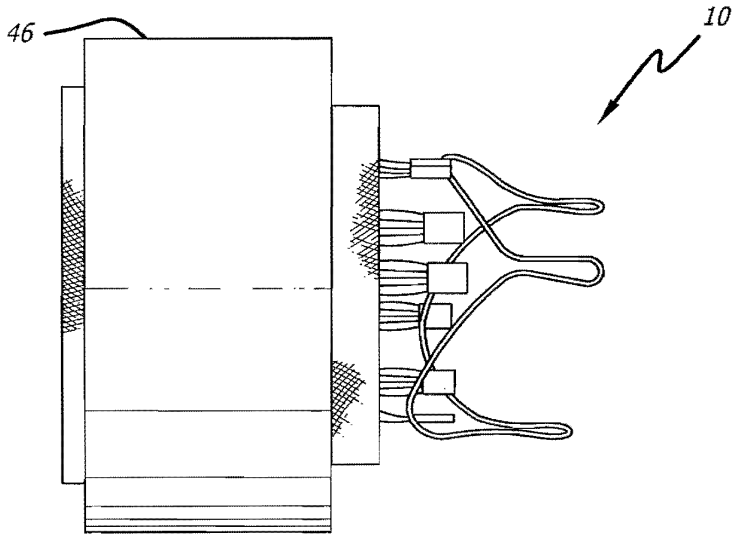


FIG. 35

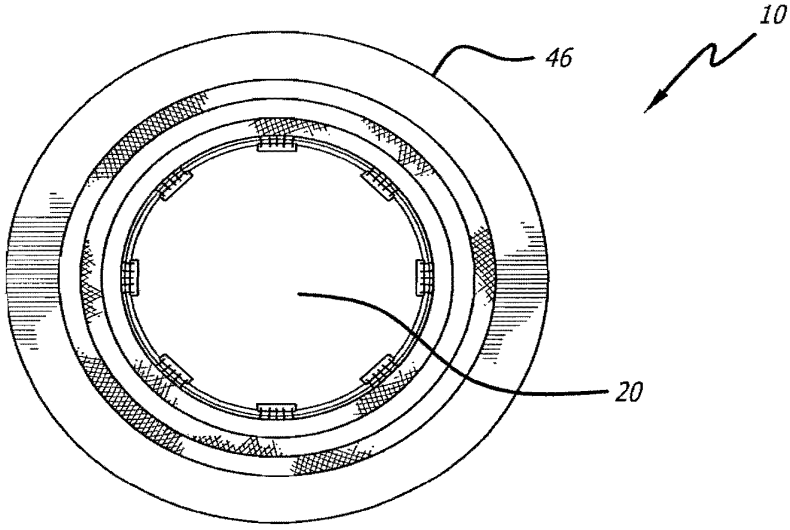
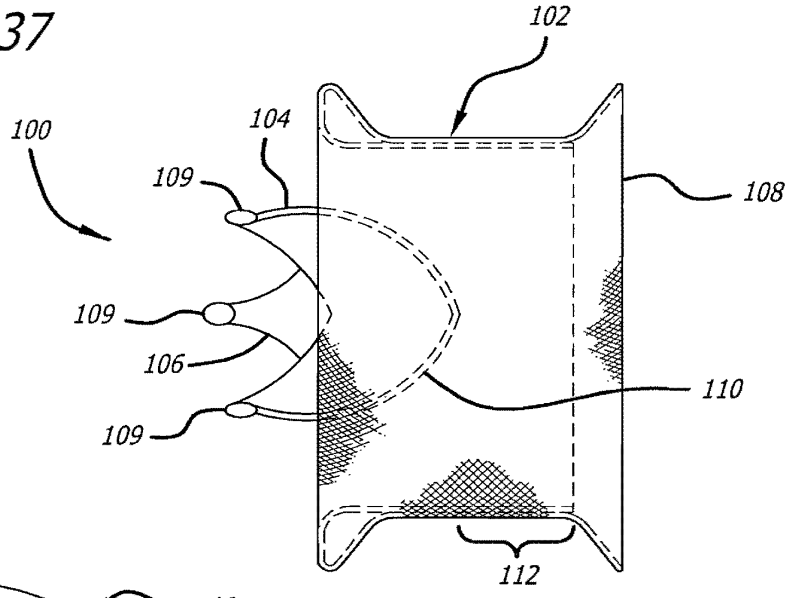


FIG. 36

FIG. 37



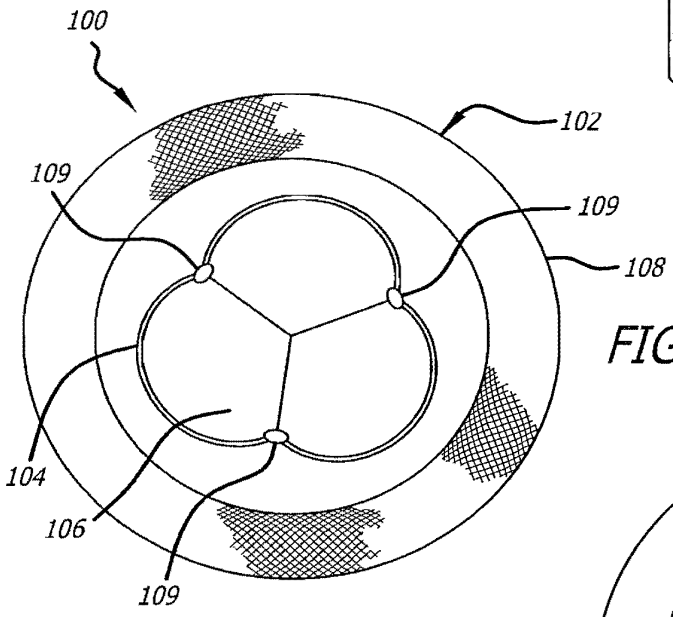


FIG. 38

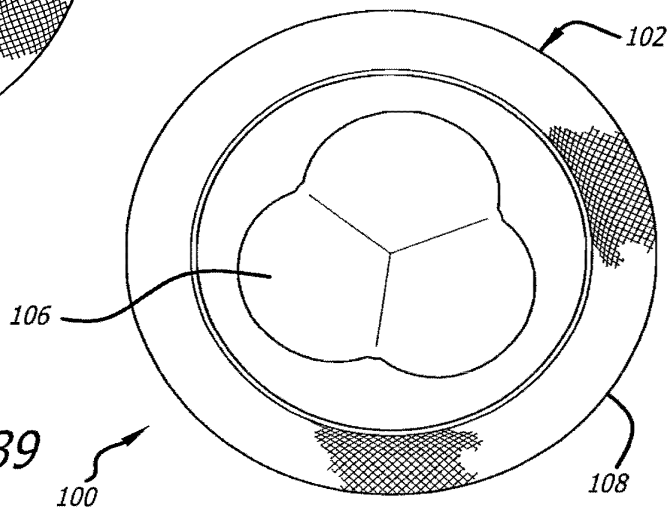


FIG. 39

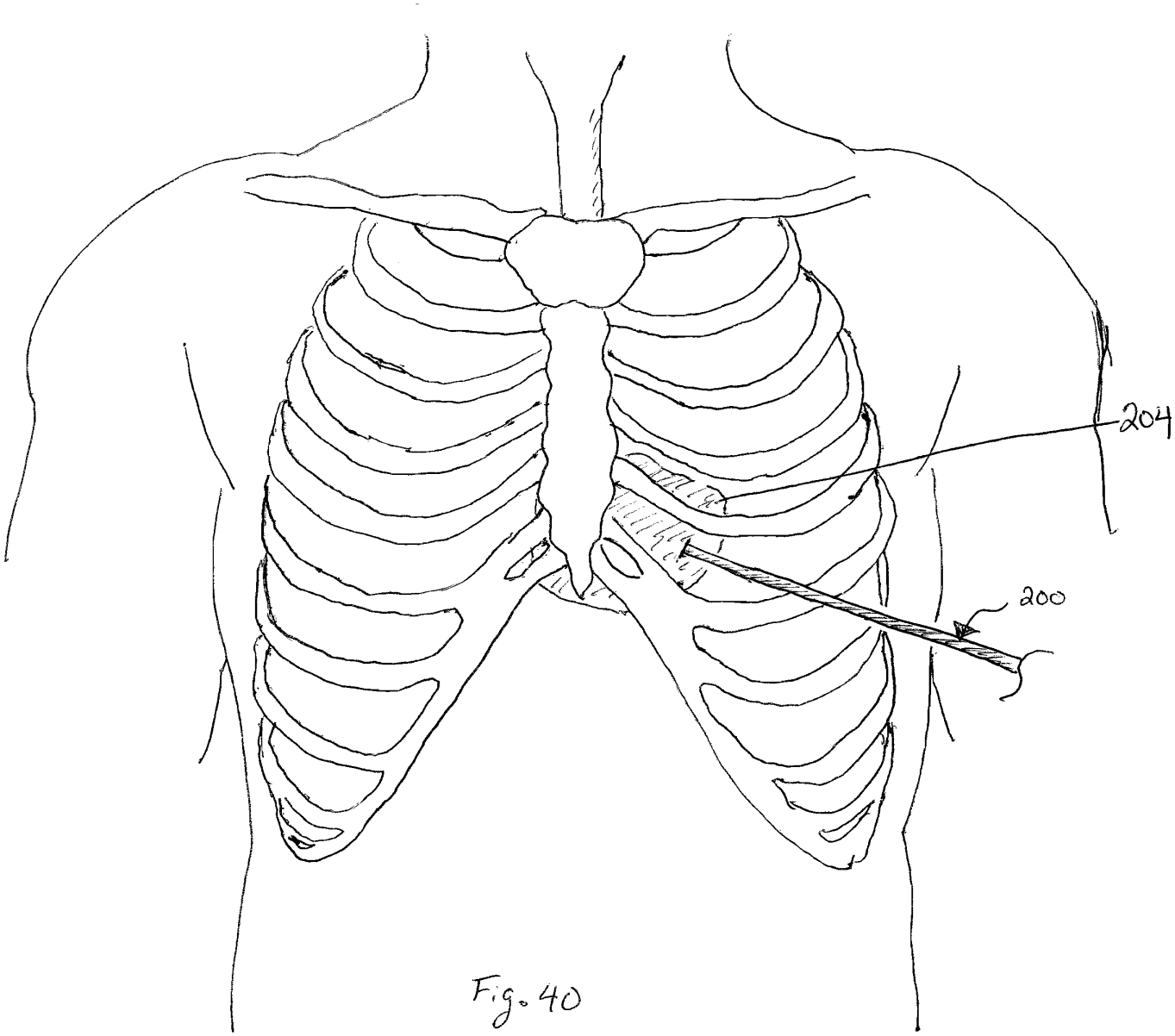


Fig. 40

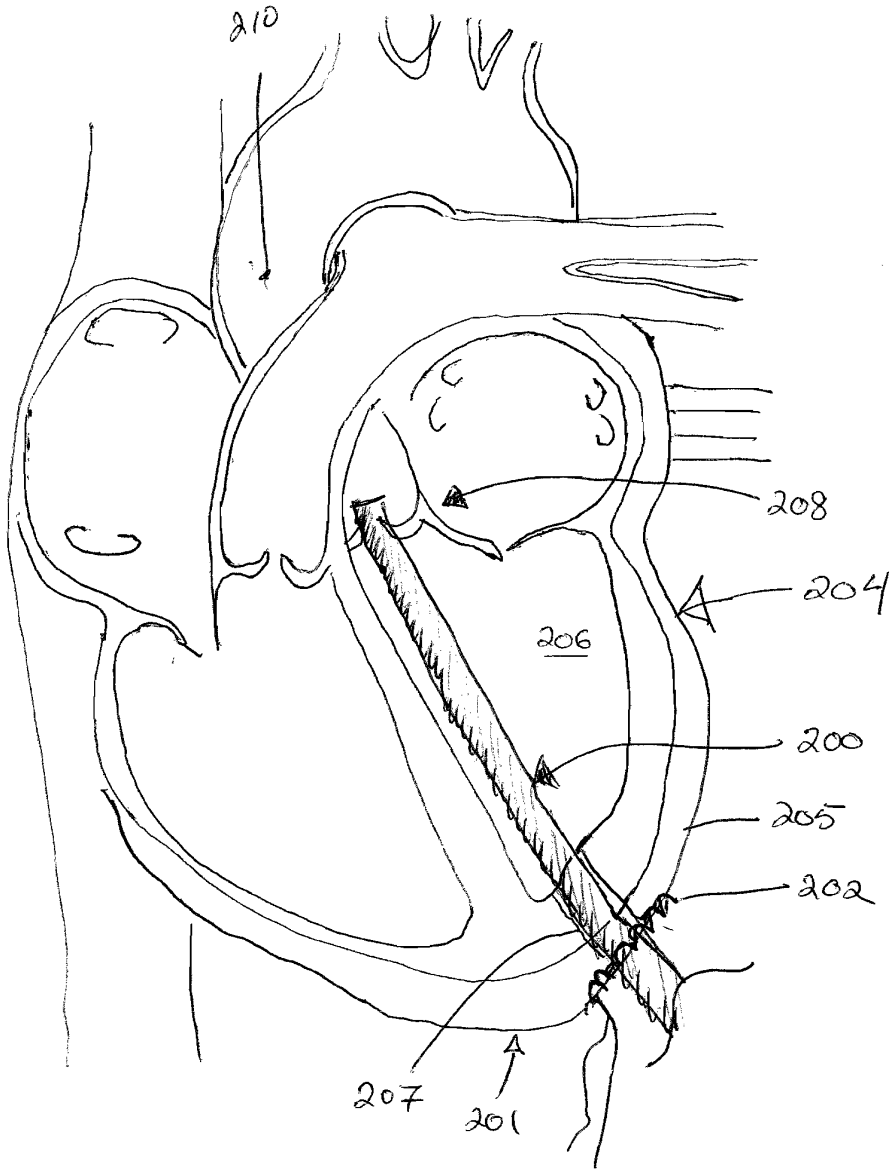


Fig. 41

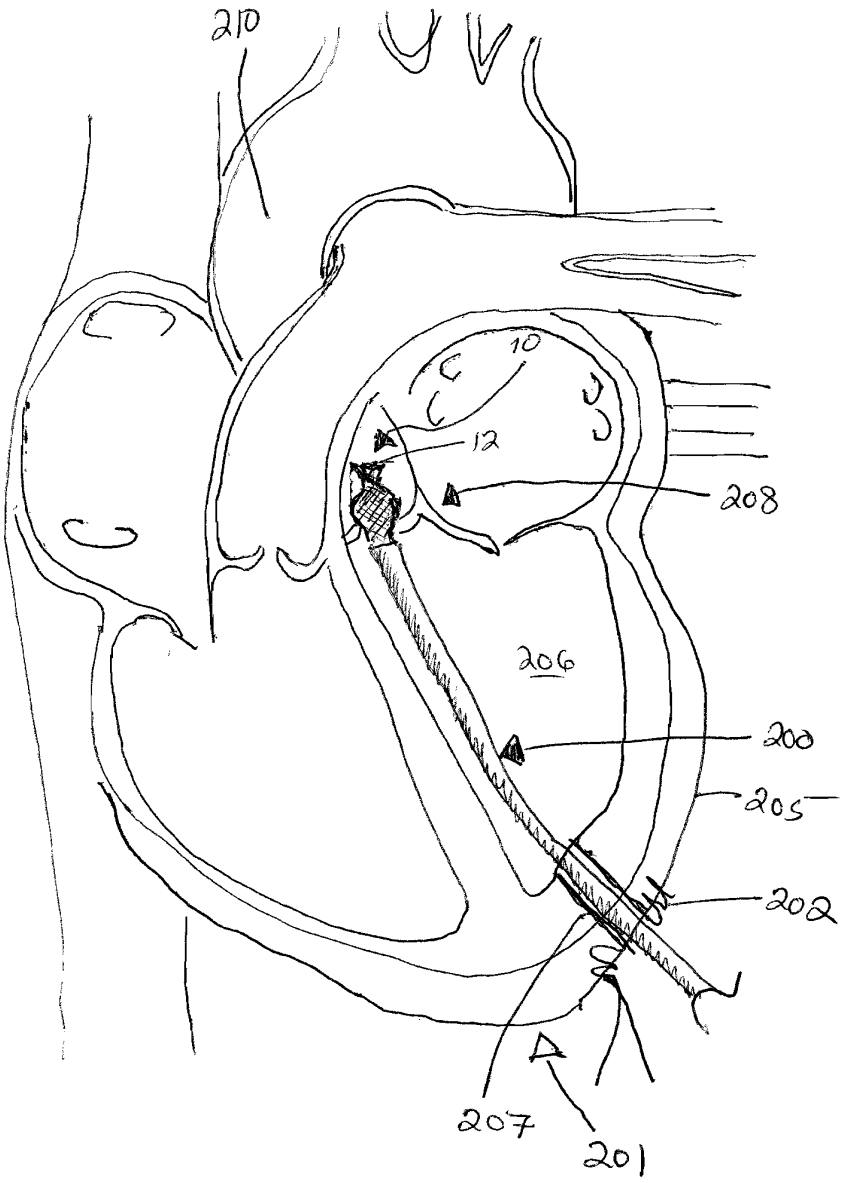


Fig. 42

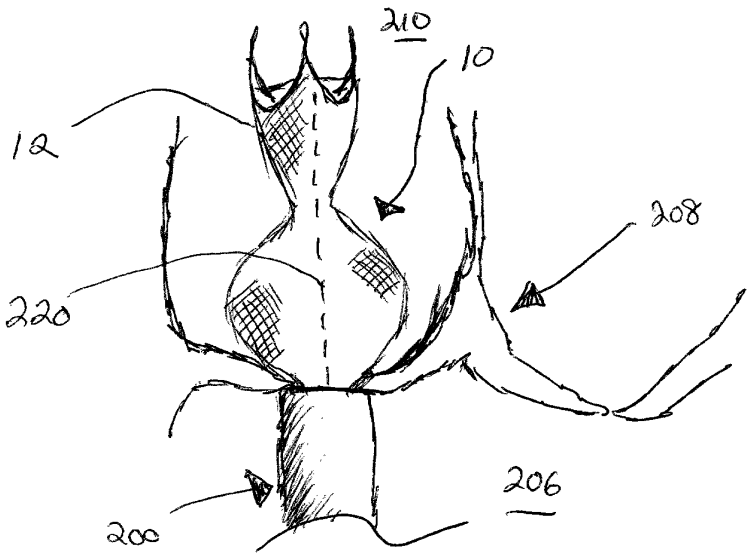


Fig. 43

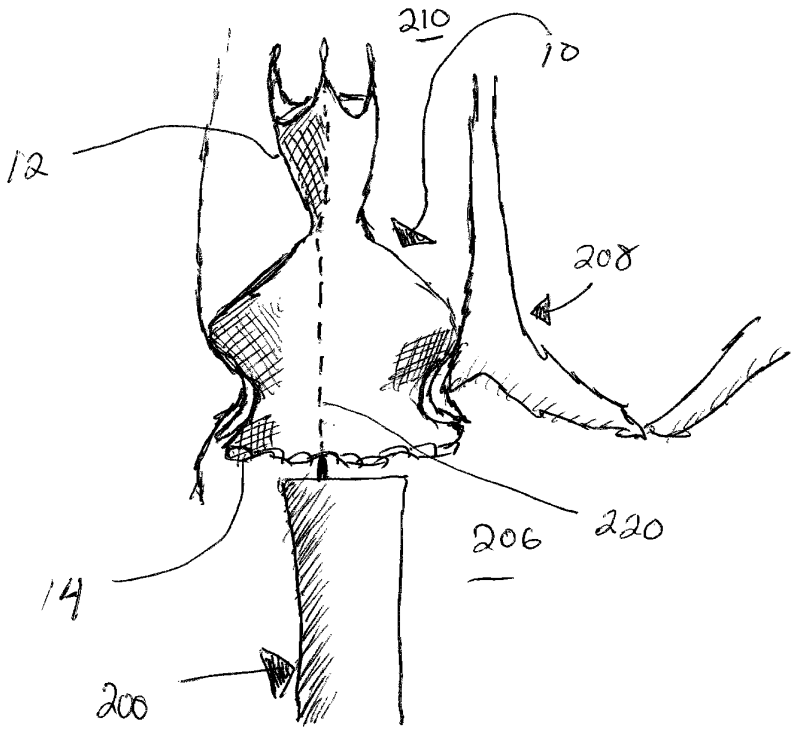


Fig. 44

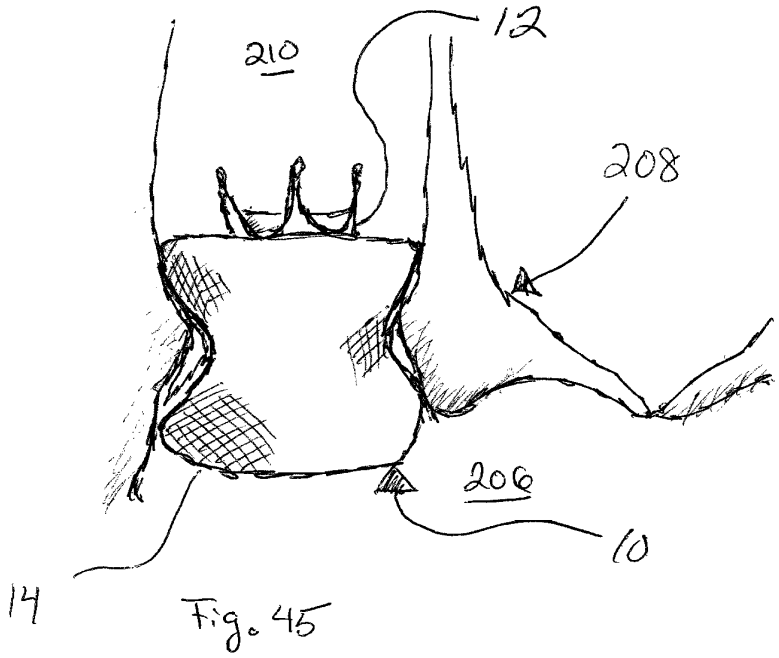


Fig. 45

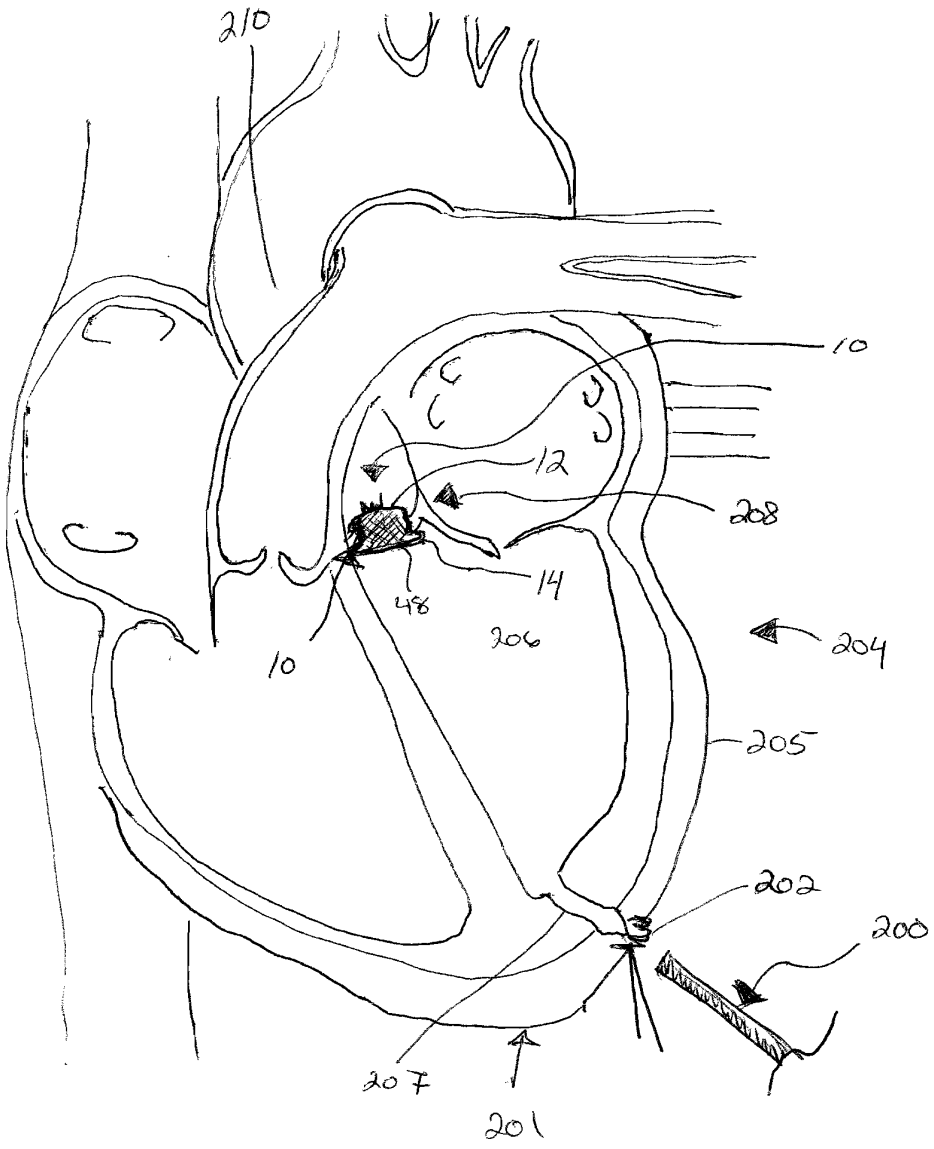


Fig. 46

Electronic Acknowledgement Receipt

EFS ID:	43804520
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	175373
Filer:	Justin Robert Nifong/Sandra Hess
Filer Authorized By:	Justin Robert Nifong
Attorney Docket Number:	426/2/12 UTIL
Receipt Date:	20-SEP-2021
Filing Date:	28-JUL-2020
Time Stamp:	10:03:40
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	426-2-12UTIL-20210920-IDS.pdf	1034752 dd8a868b639c12da04e2b7c51f5bc1dd4de1159d	no	5

Warnings:

Information:					
2	Foreign Reference	FP01_WO2011143263A2.pdf	1672421 b5b421b4e42edd08cf65f261804e59104e64c57b	no	44
Warnings:					
Information:					
3	Non Patent Literature	NPL01_608-IPR.pdf	6083706 b86aa3d6af501f3a51754e73a651fc435a1f64ed	no	207
Warnings:					
Information:					
4	Non Patent Literature	NPL02_172-IPR.pdf	23086567 53ca8366270f7e1dc910c06777af640c54499ce8	no	300
Warnings:					
Information:					
5	Non Patent Literature	NPL03_426-2-4JP-20210817-OA-incl-translation.pdf	138867 6196158a52a53de514f16f7f9ec18c4261c84ff3	no	4
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Information:					
6	Non Patent Literature	NPL04_426-2-4EP-20210906-ExamReport.pdf	192396 ade21de7c6d6166542b3db9331663a0046c3493d	no	6
Warnings:					
Information:					
			Total Files Size (in bytes):	32208709	

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

COMMUNICATION TO THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	16/941,117	Confirmation No.:	1876
Applicant	:	Aortic Innovations, LLC		
First Named Inventor	:	Ali Shahriari		
Filing Date	:	Jul 28, 2020		
TC/A.U.	:	-		
Examiner	:	-		
Docket No.	:	426/2/12 UTIL		
Customer No.	:	175373		

Title of Invention: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

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

RESPONSE TO DECISION ON PETITION

This is in response to the Decision on Petition mailed September 10, 2021.

Applicant hereby submits a copy of the office action just prior to the "Decision to Grant a Patent" from the Global/IP5 PPH participating office. An Information Disclosure Statement is not required because no references were cited in the OEE work product. All deficiencies specified in the Decision on Petition have been corrected herewith.

CONCLUSION

If any issues remain outstanding, or if a phone call could resolve any pending issues, the Commissioner is encouraged to call the attorney identified below in order to expeditiously resolve these matters.

Respectfully submitted,

Date: September 13, 2021

/Justin R. Nifong/
Justin R. Nifong
Reg. No. 59,389

NK Patent Law
4917 Waters Edge Drive, Suite 275
Raleigh, NC 27606
Telephone: (919) 348-2194
Facsimile: (919) 882-8195

Customer No. 175373

24 August 2020 (24-08-2020)

FURMAN IP LAW & STRATEGY PC
cfurman@furmanip.com

Application No.	:	**3,082,787**
Owner	:	AORTIC INNOVATIONS LLC
Title	:	**DEVICE FOR ENDOVASCULAR AORTIC REPAIR AND METHOD OF USING THE SAME**
Classification	:	A61F 2/24 (2006.01)
Your File No.	:	**551-005**
Examiner	:	Branka Ristovski

YOU ARE HEREBY NOTIFIED OF A REQUISITION BY THE EXAMINER IN ACCORDANCE WITH SUBSECTION 86(2) OF THE *PATENT RULES*. IN ORDER TO AVOID ABANDONMENT UNDER PARAGRAPH 73(1)(*a*) OF THE *PATENT ACT*, A WRITTEN REPLY MUST BE RECEIVED WITHIN **FOUR (4)** MONTHS AFTER THE ABOVE DATE.

This application has been accepted into the Patent Prosecution Highway (PPH), and will receive accelerated examination.

This application has been examined taking into account the:

Description,	pages 1-34, as originally filed;
Claims,	pages 35-37, as received on 29 July 2020 (29-07-2020) during the national phase; and
Drawings,	1/19-19/19, as originally filed.

This application has been examined taking into account applicant's correspondence on prior art received in this office on 29 July 2020 (29-07-2020).

The number of claims in this application is 12.

A search of the prior art has thus far failed to reveal any pertinent references.

The examiner has identified the following defects in the application:

Claims:

Claims 1 and 12 are indefinite and do not comply with subsection 27(4) of the *Patent Act*. Uncommon abbreviations should be fully defined on their first occurrence in a claim. The abbreviation “PTFE" and "ePTFE” should be defined as “Polytetrafluoroethylene" and "expanded Polytetrafluoroethylene”.

Claims 1 and 12 are indefinite and do not comply with subsection 27(4) of the *Patent Act*. The term "or" before the last element of the list of elements causes a lack of clarity as it is not clear whether the last element is part of the group or represents an alternative to the group (see section 16.11 of the *Manual of Patent Office Practice*). Specifically, the inclusion of "PTFE, ePTFE, or a polymer" causes this defect.

Claim 12 has been drafted as an independent claim and does not comply with subsection 63(1) of the *Patent Rules*. Said claim includes at least all of the features of claim 1, and consequently must refer thereto, in consideration of subsection 63(2) of the *Patent Rules*, and define only the additional features claimed.

Description:

The description contains statements that incorporate by reference other documents and does not comply with subsection 57(1) of the *Patent Rules*. Such statements are found at paragraphs [0057], [0077], and [0130] and should be removed.

In view of the foregoing defects, the applicant is requisitioned, under subsection 86(2) of the *Patent Rules*, to amend the application in order to comply with the *Patent Act* and the *Patent Rules* or to provide arguments as to why the application does comply.

Under section 102 of the *Patent Rules*, any amendment made in response to this requisition must be accompanied by a statement explaining the purpose of the amendment and identifying the differences between the new page and the replaced page.

To continue accelerated examination under the PPH, the applicant is reminded that any amended claims must sufficiently correspond to one or more of those claims indicated as allowable in the Office of Earlier Examination (OEE). If any amendment in response to this requisition results in claims which do not sufficiently correspond, the application may be removed from the PPH.

In order to ensure that correspondence related to PPH applications is correctly processed, the applicant is asked to clearly mark each page of the covering letter with the term **"PPH"** in the upper right hand corner of the page.

Branka Ristovski
Patent Examiner
819-744-1092

As per CIPO Client Service Standards, a response to a telephone enquiry or voice mail should be provided by the end of the next business day. In the event that attempts to reach the examiner are unsuccessful, the examiner's Section Head, Benoit Bourgon, can be reached at 819-639-6144.

For general inquiries: 1-866-997-1936 or for more options see http://www.ic.gc.ca/eic/site/cipointernet-internetopic.nsf/eng/wr00006.html.

CIPO values your feedback and invites you to complete a short and anonymous ongoing survey on patent examination products and services. You can access the survey at the following link: https://www.surveymonkey.com/r/PPE_EPBdB.

The Examination Search Report is provided for reference only and is not part of any requisition made by the examiner in accordance with the *Patent Act* or *Rules*. The applicant is not required to respond to the information contained in the Examination Search Report.

Examination Search Report

Box I: General Information			
Application No.	3,082,787	Search Report Date	2020-08-10
Title	DEVICE FOR ENDOVASCULAR AORTIC REPAIR AND METHOD OF USING THE SAME		
Examiner	Branka Ristovski	Search Conducted?	Yes

Box II: Family Prosecution		
Family Member	File Wrapper Reviewed	Status of Prosecution
US20200197199	2020-08-10	Completed
WO2013/086132	2020-08-10	Completed
EP2787925	2020-08-10	Completed

Box III: Search History			
Claims Searched	1-12	Date of Search	2020-08-10

Type of Search Conducted (select all that apply):

Canadian first to file search	■	Supplemental/top up search	□
Inventor/applicant search	■	Non laid open search	□
Comprehensive search	□	In-house searcher	□

Search History from Databases Consulted:

```
##### CANADIAN PATENT DATABASE/INTELLECT ##########

First to File: Intellect
Premier déposant : Intellect
filing-date:[2007-12-06 TO 2014-02-21] AND ipc:(A61F\ 2/24 OR A61F\ 2/07 OR A61F\
2/82 OR A61F\ 2/856) HEART VALVE INNER FRAME GRAFT POLY* OUTER FRAME SEALING WALL
FIBER*

Inventor or Applicant : Intellect-SOLR
Inventeur ou Demandeur : Intellect-SOLR
inventor:("SHAHRIARI ALI"~3) OR applicant:("AORTIC INNOVATIONS"~3) HEART VALVE INNER
FRAME GRAFT POLY* OUTER FRAME SEALING WALL FIBER OUTER FRAME RADIALLY OUTWARDLY
```

Version 9

Electronic Acknowledgement Receipt

EFS ID:	43750447
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	175373
Filer:	Justin Robert Nifong/Sandra Hess
Filer Authorized By:	Justin Robert Nifong
Attorney Docket Number:	426/2/12 UTIL
Receipt Date:	13-SEP-2021
Filing Date:	28-JUL-2020
Time Stamp:	16:20:17
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition to make special under Patent Prosecution Hwy	426-2-12UTIL-20210913-Rsp-to-PetitionDecision.pdf	19286 a03fe3204700bfba698a8608dbaddb023a58943d	no	2

Warnings:

Information:					
2	Other Reference-Patent/App/Search documents	426-2-12UTIL-20210913-426-2-4CA-OA.pdf	260458 a2082dc162774944b2add13f230ece8104be5620	no	4
Warnings:					
Information:					
		Total Files Size (in bytes):	279744		

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

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/941,117	07/28/2020	Ali Shahriari	426/2/12 UTIL	1876

175373 7590 09/10/2021

Aortic Innovations, LLC
4917 Waters Edge Drive, Suite 275
Raleigh, NC 27606

EXAMINER
CENTRAL, DOCKET

ART UNIT	PAPER NUMBER
OPAP	

NOTIFICATION DATE	DELIVERY MODE
09/10/2021	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):

usptomail@nkpatentlaw.com

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

In re Application of	:	
Shahriari, Ali	:	
Application No. 16/941,117	:	DECISION ON PETITION
Filed: 28 Jul 2020	:	
For: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME	:	

This is a decision on the request to participate in the Patent Prosecution Highway (PPH) program and the petition under 37 CFR 1.102(a), filed July 29, 2021, to make the above-identified application special and currently filed a petition under 37 CFR 1.182 for expedited consideration.

The request and petition under 37 CFR 1.102(a) are **DISMISSED**.

The petition under 37 CFR 1.182 for expedited consideration is **GRANTED**.

DISCUSSION

A grantable request to participate in the PPH pilot program and petition to make special require:

1. The U.S. application for which participation in the Global/IP5 PPH pilot program is requested must have the same earliest date, whether this is the priority date or filing date, as that of a corresponding national or regional application filed with another Global/IP5 PPH participating office or a corresponding PCT international application for which one of the Global/IP5 PPH participating offices was the International Searching Authority (ISA) or the International Preliminary Examining Authority (IPEA).

2. Applicant must:
   a. Ensure all the claims in the U.S. application must sufficiently correspond or be amended to sufficiently correspond to the allowable/patentable claim(s) in the corresponding Office of Earlier Examination (OEE) application and
   b. Submit a claims correspondence table in English;

3. Examination of the U.S. application has not begun;

4. Applicant must submit:
    a. Documentation of prior office action:
        i. a copy of the office action(s) just prior to the "Decision to Grant a Patent" from each of the Global/IP5 PPH participating office application(s) containing the allowable/patentable claim(s) or
        ii. if the allowable/patentable claims(s) are from a "Notification of Reasons for Refusal" then the Notification of Reasons for Refusal or
        iii. if the Global/IP5 PPH participating office application is a first action allowance then no office action from the Global/IP5 PPH participating office is necessary should be indicated on the request/petition form or
        iv. the latest work product in the international phase of the OEE PCT application;
    b. An English language translation of the Global/IP5 PPH participating office action or work product from (4)(a)(i)-(ii) or (iv) above;
5. Applicant must submit:
    a. An IDS listing the documents cited by the Global/IP5 PPH participating office examiner in the Global/IP5 PPH participating office action or work product (unless already submitted in this application)
    b. Copies of the documents except U.S. patents or U.S. patent application publications (unless already submitted in this application);

Conditions (1) - (3) above are considered to have been met. However, the request to participate in the PPH pilot program and petition fails to comply with the conditions (4 -5).

Regarding the requirement of condition (4), a full English language translation of the work product just prior to the Decision to Grant must be provided.

Applicant is given **ONE** opportunity within a time period of **ONE MONTH or THIRTY DAYS**, whichever is longer, from the mailing date of this decision to correct the deficiencies. **NO EXTENSION OF TIME UNDER 37 CFR 1.136 IS PERMITTED.** If the deficiencies are not corrected with the time period given, the application will await action in its regular turn.

Response must be filed via the Electronic Filing System (EFS) using the document description: Petition to make special under Patent Pros Hwy. Any preliminary amendments and IDS submitted with the PPH documents must be separately indexed as a preliminary amendment and IDS, respectively.

Telephone inquiries concerning this decision should be directed to Kimberly Inabinet at (571) 272-4618.

All other inquiries concerning the examination or status of the application is accessible in the PAIR system at http://portal.uspto.gov.

/KIMBERLY A INABINET/
Paralegal Specialist, OPET

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

REQUEST FOR PARTICIPATION IN THE GLOBAL/IP5 PATENT PROSECUTION HIGHWAY (PPH) PILOT PROGRAM IN THE USPTO

Application No.:	16941117	First Named Inventor:	Ali Shahriari
Filing Date:	7/28/2020	Attorney Docket No.:	426/2/12 UTIL
Title of the Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME		

THIS REQUEST FOR PARTICIPATION IN THE PPH PILOT PROGRAM ALONG WITH THE REQUIRED DOCUMENTS MUST BE SUBMITTED VIA EFS-WEB. INFORMATION REGARDING EFS-WEB IS AVAILABLE AT
https://www.uspto.gov/patents-application-process/applying-online/about-efs-web

APPLICANT HEREBY REQUESTS PARTICIPATION IN THE PATENT PROSECUTION HIGHWAY (PPH) PILOT PROGRAM AND PETITIONS TO MAKE THE ABOVE-IDENTIFIED APPLICATION SPECIAL UNDER THE PPH PILOT PROGRAM.

Office of earlier examination (OEE): Canada (Canadian Intellectual Property Office)

OEE application number: 3,082,787

Both the OEE application and the above-identified U.S. application have the following earliest date (filing or priority date): 12/6/2011

Type of OEE work product relied upon: Decision to grant a patent

Mailing date of OEE work product: 10/5/2020

Supporting Documents

1. OEE Work Product and Translation

A copy of the OEE work product and translation if not already in English:

☒ Attached ☐ Previously Submitted ☐ Not required because the decision to grant a patent was the first office action

☐ Applicant requests the USPTO to attempt to obtain the OEE work productd from the Dossier Access System or PATENTSCOPE

NOTE: If the applicant requests the USPTO to obtain the OEE work product electronically and such attempt is unsuccessful, the applicant will be required to supply the document. Accordingly, to avoid dismissal of the initial PPH request and potential denial of participation in the PPH program, the applicant should verify that the OEE work product is actually available via the Dossier Access System or PATENTSCOPE before requesting retrieval. If the applicant is unable to verify availability, then the applicant should submit the document with the PPH request.

2. References Cited in OEE Work Product

An information disclosure statement (IDS) listing the references cited in the OEE work product and document copies (except U.S. patents and U.S. published patent applications):

☐ Attached ☐ Previously Submitted ☒ Not required because no references were cited in the OEE work product

This collection of information is required by 35 U.S.C. 119, 37 CFR 1.55, and 37 CFR 1.102(d). The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 2 hours 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

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

REQUEST FOR PARTICIPATION IN THE GLOBAL/IP5 PPH PILOT PROGRAM IN THE USPTO

(continued)

Application No.:	16941117	First Named Inventor:	Ali Shahriari

3. Claims Correspondence Certification Statement

All of the claims in this application sufficiently correspond to the patentable/allowable claims in the OEE application.

4. Claims Correspondence Table

Claims in U.S. Application	Patentable Claims in OEE Application	Explanation Regarding the Correspondence
31	1	Same claim language

Signature	/Justin R. Nifong/	Date	7/29/2021
Name (print or type)	Justin R. Nifong	Registration Number	59389

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	16/941,117	Confirmation No.:	1876
Applicant	:	Aortic Innovations, LLC		
First Named Inventor	:	Ali Shahriari		
Filing Date	:	July 28, 2020		
TC/A.U.	:	-		
Examiner	:	-		
Docket No.	:	426/2/12 UTIL		
Customer No.	:	175373		

Title of Invention: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

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

PETITION TO EXPEDITE UNDER 37 CFR 1.182

Applicant hereby submits a petition under 37 CFR 1.182 to expedite consideration of the Request for Participation in the Global/IP5 Patent Prosecution Highway (PPH) Pilot Program filed concurrently with this Petition. A 37 CFR 1.182 petition to expedite fee of $210 is submitted concurrently with this filing.

Applicant requests expedited consideration of the Request for Participation in the Global/IP5 Patent Prosecution Highway (PPH) Pilot Program and further respectfully requests a prompt decision on the merits.

DEPOSIT ACCOUNT

The Commissioner is hereby authorized to charge any otherwise unpaid fees associated with the filing of this correspondence to Deposit Account No. **50-6191**.

Respectfully submitted,

Date: July 29, 2021

/Justin R. Nifong/
Justin R. Nifong
Reg. No. 59,389

NK Patent Law
4917 Waters Edge Drive, Suite 275
Raleigh, NC 27606
Telephone: (919) 348-2194
Facsimile: (919) 882-8195

Customer No. 175373

Electronic Patent Application Fee Transmittal

Application Number:	16941117
Filing Date:	28-Jul-2020
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Filer:	Justin Robert Nifong
Attorney Docket Number:	426/2/12 UTIL

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
PETITION FEE - 37 CFR 1.17(F)(GROUP I)	2462	1	210	210
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**210**

Electronic Acknowledgement Receipt	
EFS ID:	43375624
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	175373
Filer:	Justin Robert Nifong
Filer Authorized By:	
Attorney Docket Number:	426/2/12 UTIL
Receipt Date:	29-JUL-2021
Filing Date:	28-JUL-2020
Time Stamp:	11:39:07
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$210
RAM confirmation Number	E20217SB39522209
Deposit Account	506191
Authorized User	Justin Nifong
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		426-2-12-UTIL-Preliminary-Amendment.pdf	187522 738880b3f6f1f3852bcd0bddc1bdabced54e8c09	yes	3
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Preliminary Amendment		1	1	
	Claims		2	2	
	Applicant Arguments/Remarks Made in an Amendment		3	3	
Warnings:					
Information:					
2	Non Patent Literature	CA-Allowance.pdf	481512 820b1d3b2c7f60e3d0b09c2cb82a379a5395048c	no	4
Warnings:					
Information:					
3	Petition to make special under Patent Prosecution Hwy	426-2-12UTIL-PPH-Request.pdf	755887 e02e42ec7b12a76d1de2d8d27e9f40010f5be444	no	3
Warnings:					
Information:					
4	Petition for review by the Office of Petitions	426-2-22UTIL-Petition-to-Expedite.pdf	180348 8e44350a623fd690d54eb2111e8ae98fe83edcaa	no	2
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	38073 026fbe9ff5839fc2fb93d2399c67e4fc1a37606e	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	1643342

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

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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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COMMUNICATION TO THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	16/941,117	Confirmation No.:	1876
Applicant	:	Aortic Innovations, LLC		
First Named Inventor	:	Ali Shahriari		
Filing Date	:	July 28, 2020		
TC/A.U.	:	-		
Examiner	:	-		
Docket No.	:	426/2/12 UTIL		
Customer No.	:	175373		

Title of Invention: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

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

PRELIMINARY AMENDMENT

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 3 of this paper.

Amendments to the Claims:

The claims are amended as follows and will replace all previous versions and listings of claims:

Listing of Claims:

Claims 1-30 (Canceled)

31. (New) A heart valve assembly comprising:

a. an inner frame comprising a graft covering housing a prosthetic heart valve, wherein the graft covering extends around the prosthetic heart valve for providing sealing to the heart valve;

b. an outer frame formed from a metallic material and defining a gridded configuration, and being secured to the graft covering by a plurality of stitches; and

c. a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks, wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame;

wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer.

REMARKS

Claims 1-30 have been canceled. New claim 31 has been added. Entry of the amendment and favorable consideration are requested. No new matter has been added.

Application is being submitted with a request under the Patent Prosecution Highway, and a petition to expedite consideration of the same.

DEPOSIT ACCOUNT

The Commissioner is hereby authorized to charge any otherwise unpaid fees associated with the filing of this correspondence to Deposit Account No. **50-6191**.

Respectfully submitted,

Date: July 29, 2021

/Justin R. Nifong/
Justin R. Nifong
Reg. No. 59,389

NK Patent Law
4917 Waters Edge Drive, Suite 275
Raleigh, NC 27606
Telephone: (919) 348-2194
Facsimile: (919) 882-8195

Customer No. 115007

Innovation, Sciences et Développement économique Canada
Office de la propriété intellectuelle du Canada

Innovation, Science and Economic Development Canada
Canadian Intellectual Property Office

Avis du commissaire - Demande jugée acceptable
Commissioner's Notice - Application Found Allowable

FURMAN IP LAW & STRATEGY PC
cfurman@furmanip.com

Détails de l'avis / Notice Details	
Date de l'avis: Notice Date:	2020/10/05
N° de la demande: Application N°:	**3,082,787**
Votre n° de référence: Your Reference N°:	551-005
Date d'échéance de l'avis: Notice Due Date:	2021/02/05
Montant dû: Amount Due:	$150.00*

Date de dépôt/Filing Date:	2012/12/06
Demandeur(s)/Applicant(s):	AORTIC INNOVATIONS LLC
Inventeur(s)/Inventor(s):	SHAHRIARI, ALI
Titre de l'invention:	DISPOSITIF POUR UNE REPARATION AORTIQUE ENDOVASCULAIRE ET PROCEDE D'UTILISATION DU DISPOSITIF
Title of invention:	DEVICE FOR ENDOVASCULAR AORTIC REPAIR AND METHOD OF USING THE SAME
Revendications/Claims:	012
Taxe pour pages en sus: Excess Pages Fee:	
Examinée tel que modifiée: Examined as amended:	2020/09/01

Le présent avis du commissaire aux brevets vise à informer le demandeur que la demande de brevet a été jugée acceptable et que le paiement de la taxe finale réglementaire doit être fait au plus tard le 2021/02/05 .

Si la taxe finale n'est pas payée au plus tard le 2021/02/05 , la demande sera réputée abandonnée.

*Le montant de la taxe applicable sera le montant ajusté au 1er janvier de l'année pendant laquelle la taxe est reçue. Veuillez consulter le site web de l'OPIC concernant les taxes générales pour les brevets pour connaître le montant applicable :

https://www.ic.gc.eic/site/cipointernet-internetopic.nsf/fra/wr00142.html

Veuillez vous assurer de l'exactitude des renseignements au dossier avant de faire le paiement de la taxe finale, car peu de modifications sont autorisées après le paiement de la taxe finale et après la délivrance d'un brevet.

Références pertinentes:
* par. 86(1) des *Règles sur les brevets*

Pour de plus amples renseignements concernant cet avis ou la façon de rétablir une demande de brevet abandonnée, veuillez consulter le *Recueil des pratiques du Bureau des brevets* (RPBB) accessible au canada.ca/brevets ou téléphoner au 1 819 997-2839.

This is a Notice from the Commissioner of Patents to inform the applicant that the application for a patent has been found allowable and payment of the prescribed final fee is required before the end of 2021/02/05.

If the final fee is not paid before the end of 2021/02/05, the application will be deemed to be abandoned.

*The applicable fee amount will be the amount as adjusted on January 1 of the year in which the fee is received. Please refer to the CIPO Patent Fees website for the amount applicable:

https://www.ic.gc.eic/site/cipointernet-internetopic.nsf/eng/wr00142.html

Please ensure the accuracy of the information on file before payment of the final fee as there are limited modifications that are allowed after payment of the final fee and post grant.

Relevant references:
* s.86(1) of the *Patent Rules*

For more information regarding this notice or on how to reinstate an abandoned patent application, please refer to the *Manual of Patent Office Practice* (MOPOP) at canada.ca/patents or phone 1-819-997-2839.

OCT017 Aug. 2020

CLAIMS:

1. A heart valve assembly comprising:

    a. an inner frame comprising a graft covering housing a prosthetic heart valve, wherein the graft covering extends around the prosthetic heart valve for providing sealing to the heart valve;

    b. an outer frame formed from a metallic material and defining a gridded configuration, and being secured to the graft covering by a plurality of stitches; and

    c. a sealing material positioned externally to the outer frame for providing sealing between the outer frame and a patient's anatomical wall to prevent paravalvular leaks, wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the outer frame;

    wherein the graft covering is made of polyester, polytetrafluoroethylene, expanded polytetrafluoroethylene, or a polymer.

2. The valve assembly of claim 1, wherein the fibers cover at least two circumferentially extending rows of grids formed in the gridded configuration.

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3. The valve assembly of claim 1, wherein the fibers are engaged with the outer frame.

4. The valve assembly of claim 1, wherein the outer frame extends distally further than the prosthetic heart valve.

5. The valve assembly of claim 1, wherein the outer frame is a singular, integral component.

6. The valve assembly of claim 1, wherein the outer frame and the graft covering are attached by stitches at a top and bottom portion of the graft covering.

7. The valve assembly of claim 1, wherein the graft covering and the fibers are distinct elements.

8. The valve assembly of claim 1, wherein the valve assembly is delivered endovascularly.

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9. The valve assembly of claim 1, wherein a seal is created between the inner frame and the outer frame.

10. The valve assembly of claim 1, wherein the valve assembly is balloon expandable.

11. The valve assembly of claim 1, wherein expansion of the valve assembly presses the sealing material against the aortic annulus of the patient.

12. The valve assembly of Claim 1 wherein:

    a. the outer frame extends distally further than the prosthetic heart valve;

    b. the graft covering and the fibers are distinct elements; and

    c. expansion of the valve assembly presses the sealing material against the aortic annulus of the patient.

Date Reçue/Date Received 2020-09-01

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/941,117	Filing Date 07/28/2020	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ 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) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	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	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	01/29/2021							
	Total (37 CFR 1.16(i))	* 7	Minus	** 20	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 1	Minus	*** 3	= 0		x $240 =	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

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LDRC
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/EVA V GILLIS/
*** 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.	

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COMMUNICATION TO THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	16/941,117	Confirmation No.:	1876
Applicant	:	Aortic Innovations, LLC		
First Named Inventor	:	Ali Shahriari		
Filing Date	:	Jul 28, 2020		
TC/A.U.	:	3700		
Examiner	:	-		
Docket No.	:	426/2/12 UTIL		
Customer No.	:	175373		

Title of Invention: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

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

PRELIMINARY AMENDMENT

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 4 of this paper.

Amendments to the Claims:

The claims are amended as follows and will replace all previous versions and listings of claims:

Listing of Claims:

Claims 1-23 (Canceled)

24. (New) A transcatheter valve assembly comprising:

a stent frame formed from a metallic material, wherein the stent frame forms a major frame portion that approximates a cylinder when the stent frame is expanded;

a prosthetic heart valve carried by the major frame portion and having prosthetic leaflets;

a seal positioned radially outwardly of the major frame portion that forms a sealing interface against an annulus of a patient when the seal is compressed thereagainst,

wherein the seal defines a plurality of radially extending fibers,

wherein the plurality of radially extending fibers extend outwardly from an inflow end portion to an outflow end portion of the major frame portion.

25. (New) The transcatheter valve assembly of claim 24, wherein the plurality of radially extending fibers defines a first portion of fibers positioned radially outwardly of the stent frame that forms a first sealing interface against the annulus and native valve leaflets of the patient when the first portion of fibers are compressed thereagainst, wherein the first portion of fibers extend radially outwardly of the stent frame; and

wherein the seal further defines a second portion of fibers carried by the stent frame that forms a second sealing interface against the stent frame when the second portion of fibers are compressed thereagainst,

26. (New) The transcatheter valve assembly according to claim 25, wherein the first portion of fibers and the second portion of fibers radially overlap.

27. (New) The transcatheter valve assembly according to claim 24, further including a graft covering between the stent frame and the prosthetic leaflets.

28. (New) The transcatheter valve assembly according to claim 27, wherein the graft covering extends to the inflow end portion of the stent frame, wherein, stitching extending between the graft covering through the stent frame secures the graft covering to the inflow end portion of the stent frame.

29. (New) The transcatheter valve assembly according to claim 28, wherein the stitching extends into the prosthetic leaflets.

30. (New) The transcatheter valve assembly according to claim 24, wherein the transcatheter valve assembly replaces a native mitral valve.

REMARKS

Claims 1-23 have been canceled. New claims 24-30 have been added. Entry of the amendment and favorable consideration are requested. No new matter has been added.

DEPOSIT ACCOUNT

The Commissioner is hereby authorized to charge any otherwise unpaid fees associated with the filing of this correspondence to Deposit Account No. **50-6191**.

Respectfully submitted,

Date: January 29, 2021

/Justin R. Nifong/
Justin R. Nifong
Reg. No. 59,389

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4917 Waters Edge Drive, Suite 275
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Customer No. 175373

Electronic Acknowledgement Receipt

EFS ID:	41781298
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	175373
Filer:	Justin Robert Nifong/Donna Donovan
Filer Authorized By:	Justin Robert Nifong
Attorney Docket Number:	426/2/12 UTIL
Receipt Date:	29-JAN-2021
Filing Date:	28-JUL-2020
Time Stamp:	10:46:54
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		426-2-12UTIL-20210129-Preliminary-Amendment.pdf	26516 e6df5110343a02defbd8932b9ed68c01943b9cce	yes	4

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Preliminary Amendment	1	1
	Claims	2	3
	Applicant Arguments/Remarks Made in an Amendment	4	4
Warnings:			
Information:			
	Total Files Size (in bytes):	26516	

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/941,117	07/28/2020	Ali Shahriari	426/2/12 UTIL

CONFIRMATION NO. 1876

175373
Aortic Innovations, LLC
4917 Waters Edge Drive, Suite 275
Raleigh, NC 27606

PUBLICATION NOTICE

OC000000121292615

Title:DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

Publication No.US-2020-0352751-A1
Publication Date:11/12/2020

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Application Number	16/941,117
Filing Date	2020-07-28
First Named Inventor	Ali Shahriari
Art Unit	3774
Examiner Name	John K. Fristoe, Jr.
Attorney Docket Number	426/2/12 UTIL

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☐ Attorney or agent of record. Registration Number _____.

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Signature /Justin R. Nifong/

Typed or Printed Name Justin R. Nifong

Date October 30, 2020 | Telephone (919) 348-2194

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EFS ID:	40994240
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	171373
Filer:	Justin Robert Nifong/Donna Donovan
Filer Authorized By:	Justin Robert Nifong
Attorney Docket Number:	426/2/12 UTIL
Receipt Date:	30-OCT-2020
Filing Date:	28-JUL-2020
Time Stamp:	12:14:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Change of Address	426-2-12UTIL-20201030-Change-of-Address.pdf	246916 1a18dbb3ac3b326664562a0e2d1a37d70d104f50	no	2

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Application Number	16/941,117
Filing Date	2020-07-28
First Named Inventor	Ali Shahriari
Art Unit	3774
Examiner Name	John K. Fristoe, Jr.
Attorney Docket Number	426/2/12 UTIL

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Signature /Justin R. Nifong/

Typed or Printed Name Justin R. Nifong

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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.
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EFS ID:	40983264
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	115007
Filer:	Justin Robert Nifong/Donna Donovan
Filer Authorized By:	Justin Robert Nifong
Attorney Docket Number:	426/2/12 UTIL
Receipt Date:	29-OCT-2020
Filing Date:	28-JUL-2020
Time Stamp:	13:46:09
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Change of Address	426-2-12UTIL-20201029-Change-of-Address.pdf	241389 829769bc3daa49d741d028759d7f78cc926055c2	no	2

Warnings:

Information:	
Total Files Size (in bytes):	241389

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
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New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/08a (02-18)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16941117
Filing Date	2020-07-28
First Named Inventor	Ali Shahriari
Art Unit	3774
Examiner Name	-
Attorney Docket Number	426/2/12 UTIL

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	8992608		2015-03-31	Haug et al.	
	2	10716662		2020-07-21	Delaloye et al.	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20070288087	A1	2007-12-13	Fearnot et al.	
	2	20100217382	A1	2010-08-26	Chau et al.	
	3	20100249916	A1	2010-09-30	Zhang	
	4	20120123529	A1	2012-05-17	Levi et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16941117
	Filing Date	2020-07-28
	First Named Inventor	Ali Shahriari
	Art Unit	3774
	Examiner Name	-
	Attorney Docket Number	426/2/12 UTIL

	5	20200197199	A1	2020-06-25	Shahriari	
	6	20090143855	A1	2009-06-04	Weber et al.	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2011069048	WO	A2	2011-06-09	Chau et al.		
	2	2001049213	WO	A1	2009-06-04	Bailey		
	3	2004032987	WO	A1	2004-04-22	Bechgaard et al.		

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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, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	BOBO, JR., DONALD E., Surgical Heart Valve Therapy, Edwards Lifesciences, 2011 Investor Conference, December 9, 2011, 12 Pages	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16941117
	Filing Date	2020-07-28
	First Named Inventor	Ali Shahriari
	Art Unit	3774
	Examiner Name	-
	Attorney Docket Number	426/2/12 UTIL

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16941117
	Filing Date	2020-07-28
	First Named Inventor	Ali Shahriari
	Art Unit	3774
	Examiner Name	-
	Attorney Docket Number	426/2/12 UTIL

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.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

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

Signature	/Justin R. Nifong/	Date (YYYY-MM-DD)	2020-10-21
Name/Print	Justin R. Nifong	Registration Number	59389

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/DK 03/00686

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61L27/44 A61L27/14 A61F2/02 B32B27/32

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61L A61F B32B B29C

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

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

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 01 45595 A (LAURITZEN JES BRUUN ;PEDERSEN WALTHER BATSBERG (DK); STEENSTRUP FR) 28 June 2001 (2001-06-28) page 10, line 12 - line 28 page 15 -page 21 page 22, line 1 - line 9 example 1 claims 1,2,4-14,20-23,28 ---	1-101
X	WO 01 64278 A (SCIMED LIFE SYSTEMS INC) 7 September 2001 (2001-09-07) page 2, line 17 - line 23	1,3-6
A	page 2, line 29 -page 3, line 6 page 4, line 14 - line 20 page 6, line 32 -page 7, line 6 page 8, line 26 - line 30; example 1 claims 1,2,4 --- -/--	2,7-85

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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

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

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"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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 January 2004	15 MAART 2004

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	JOHANNA BROLUND /EÖ

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INTERNATIONAL SEARCH REPORT

International application No
PCT/DK 03/00686

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 392 734 A (ICI PLC) 17 October 1990 (1990-10-17) page 2 -page 3; claims 1,5-12	1-101
A	US 6 165 220 A (SHEN FU-WEN ET AL) 26 December 2000 (2000-12-26) column 1 -column 2 column 4 -column 6	76,77, 79,81
P,A	US 2003/055506 A1 (KOZLOVA ZDENA ET AL) 20 March 2003 (2003-03-20) the whole description claims 1-7,10	1-101
A	EP 0 457 952 A (ZACHARIADES ANAGNOSTIS E) 27 November 1991 (1991-11-27) abstract; claims 1-8,19-25	1-101

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Internati[illegible] pplication No
PCT/DK 03/00686

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0145595 A	28-06-2001	AU 1996401 A	03-07-2001
		BG 106862 A	28-02-2003
		BR 0016474 A	20-08-2002
		CA 2392782 A1	28-06-2001
		CN 1433289 T	30-07-2003
		CZ 20021966 A3	12-03-2003
		WO 0145595 A2	28-06-2001
		EE 200200329 A	15-10-2003
		EP 1242008 A2	25-09-2002
		JP 2003517875 T	03-06-2003
		NO 20022905 A	12-08-2002
		SK 8232002 A3	02-05-2003
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WO 0164278 A	07-09-2001	AU 4320101 A	12-09-2001
		CA 2401400 A1	07-09-2001
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		WO 9952474 A1	21-10-1999
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		CZ 20021137 A3	11-09-2002
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		JP 2003510129 T	18-03-2003
		WO 0122902 A2	05-04-2001
EP 0457952 A	27-11-1991	US 4944974 A	31-07-1990
		EP 0457952 A1	27-11-1991

Form PCT/ISA/210 (patent family annex) (July 1992)

Electronic Acknowledgement Receipt

EFS ID:	40900857
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	115007
Filer:	Justin Robert Nifong/Donna Donovan
Filer Authorized By:	Justin Robert Nifong
Attorney Docket Number:	426/2/12 UTIL
Receipt Date:	21-OCT-2020
Filing Date:	28-JUL-2020
Time Stamp:	10:20:27
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	426-2-12UTIL-20201021-IDS.pdf	1034769 90a6b271212aad81c8c33161de102f1046ba4241	no	5

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2	Foreign Reference	F1-WO2011069048A2.pdf	6903711 d5302513581788efaca346f9bb6da09e9e0d98f8	no	106
Warnings:					
Information:					
3	Foreign Reference	F2-WO0149213A2.pdf	3348230 0485ebdc086f438e35f2af8c2dd3f180666ef03b	no	42
Warnings:					
Information:					
4	Foreign Reference	F3-WO2004032987A1.pdf	5847932 e4a34d542928176fc1375eadba475a5c7d8bfb9c	no	75
Warnings:					
Information:					
5	Non Patent Literature	NPL1-Surgical_Heart_Valve_Therapy.pdf	977555 c45213b4e8fab209c18cafe97bf1d81a66f0763f	no	12
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			Total Files Size (in bytes):	18112197	

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COMMUNICATION TO THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	16/941,117	Confirmation No.:	1876
Applicant	:	Aortic Innovations, LLC		
First Named Inventor	:	Ali Shahriari		
Filing Date	:	Jul 28, 2020		
TC/A.U.	:	3774		
Examiner	:	-		
Docket No.	:	426/2/12 UTIL		
Customer No.	:	115007		

Title of Invention: DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

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

PRELIMINARY AMENDMENT

Amendments to the Claims begin on page **2** of this paper.

Remarks begin on page **5** of this paper.

Electronic Acknowledgement Receipt	
EFS ID:	40375150
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	115007
Filer:	Justin Robert Nifong/Donna Donovan
Filer Authorized By:	Justin Robert Nifong
Attorney Docket Number:	426/2/12 UTIL
Receipt Date:	25-AUG-2020
Filing Date:	28-JUL-2020
Time Stamp:	13:33:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		426-2-12UTIL-20200825-Prel-Amendment.pdf	29623 2b59ce0009e8ec9faf3e23fbb6fa4a881e62c f4f	yes	5

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Applicant Arguments/Remarks Made in an Amendment	5	5
	Claims	2	4
	Preliminary Amendment	1	1
Warnings:			
Information:			
	Total Files Size (in bytes):	29623	

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REMARKS

Claims 1-10 have been canceled. New claims 11-23 have been added. Entry of the amendment and favorable consideration are requested. No new matter has been added.

DEPOSIT ACCOUNT

The Commissioner is hereby authorized to charge any otherwise unpaid fees associated with the filing of this correspondence to Deposit Account No. **50-6191**.

Respectfully submitted,

Date: August 25, 2020

/Justin R. Nifong/
Justin R. Nifong
Reg. No. 59,389

NK Patent Law
4917 Waters Edge Drive, Suite 275
Raleigh, NC 27606
Telephone: (919) 348-2194
Facsimile: (919) 882-8195

Customer No. 115007

Amendments to the Claims:

The claims are amended as follows and will replace all previous versions and listings of claims:

Listing of Claims:

Claims 1-10 (Canceled)

11. (New) A valve assembly for being deployed endovascularly, the valve comprising:
a frame formed from a metallic material and that defines a gridded configuration;
a prosthetic heart valve positioned within the frame and configured for replacing a native valve of a patient,
a graft covering extending circumferentially inwardly among at least a portion of the frame and at least partially exterior to the prosthetic heart valve, wherein the graft covering is one of polyester, PTFE, ePTFE, or a polymer;
wherein the frame is secured to the graft covering by a plurality of stitches at an end of the graft covering,
a sealing material positioned externally to the frame for providing sealing between the frame and a patient's anatomical wall to prevent paravalvular leaks, wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the frame that form a circumferential seal about the frame,
wherein the valve assembly is balloon expandable.

12. (New) The valve assembly of claim 11, wherein the fibers cover at least two circumferentially extending rows of grids formed in the gridded configuration.

13. (New) The valve assembly of claim 11, wherein the fibers are engaged with the frame.

14. (New) The valve assembly of claim 11, wherein the frame extends distally further than the prosthetic heart valve.

15. (New) The valve assembly of claim 11, wherein the frame is a singular, integral component.

16. (New) The valve assembly of claim 11, wherein the frame and the graft covering are attached by stitches at a top and bottom portion of the graft covering.

17. (New) The valve assembly of claim 11, wherein the graft covering and the fibers are distinct elements.

18. (New) The valve assembly of claim 11, wherein the valve assembly is delivered endovascularly.

19. (New) The valve assembly of claim 11, wherein a seal is created between the graft and the frame.

20. (New) The valve assembly of claim 11, wherein expansion of the valve assembly presses the sealing material against the aortic annulus of the patient.

21. (New) The valve assembly of claim 11, wherein the valve assembly replaces a native mitral valve.

22. (New) The valve assembly of claim 11, wherein the valve assembly replaces an aortic valve.

23. (New) A valve assembly for being deployed endovascularly, the valve comprising:
a frame formed from a metallic material and that defines a gridded configuration;
a prosthetic heart valve positioned within the frame and configured for replacing a native valve of a patient,
a graft covering extending circumferentially inwardly among at least a portion of the frame and at least partially exterior to the prosthetic heart valve, wherein the graft covering is one of polyester, PTFE, ePTFE, or a polymer;

wherein the frame is secured to the graft covering by a plurality of stitches at a proximal end of the graft covering and a plurality of stitches at a proximal end of the outer frame,

a sealing material positioned externally to the frame for providing sealing between the frame and a patient's anatomical wall to prevent paravalvular leaks, wherein the sealing material includes a plurality of radially extending fibers that extend outwardly of the frame that form a circumferential seal about the frame, wherein a portion of each fiber of the radially extending fibers is not knitted with another fiber,

wherein the fibers cover at least two circumferentially extending rows of grids formed in the gridded configuration,

wherein expansion of the valve assembly presses the sealing material against the aortic annulus of the patient,

wherein the valve assembly is delivered endovascularly.

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
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/941,117	Filing Date 07/28/2020	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ 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	08/25/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 13	Minus	** 20	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $230 =	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".	/JESSICA T GAYNOR/
*** 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.**

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

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/941,117	07/28/2020	3774	785	426/2/12 UTIL	10	2

CONFIRMATION NO. 1876

115007
NK Patent Law
4917 Waters Edge Dr.
Suite 275
Raleigh, NC 27606

FILING RECEIPT

OC000000118963711

Date Mailed: 08/06/2020

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)

Ali Shahriari, Boca Raton, FL;

Applicant(s)

Aortic Innovations, LLC, Boca Raton, FL;

Power of Attorney: The patent practitioners associated with Customer Number 115007

Domestic Priority data as claimed by applicant

This application is a CON of 16/935,261 07/22/2020
which is a CON of 16/808,137 03/03/2020
which is a CON of 16/736,879 01/08/2020
which is a CON of 16/042,286 07/23/2018 PAT 10555823
which is a CON of 14/614,628 02/05/2015 PAT 10028848
which is a CON of 14/569,306 12/12/2014 PAT 9339399
which is a DIV of 13/706,896 12/06/2012 PAT 8940040
which claims benefit of 61/723,446 11/07/2012
and claims benefit of 61/567,458 12/06/2011

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

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

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

If Required, Foreign Filing License Granted: 08/04/2020

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/941,117**

Projected Publication Date: 11/12/2020

Non-Publication Request: No

Early Publication Request: No

** **SMALL ENTITY** **

Title

DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

Preliminary Class

623

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

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

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

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

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

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

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

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

NOT GRANTED

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

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor

community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/941,117

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	75		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	330		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	10 minus 20 =	*	x 50 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*	x 230 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	785		TOTAL	

APPLICATION AS AMENDED - PART II

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

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)	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.

POWER OF ATTORNEY FOR PATENT APPLICATIONS

Under 37 CFR § 3.73(b) and/or (c), Aortic Innovations, LLC, hereby certifies that it is the Assignee of the entire right, title, and interest in and to the patent applications listed below. Each of the patent applications listed below is assigned to Aortic Innovations, LLC. As required by 37 CFR § 3.73(b)(1)(i) and/or (c)(1)(i), the documentary evidence of the chain of title from the original owner to the Assignee was submitted for recordation pursuant to 37 § CFR 3.11 as shown in the Reel/Frame numbers listed below.

Title	Serial No.	Filing Date	Assignment	Date
Transcathetor Arotic Valve for Endovascular Aortic Repair	61/723,446	11/7/2012	029574/0731	1/7/2013
Transcathetor Aortic Valve for Endovascular Aortic Repair	61/567,458	12/6/2011	029005/0233	9/19/2012
Branched Aortic Graft and Method of Using the Same	61/777,918	3/12/2013	030346/0253	5/3/2013
Device for Endovascular Aortic Repair and Method of Using the Same	13/706,896	12/6/2012	032145/0006	2/5/2014
Device for Endovascular Aortic Repair and Method of Using the Same	US2012/068165	12/6/2012	029574/0887	1/7/2013
Transcatheral Mitral Valve and Delivery System	61/780,242	3/13/2013	030346/0233	5/3/2013
Device for Transcatheter Mitral Valve Repair and Replacement	61/817,118	4/29/2013	032145/0006	2/5/2014

The undersigned, acting as the Assignee, hereby revokes all prior powers of attorney, if applicable, and appoints the practitioners associated with the customer number 115007 as my/our attorney(s) or agent(s) to prosecute the patent(s) and/or patent application(s) and transact all business in the United States Patent and Trademark Office connected therewith.

By: _____ Date: 2/4/14

Ali Shahriari, Owner

Aortic Innovations, LLC

Electronic Acknowledgement Receipt

EFS ID:	40171510
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	115007
Filer:	Justin Robert Nifong
Filer Authorized By:	
Attorney Docket Number:	426/2/12 UTIL
Receipt Date:	03-AUG-2020
Filing Date:	
Time Stamp:	07:41:56
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	16910189.pdf	71691 aaa530cb665a01a39ecb9df73dd62d030a15dfb7	no	1

Warnings:

Information:	
Total Files Size (in bytes):	71691

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

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	426/2/12 UTIL
	Application Number	
Title of Invention	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME	

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

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Ali		Shahriari	

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

City	Boca Raton	State/Province	FL	Country of Residence i	US

Mailing Address of Inventor:

Address 1	839 Enfield Street		
Address 2			
City	Boca Raton	**State/Province**	FL
Postal Code	33487	**Country** i	US

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

Correspondence Information:

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	115007		
Email Address	docket@nkpatentlaw.com	Add Email	Remove Email

Application Information:

Title of the Invention	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME		
Attorney Docket Number	426/2/12 UTIL	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	19	**Suggested Figure for Publication (if any)**	1

PTO/AIA/14 (08-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	426/2/12 UTIL
	Application Number	
Title of Invention	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME	

Filing By Reference:

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

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

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

Publication Information:

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

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

Representative Information:

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

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	115007		

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix	Remove
Registration Number					
Prefix	**Given Name**	Middle Name	**Family Name**	Suffix	Remove
Registration Number					

Additional Representative Information blocks may be generated within this form by selecting the **Add** button.

PTO/AIA/14 (08-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	426/2/12 UTIL
	Application Number	
Title of Invention	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME	

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	16935261	2020-07-22

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16935261	Continuation of	16808137	2020-03-03

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16808137	Continuation of	16736879	2020-01-08

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16736879	Continuation of	16042286	2018-07-23	10555823	2020-02-11

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16042286	Continuation of	14614628	2015-02-05	10028848	2018-07-24

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14614628	Continuation of	14569306	2014-12-12	9339399	2016-05-17

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14569306	Division of	13706896	2012-12-06	8940040	2015-01-27

PTO/AIA/14 (08-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	426/2/12 UTIL
	Application Number	
Title of Invention	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME	

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13706896	Claims benefit of provisional	61723446	2012-11-07

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13706896	Claims benefit of provisional	61567458	2011-12-06

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

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) 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).

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

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

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

PTO/AIA/14 (08-15)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	426/2/12 UTIL
	Application Number	
Title of Invention	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME	

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	426/2/12 UTIL
	Application Number	
Title of Invention	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME	

Applicant Information:

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

Applicant 1

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

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. ☒

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Email Address			

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	426/2/12 UTIL
	Application Number	
Title of Invention	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME	

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.

Assignee 1

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

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

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	426/2/12 UTIL
	Application Number	
Title of Invention	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME	

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e. g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

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

Signature	/Justin R. Nifong/			Date (YYYY-MM-DD)	
First Name	Justin R.	Last Name	Nifong	Registration Number	59389

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

DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME

[0001] This application is a continuation of U.S. Patent Application No. 16/935,261 entitled "DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME", which was filed on July 22, 2020, which is a continuation of U.S. Patent Application No. 16/808,137 entitled "HEART VALVE REPLACEMENT DEVICE FOR ENDOVASCULAR AORTIC REPAIR AND METHOD OF USING THE SAME", which was filed on March 3, 2020, which is a continuation of U.S. Patent Application No. 16/736,879 entitled "DEVICE FOR ENDOVASCULAR AORTIC REPAIR AND METHOD OF USING THE SAME", which was filed on January 8, 2020, which is a continuation of U.S. Patent Application No. 16/042,286 entitled "DEVICE FOR ENDOVASCULAR AORTIC REPAIR AND METHOD OF USING THE SAME", which was filed on July 23, 2018 and issued as U.S. Patent No. 10,555,823 on February 11, 2020, which is a continuation of U.S. Patent Application No. 14/614,628 entitled "Device for Endovascular Aortic Repair and Method of Using the Same", which was filed on February 5, 2015 and issued as U.S. Patent No. 10,028,848 on July 24, 2018, which is a continuation of U.S. Patent Application No. 14/569,306 entitled "Device for Endovascular Aortic Repair and Method of Using the Same", which was filed on December 12, 2014 and issued as U.S. Patent No. 9,339,399 on May 17, 2016, which is a divisional of U.S. Patent Application No. 13/706,896 entitled "Device for Endovascular Aortic Repair and Method of Using the Same", which was filed on December 6, 2012 and issued as U.S. Patent No. 8,940,040 on January 27, 2015, which claims the benefit under 35 U.S.C. § 119 to U.S. Provisional Application Serial No. 61/567,458 entitled "Transcathetar Aortic Valve for Endovascular Aortic Repair", which was filed on December 6, 2011. Application No. 13/706,896 also claims priority under § 119 to U.S.

Provisional Application Serial No. 61/723,446 entitled "Transcathetar Aortic Valve for Endovascular Aortic Repair", which was filed on November 7, 2012. Each of the applications referenced herein are incorporated by reference in their entirety.

TECHNICAL FIELD

[0002] The present disclosure relates to a device and method of using same for endovascular aortic repair, including repair of aortic valve disease, aortic stenosis, ascending aortic aneurysms, aortic insufficiency, aortic regurgitation, ascending aneurysm, bicuspid valve disease, and/or Type A dissections.

BACKGROUND

[0003] The normal aortic root and the ascending aorta are composed of the aortic annulus, the sinuses of Valsalva, the sinutubular junction, and the tubular portion. The challenge facing practitioners of endovascular repair of ascending aortic aneurysms is that there is a very short proximal landing zone at the level of the sinutubular junction, there is variable coronary anatomy from patient to patient, and, in many cases, there is involvement of the aortic valve with either stenosis or insufficiency. Generally speaking, and as discussed in the article SURGERY INSIGHT: THE DILATED ASCENDING AORTA — INDICATIONS FOR SURGICAL INTERVENTION, by James E. Davies and Thralf M. Sundt published in Nature Clinical Practice Cardiovascular Medicine (2007), the contents of which are incorporated herein by reference in its entirety, there are three basic types of involvement of the ascending aorta, designated as Type A, B, or C. These will be discussed in further detail below and are shown in FIGS. 1A-1C, which have been reproduced from the referenced article.

[0004] Type A aneurysms are most commonly found in younger patients and patients with connective tissue disorders such as Marfan syndrome. The anatomical characteristics of Type A aneurysms are dilatation of the sinuses of Valsalva with or without dilatation of the aortic annulus. The sinutubular junction is most often dilated. The valve could be normal, stenotic or insufficient. An example of a Type A aneurysm is shown in FIG. 1A.

[0005] The anatomical characteristics of Type B aneurysms are dilatation of the tubular portion. Initially the sinutubular junction may be normal or mildly dilated, however as the aneurysm grows, it stretches the sinutubular junction and may eventually lead to aortic insufficiency. The valve could be normal, stenotic or insufficient. The bulk of the aneurysm is at the level of the tubular aorta. An example of a Type B aneurysm is shown in FIG. lB.

[0006] The anatomical characteristics of Type C aneurysms are dilatation of the sinuses of Valsalva, sinutubular junction and the tubular portion of the aorta. The valve could be normal, stenotic or insufficient. Type B and C aneurysms are most commonly found in an older group of patients. An example of a Type C aneurysm is shown in FIG. 1C.

[0007] There are devices clinically used for endovascular repair of ascending aortic aneurysms. Although transcatheter valves are a clinical reality, none in clinical use have been designed with the purpose of endovascular repair of multiple types of ascending aortic aneurysms. Indeed, a device is needed that can treat different anatomical variations of ascending aortic aneurysms, create effective proximal and distal seal zones within the aorta, and have a durable valve component, but that also allows for future valve re-interventions. A device is also needed that would allow for treatment of different coronary anatomical variations among the patient population, allow future coronary re-intervention, but that also avoids coronary compression, and enables treatment of possible paravalvular leaks.

SUMMARY

[0008] According to one aspect of the disclosure, an endograft device for endovascular repair of ascending aortic aneurysms is disclosed. The endograft device includes a first prosthetic component that has a proximal frame and a distal frame that is secured to the proximal frame and extends to a distal end of the first prosthetic component. The endograft device also includes at least one conduit that is secured to the first prosthetic component and that is positioned adjacent to the proximal frame, and a second prosthetic component that is secured to a proximal end of the first prosthetic component. The second prosthetic component includes a balloon-expandable frame extending distally from a proximal end of the second prosthetic component and a self-expanding frame that is connected to the balloon-expandable frame and extends to a distal end of the second prosthetic component. The endograft device also includes a valve element that is secured to the balloon-expandable frame at the proximal end of the second prosthetic component.

[0009] In some embodiments, the self-expanding frame may have an hourglass shape. In some embodiments, the self-expanding frame may include a first section that tapers inwardly between a proximal end and a distal end. The endograft device may also include a second section having a proximal end that is secured to the distal end of the first section. The second section may taper outwardly between the proximal end of the second section and a distal end of the second section. Additionally, in some embodiments, the proximal end of the first section may be connected to a distal end of the balloon-expandable frame.

[0010] In some embodiments, the self-expanding frame may include a third section that extends proximally from the proximal end of the first section. The third section may have a passageway defined therein, and the balloon-expandable frame may be positioned in the passageway of the third section of the self-expanding frame. In some embodiments, the balloon-

expandable frame may be expandable between an unexpanded position in which an outer surface of the balloon-expandable frame is spaced apart from an inner surface of the self-expanding frame and an expanded position in which the outer surface of the balloon-expandable frame is engaged with the inner surface of the self-expanding frame.

[0011] In some embodiments, a plurality of fibers may be attached to the third section of the self-expanding frame. When the balloon-expandable frame is in the expanded position, the outer surface of the balloon-expandable frame may be engaged with the plurality of fibers.

[0012] In some embodiments, the proximal frame of the first prosthetic component may have a passageway defined therein, and the distal end of the second prosthetic component may be positioned in the passageway of the first prosthetic component.

[0013] In some embodiments, the conduit may include a pair of conduits positioned on opposite sides of the first prosthetic component. Additionally, in some embodiments, the conduit may have a proximal opening that is positioned adjacent to a proximal end of the first prosthetic component.

[0014] In some embodiments, the proximal frame may include a first section secured to the distal end of the second prosthetic component, and a second section connected to the first section. The second section may taper outward between a proximal end connected to the first section and a distal end. The conduit may have a distal opening defined in the second section of the proximal frame.

[0015] Additionally, in some embodiments, the endograft device may include a stent having a distal end positioned in the proximal opening of the at least one conduit and a proximal end configured to be positioned in a coronary artery.

[0016] In some embodiments, an outer surface of the second prosthetic component and an outer surface of the proximal frame of the first prosthetic component may be covered such that fluid is prevented from passing therethrough. Additionally, an outer surface of the distal frame of the first prosthetic component may be uncovered such that is fluid permitted to pass therethrough.

[0017] According to another aspect, a transcatheter valve is disclosed. The transcatheter valve includes a frame component having a balloon-expandable frame extending distally from a proximal end of the frame component and a self-expanding frame secured to the balloon-expandable frame. The self-expanding frame includes a first section that tapers inwardly between a proximal end and a distal end, and a second section that tapers outwardly between a proximal end secured to the distal end of the first section and a distal end. A valve element is positioned in the balloon-expandable frame at the proximal end of the frame component.

[0018] In some embodiments, the frame component may be a dual-frame component. The self-expanding frame may be an outer frame of the dual-frame component and may have a passageway defined therein. The balloon-expandable frame may be an inner frame of the dual-frame component that is positioned in the passageway defined in the self-expanding frame. Additionally, the balloon-expandable frame may be expandable between an unexpanded position in which an outer surface of the balloon-expandable frame is spaced apart from an inner surface of the self-expanding frame and an expanded position in which the outer surface of the balloon-expandable frame is engaged with the inner surface of the self-expanding frame.

[0019] In some embodiments, a plurality of fibers may be attached to the self-expanding frame. When the balloon-expandable frame is in the expanded position, the outer surface of the balloon-expandable frame may be engaged with the plurality of fibers. Additionally, in some embodiments, an outer surface of the first section of the self-expanding frame may be uncovered

such that fluid is permitted to pass therethrough and an outer surface of the second section of the self-expanding frame may be covered such that fluid is prevented from passing therethrough.

[0020] In some embodiments, the self-expanding frame may include an elongated section extending distally from the second section. The elongated section may have a length that is greater than a combined length of the first section and the second section. Additionally, in some embodiments, the self-expanding frame may be covered with at least one of a collagen and hydrogel. In some embodiments, the valve element may be one of a bicuspid valve and a tricuspid valve.

[0021] According to another aspect, a method of repairing a patient's aorta is disclosed. The method includes introducing a first prosthetic component into the patient's aorta such that a proximal frame of the first prosthetic component is positioned in the ascending aorta and a distal frame of the first prosthetic component is positioned in the aortic arch of the patient's aorta, advancing a covered stent through a conduit defined in the first prosthetic component into a coronary artery of the patient's aorta, securing a second prosthetic component to a proximal end of the first prosthetic component in the patient's aorta, and expanding a proximal section of the second prosthetic component into engagement with the aortic annulus of the patient's aorta such that a valve secured to the proximal section is positioned in the aortic annulus proximal to the coronary arteries.

[0022] In some embodiments, expanding the proximal section of the second prosthetic component may include operating a balloon-expandable frame. Additionally, in some embodiments, expanding the proximal section of the second prosthetic component may include permitting a self-expanding frame to expand into engagement with the aortic annulus, and operating the balloon-expandable frame may include advancing an outer surface of the balloon-

expandable frame into engagement with an inner surface of the self-expanding frame after the self-expanding frame is engaged with the aortic annulus.

[0023] In some embodiments, operating the balloon-expandable frame may include advancing an outer surface of the balloon-expandable frame into engagement with the aortic annulus.

[0024] In some embodiments, an outer surface of the second prosthetic component and an outer surface of the proximal frame of the first prosthetic component may be covered such that fluid is prevented from passing therethrough. Additionally, an outer surface of the distal frame of the first prosthetic component may be uncovered such that is permitted to pass therethrough.

[0025] In some embodiments, introducing the first prosthetic component into the patient's aorta and advancing the covered stent through the conduit defined in the first prosthetic component into the coronary artery of the patient's aorta may be performed during a first surgical procedure. In some embodiments, securing the second prosthetic component to the proximal end of the first prosthetic component and expanding the proximal section of the second prosthetic component into engagement with the aortic annulus of the patient's aorta may be performed during a second surgical procedure different from the first surgical procedure.

[0026] In some embodiments, the method may also include introducing the second prosthetic component into the ascending aorta prior to introducing the first prosthetic component.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] Embodiments of the present disclosure will now be described by way of example in greater detail with reference to the attached figures, in which:

[0028] FIG. 1 is an illustrative aorta;

[0029] FIG. 1A is an example of a Type A aneurysm;

[0030] FIG. 1B is an example of a Type B aneurysm;

[0031] FIG. 1C is an example of a Type C aneurysm;

[0032] FIG. 2 is partial cutaway view of an aorta with an embodiment of an endovascular prosthetic device implanted therein;

[0033] FIG. 3 is an elevation view of a proximal prosthetic component of the endovascular prosthetic device of FIG. 2;

[0034] FIG. 4 is an elevation view of a distal prosthetic component of the endovascular prosthetic device of FIG. 2;

[0035] FIG. 5 is a cross sectional view of the distal prosthetic component of FIG. 4 taken along the line 5-5 in FIG. 4;

[0036] FIG. 6 is a partial cutaway view of the aorta with the distal prosthetic component of FIG. 3 implanted therein;

[0037] FIG. 7 is a view similar to FIG. 6 showing stents extending from the distal prosthetic component;

[0038] FIG. 8 is an elevation view of another embodiment of a proximal prosthetic component of the endovascular prosthetic device of FIG. 2;

[0039] FIG. 9 is an elevation view of a self-expanding outer frame of the proximal prosthetic component of FIG. 8;

[0040] FIG. 10 is an elevation view of a balloon-expandable inner frame of the proximal prosthetic component of FIG. 8;

[0041] FIG. 11 is a perspective view a proximal end of the proximal prosthetic component of FIG. 8;

[0042] FIG. 12 is a cross-sectional elevation view of the proximal prosthetic component of FIG. 8 taken along the line 12-12 in FIG. 11;

[0043] FIG. 13 is a plan view of the proximal prosthetic component of FIG. 8 showing the inner frame in an unexpanded position;

[0044] FIG. 14 is a plan view similar to FIG. 13 showing the inner frame in an expanded position;

[0045] FIG. 15 is a partial cutaway view of the aorta with the distal prosthetic component of FIG. 4 secured to the proximal prosthetic component of FIG. 8;

[0046] FIG. 16 is a view similar to FIG. 15 showing the inner frame in an expanded position;

[0047] FIG. 17 is an embodiment of a transcatheter valve device similar to the proximal prosthetic component of FIG. 3;

[0048] FIGS. 18-19 are partial cutaway views of the aorta with the transcatheter valve of FIG. 17 implanted therein;

[0049] FIG. 20 is another embodiment of a transcatheter valve device similar to the proximal prosthetic component of FIG. 8; and

[0050] FIGS. 21-22 are partial cutaway views of the aorta with the transcatheter valve of FIG. 20 implanted therein.

DETAILED DESCRIPTION OF THE DRAWINGS

[0051] While the concepts of the present disclosure are susceptible to various modifications and alternative forms, specific exemplary embodiments thereof have been illustrated by way of example in the drawings and will herein be described in detail. It should be understood, however, that there is no intent to limit the concepts of the present disclosure to the particular

forms disclosed, but on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

[0052] Terms representing anatomical references, such as anterior, posterior, medial, lateral, superior, inferior, distal, proximal, etcetera, may be used throughout the specification in reference to the orthopaedic implants and surgical instruments described herein as well as in reference to the patient's natural anatomy. Such terms have well-understood meanings in both the study of anatomy and the field of orthopaedics. Use of such anatomical reference terms in the written description and claims is intended to be consistent with their well-understood meanings unless noted otherwise. For example, the term "proximal" refers to the direction that is generally closest to the heart, and the term "distal" refers to the direction that is generally furthest from the heart.

[0053] Referring to FIGS. 2-16, exemplary designs of an endovascular prosthetic device or endograft device 10 (hereinafter device 10) are shown. The device 10 is intended for the treatment of most ascending aortic aneurysms and is configured to treat any type of ascending aneurysm regardless of involvement of the aortic valve and the sinuses of Valsalva. As described in greater detail below, the device 10 permits future coronary and aortic valve interventions as well as extension of a fenestrated/ branch graft into the aortic arch. Part of the device 10 may also be modified and used as a transcatheter valve, as described in greater detail below in regard to FIGS. 17-22. Such a valve may be introduced transfemorally or through the subclavian artery or the apex of the heart.

[0054] Referring now to FIGS. 2-7, the device 10 includes a proximal component 12 that is attached to a distal component 14. As shown in FIG. 2, the distal component 14 may be secured to the proximal component 12 when implanted into a patient's aorta 16. When implanted, the

proximal component 12 is positioned in the patient's ascending aorta 18, while the distal component 14 extends distally into the arch 20 of the patient's aorta 16. The distal component 14 includes a pair of "Endo-cabrol conduits" or conduits 22, and each conduit 22 is sized to receive a catheter or stent 24 for coronary blood flow, as described in greater detail below. The device 10 is configured to treat all ascending aneurysms with or without dilated sinutubular junctions and aortic valve disease.

[0055] As shown in FIG. 3, the proximal component 12 includes a frame 26 that extends from a proximal end 28 to a distal end 30. The frame 26 is attached to a valve 32 (shown in phantom), which is positioned at the proximal end 28 of the component 12. In the illustrative embodiment, the valve 32 is configured as a bicuspid valve. It should be appreciated that in other embodiments the valve 32 may be tricuspid or quadracuspid. The valve 32 may be constructed from treated bovine pericardium or other suitable proven biological or synthetic material. When the proximal component 12 is implanted into the patient's aorta 16, the valve 32 replaces the aortic valve and permits fluid (i.e., blood) to selectively pass from the heart and into a passageway 36 extending through the proximal component 12.

[0056] The valve 32 is housed in a balloon-expandable frame 34 of the frame 26. As shown in FIG. 3, the balloon-expandable frame 34 is embodied as a balloon-expandable stent 38 that extends distally from the proximal end 28 of the component 12 and has a length 40 of approximately 15 mm. In other embodiments, the stent 38 may be longer or shorter depending on, for example, the patient's anatomy. The stent 38 is tubular and is constructed of a metallic material, such as, nitinol, stainless steel, or other implant grade metallic material, in an open-cell configuration. It should be appreciated that in other embodiments the stent 38 may be formed from a polymeric material and may be formed in, for example, a Z-stent configuration. In the illustrative

embodiment, the outer surface 42 of the stent 38 is covered with low-profile polyester, ePTFE, or other nonporous covering material 44 that prevents fluid from passing through the outer surface 42. However, it should be appreciated that the stent 38 may be covered with standard polyester or other nonporous materials.

[0057] As shown in FIG. 3, the stent 38 of the balloon-expandable frame 34 has a diameter 46. As described in greater detail below, the balloon-expandable frame 34 is expandable during implantation from an unexpanded diameter (not shown) to the expanded diameter 46. In the illustrative embodiment, the expanded diameter 46 is equal to approximately 26 mm when the frame 34 is expanded. In other embodiments, the expanded diameter may be greater than or less than 26 mm depending on, for example, the patient's anatomy. Examples of balloon-expandable stents are described in U.S. Patent No. 5,102,417 entitled "Expandable Intraluminal Graft, and Method and Apparatus for Implanting an Expandable Intraluminal Graft" by Julio C. Palmaz and U.S. Patent No. 6,582,462 entitled "Valve Prosthesis for Implantation in the Body and a Catheter for Implanting Such Valve Prosthesis" by Henning Rud Andersen et al., which are expressly incorporated herein by reference. In the illustrative embodiment, the diameter 46 is oversized relative to the diameter of the aortic annulus 210 (see FIG. 1) such that an interference fit is created between the stent 38 and the annulus 210 when the component 12 is implanted and the stent 38 is expanded, as described in greater detail below.

[0058] The balloon-expandable frame 34 is attached to a self-expanding frame 50. In the illustrative embodiment, the distal end 52 of the balloon-expandable frame 34 is secured to the proximal end 54 of the frame 50 by stitching or sewing the frames 34, 50 together, thereby forming the frame 26 of the component 12. It should be appreciated that in other embodiments the frames

34, 50 may be secured together via welding or other fasteners. The frames 34, 50 may also be formed as a single, monolithic frame.

[0059] As shown in FIG. 3, the self-expanding frame 50 has a generally hourglass shape and is formed from a metallic material, such as, nitinol, stainless steel, or other implant grade metallic material. It should be appreciated that in other embodiments the frame 50 may be formed from a polymeric material. The frame 50 includes an inwardly tapered proximal section 60, an outwardly tapered middle section 62, and an elongated distal section 64. The section 60 includes the proximal end 54 of the frame 50 and has a distal end 66 connected to the proximal end 68 of the outwardly tapered middle section 62. The section 60 tapers inwardly between the ends 54, 66 from approximately 26 mm at the end 54 to approximately 22 mm at the end 66. In the illustrative embodiment, the proximal section 60 has a length 70 of approximately 10 mm. It should be appreciated that in other embodiments the dimensions of the section 60 may vary depending on, for example, the patient's anatomy.

[0060] The outwardly tapered middle section 62 of the self-expanding frame 50 has the proximal end 68 and a distal end 72 connected to the proximal end 74 of the elongated distal section 64. The section 62 tapers outwardly from a diameter of approximately 22 mm at the end 68 to a diameter of approximately 28 mm at the end 72. In the illustrative embodiment, the middle section 62 has a length 76 of approximately 10 mm. In other embodiments, the dimensions of the section 62 may vary depending on, for example, the patient's anatomy. Among other things, the tapered sections 60, 62 of the proximal component 12 permit the placement of the stents 24 that extend from the distal component 14 to the coronary arteries, as described in greater detail below.

[0061] The elongated distal section 64 of the self-expanding frame 50 extends distally from the proximal end 74 to the distal end 30 of the component 12. In the illustrative embodiment, the

section 64 has a length 78 that is greater than the combined length of the tapered sections 60, 62. In one particular non-limiting example, the length 78 of the elongated distal section 64 is approximately 25 mm and has a diameter 80 of approximately 28 mm. In other embodiments, the dimensions of the section 64 may vary depending on, for example, the patient's anatomy. In one exemplary embodiment, the distal section 64 may taper between the proximal end 74 and the distal end 30.

[0062] As shown in FIG. 3, the proximal section 60 of the self-expanding frame 50 is formed in an open-cell stent configuration, and the sections 62, 64 are formed in a Z-stent configuration. It should be appreciated that in other embodiments the sections 60, 62, 64 may be formed in a single configuration, including an open-cell stent configuration or Z-stent configuration. The sections 60, 62, 64 may also be formed as a single monolithic component. The outer surface 82 of the self-expanding frame 50 is covered with low profile polyester, ePTFE, or other nonporous covering material 84 such that fluid is prevented from passing through the surface 82. In that way, the entire outer surface of the component 12 is covered to prevent fluid from passing therethrough. The covering material 84 immediately distal to the balloon-expandable frame 34 is equipped with a "trap door" 86, which may be opened to permit the passage of one or more surgical instruments for embolization of possible paravalvular leaks. The entire outer surface of component 12 may be also covered with low-profile Dacron or other synthetic material. It should also be appreciated that all or part of the component 12 may be covered with hydrogel or other sealing material.

[0063] As described above, the device 10 also includes a distal component 14, which is secured to the distal end 30 of the proximal component 12 when the device 10 is implanted in the patient's aorta 16. Referring now to FIG. 4, the distal component 14 includes a frame 100 that

extends from a proximal end 102 configured to be secured to the proximal component 12 to a distal end 104. The frame 100 has a passageway 106 defined therein, which extends through the ends 102, 104 of the component 14. The passageway 106 has a diameter 108 and is sized to receive the distal end 30 of the proximal component 12 when the device 10 is assembled.

[0064] In the illustrative embodiment, the components 12, 14 are secured together via an interference fit between the frame 100 and the distal end 30 of the proximal component 12. Specifically, the diameter 108 of the passageway 106 is less than the diameter 80 of the proximal component 12. In the illustrative embodiment, the diameter 108 is equal to approximately 26 mm. It should be appreciated that in other embodiments the components 12, 14 may be secured together via stitching or other fastening means.

[0065] As shown in FIG. 4, the component 14 includes a proximal frame 110 that is connected to an elongated distal frame 112. The proximal frame 110 and the distal frame 112 are formed from metallic materials, such as, nitinol, stainless steel, or other implant grade metallic materials. It should be appreciated that in other embodiments the frames 110, 112 may be formed from a polymeric material. The proximal frame 110 is formed in a Z-stent configuration, and the distal frame 112 is formed in an open-cell configuration. Each of the frames 110, 112 is self-expanding. In the illustrative embodiment, the distal frame 112 is secured to the distal end 114 of the proximal frame 110 by stitching or sewing the frames 110, 112 together. It should be appreciated that in other embodiments the frames 110, 112 may be secured together via welding or other fasteners. The frames 110, 112 may also be formed as a single, monolithic frame.

[0066] The proximal frame 110 has an outer surface 120 that is covered with low profile polyester, ePTFE, or other nonporous covering material 122. As a result, fluid is prevented from

passing through the surface 120. The distal frame 112 is uncovered such that fluid is permitted to pass through the openings 124 formed therein.

[0067] As shown in FIG. 4, the proximal frame 110 includes a proximal section 126, an outwardly tapered section 128 extending distally from the proximal section 126, and an elongated distal section 130. The proximal section 126 includes the proximal end 102 of the component 14 and has a distal end 132 connected to the proximal end 134 of the outwardly tapered section 128. In the illustrative embodiment, the proximal section 126 has a length 136 of approximately 25 mm. It should be appreciated that in other embodiments the dimensions of the section 126 may vary depending on, for example, the patient's anatomy.

[0068] The tapered section 128 of the frame 110 has the proximal end 134 and a distal end 140 connected to the proximal end 142 of the elongated distal section 130. The section 128 tapers outwardly from a diameter of approximately 26 mm at the end 132 to a diameter between approximately 44 mm and 48 mm at the end 140. In the illustrative embodiment, the tapered section 128 has a length 146 of approximately 10 mm. It should be appreciated that in other embodiments the dimensions of the section 128 may vary depending on, for example, the patient's anatomy.

[0069] The elongated distal section 130 of the frame 110 extends distally from the proximal end 142 to the distal end 114 of the frame 110. In the illustrative embodiment, the section 130 has a length 150. In one particular non-limiting example, the length 150 of the elongated distal section 130 is approximately 20 mm. The section 130 also has a diameter 152 of between approximately 44 mm and 48 mm. In other embodiments, the dimensions of the section 130 may vary depending on, for example, the patient's anatomy.

[0070] As described above, the distal component 14 also includes a pair of conduits 22, which are connected to the proximal frame 110. Each conduit 22 has a distal end 160 secured to the tapered section 128 of the frame 110 and a proximal end 162 positioned adjacent to the proximal end 102 of the component 12. As shown in FIG. 4, the conduit 22 does not extend beyond the proximal end 102 of the component 12. Each conduit 22 has a passageway 164 that extends through the ends 160, 162 and is sized to receive a stent 24.

[0071] The passageway 164 has a proximal opening 166 defined in the end 162. The opening 166 has a diameter 168 that in the exemplary embodiment is equal to approximately 5 mm. As shown in FIG. 5, the passageway 164 has a distal opening 170 that is defined in the end 160 and the tapered section 128 of the frame 110. The distal opening 170 has a diameter 172 that is greater than the diameter 168. In the illustrative embodiment, the diameter 172 is equal to approximately 8 mm. The passageway 164 measures approximately 8 mm in diameter over a distance 174 of approximately 5 mm and tapers smoothly into the approximately 5 mm diameter 168 at a junction 176. The passageway 164 maintains the diameter 168 between the junction 176 and the proximal opening 166. In the illustrative embodiment, the passageway 164 has a length 180 of approximately 2 cm between the junction 176 and the proximal opening 166.

[0072] Each conduit 22 is wire reinforced and allows for passage of catheters or stents 24 and easier cannulation of the coronary ostia, regardless of deployment orientation. This configuration allows stenting of the coronary arteries 182 (see FIG. 1) prior to the deployment of component 12, as described in greater detail below. In the illustrative embodiment, the tapered section 128 permits the uncompromised passage of stents 24 into the coronary arteries 182 in such a way that the stents are not compressed between the sinutubular junction and the device 10 itself.

[0073] As shown in FIG. 4, the elongated distal frame 112 of the component 14 extends distally from the distal end 114 of the frame 110 to the distal end 104 of the component 14. In the illustrative embodiment, the frame 112 has a length 190. In one particular non-limiting example, the length 190 of the elongated frame 112 is approximately 10 cm, which is sufficient to cover the arch 20 of the aorta 18 when implanted therein. In other embodiments, the dimensions of the frame 112 may vary depending on, for example, the patient's anatomy. The distal frame 112 permits the accurate deployment of component 14 without compromising the circulation to supra-aortic branches. It also allows for cannulation of the supra-aortic branches, if placement of a fenestrated/ branch arch device is necessary.

[0074] To implant the device 10 in the patient's aorta 16, a surgeon may obtain open exposure or percutaneous access to the common femoral artery. The iliac arteries or an iliac conduit may also be used. After obtaining access and placing a stiff wire in the ascending aorta 18, the device 10 and the delivery system are prepared. In the illustrative embodiment, the delivery system is composed of a 100-105 cm hydrophilic sheath. As shown in FIG. 6, the distal component 14 is delivered first. After performing a lateral oblique thoracic aortogram, the component 14 is deployed such that the distal end 114 of the proximal frame 110 is positioned proximal to the innominate artery 200, thereby ensuring that the distal openings 170 of the conduits 22 are at 12 and 6 o'clock positions in relationship to the innominate artery 200.

[0075] Using the contralateral common femoral artery wires, standard coronary guide catheters are introduced through the distal frame 112 of the component 14 into each conduit 22. The conduits 22 may then be cannulated with the catheters prior to insertion of the stents 24. Alternatively, the conduits 22 may be pre-cannulated. Using the catheters, access is obtained to the right and left coronary arteries 182. The stents 24 are advanced into the passageways 164

through the distal openings 170 and out of the conduits 22 to bridge the arteries 182 and the conduits 22, as shown in FIG. 7. In that way, each artery 182 is connected to its respective conduit 22. Each stent 24 is covered and may be embodied as a balloon-expandable stent or a self-expanding stent. It should be appreciated that coronary artery bypasses may be performed to the right and left coronary systems prior to the placement of the component 14.

[0076] The proximal component 12 may be deployed after the implantation of the distal component 14. The components 12, 14 may be deployed in a single surgical procedure taking place on a single day or the component 14 may be deployed in one procedure, and the component 12 may be deployed in another, separate procedure at a later date. As shown in FIG. 1, the proximal component 12 is deployed into the position across the native aortic valve 202.

[0077] To do so, a stiff wire is passed through the aortic valve 202 into the left ventricle 204. The delivery system for the proximal component 12 is passed through the valve 202. An example of a delivery system is described in U.S. Patent No. 5,102,417 entitled "Expandable Intraluminal Graft, and Method and Apparatus for Implanting an Expandable Intraluminal Graft" by Julio C. Palmaz, which is incorporated herein by reference. When the delivery system is in position, the proximal component 12 is released by unsheathing the system, thereby permitting expansion of the self-expanding frame 50. As described above, the self-expanding frame 50 engages the proximal end 102 of the distal component 14 to secure the components 12, 14 together and seal the distal end 30 of the component 12 within the distal component 14. As shown in FIG. 2, the proximal end 28 of the proximal component 12 is positioned in the aortic annulus, and the hour-glass shape of the component 12 provides a space for the native aortic valve leaflets such that the leaflets are not pressed against or over the openings of coronary arteries 182.

[0078] The balloon-expandable frame 34 may be now deployed by inflating the balloon within the delivery system. This deploys the frame 34 to the predetermined expanded diameter 46 and advances the frame 34 into engagement with the aortic annulus 210, thereby sealing the aortic annulus 210 such that fluid is permitted to pass from the left ventricle 204 only through the valve 32. As shown FIG. 1, the valve 32 is positioned in the aortic annulus 210 proximal to the coronary arteries 182. It should be appreciated that the deployment of the component 12 may be performed during rapid ventricular pacing (RVP). In cases with aortic stenosis, the valve 32 may be dilated with balloon angioplasty prior to the introduction of the proximal component 12.

[0079] Referring now to FIGS. 8-16, another embodiment of a proximal component 212 of the device 10 is shown. Some features of the embodiment illustrated in FIGS. 8-16 are substantially similar to those described above in reference to the embodiment of FIGS. 1-7. Such features are designated in FIGS. 8-16 with the same reference numbers as those used in FIGS. 1-7. Similar to the proximal component 12 of FIGS. 1-7, the proximal component 212 may be secured to the distal component 14 when implanted into a patient's aorta 16. When implanted, the proximal component 212 is positioned in the patient's ascending aorta 18, while the distal component 14 extends distally into the arch 20 of the patient's aorta 16.

[0080] As shown in FIG. 8, the proximal component 212 includes a dual-frame 214 that extends from a proximal end 28 to a distal end 30. The frame 214 is attached to a valve 32 (shown in phantom), which is positioned at the proximal end 28 of the component 212. In the illustrative embodiment, the valve 32 is configured as a bicuspid valve. It should be appreciated that in other embodiments the valve 32 may be tricuspid or quadracuspid. The valve 32 may be constructed from treated bovine pericardium or other suitable proven biological or synthetic material. When the proximal component 212 is implanted into the patient's aorta 16, the valve 32 replaces the

aortic valve and permits fluid (i.e., blood) to selectively pass from the heart and into a passageway 36 extending through the proximal component 212.

[0081] The dual-frame 214 of the proximal component 212 includes a self-expanding outer frame 216 and a balloon-expandable inner frame 218 that is secured to the self-expanding outer frame 216 and houses the valve 32. Referring now to FIG. 9, the self-expanding outer frame 216 has a generally hourglass shape and is formed from a metallic material, such as, nitinol, stainless steel, or other implant grade metallic material. It should be appreciated that in other embodiments the outer frame 216 may be formed from a polymeric material. The outer frame 216 includes an elongated proximal section 220, an inwardly tapered section 222, an outwardly tapered middle section 62, and an elongated distal section 64.

[0082] The elongated proximal section 220 of the outer frame 216 includes the proximal end 28 of the component 212 and has a distal end 224 connected to a proximal end 226 of the inwardly tapered section 222. The proximal section 220 is embodied as a tubular stent. It should be appreciated that in other embodiments the section 220 may be shaped as a prism, cone, or other geometric shape depending on the patient's anatomy.

[0083] In the illustrative embodiment, the proximal section 220 has a length 228 that is equal to approximately 15 mm. The proximal section 220 also has a diameter 230 of approximately 32 mm. It should be appreciated that in other embodiments the dimensions of the frame 216 may vary according to the anatomy of the patient. In the illustrative embodiment, the diameter 230 is oversized relative to the diameter of the aortic annulus 210 such that an interference fit is created between the proximal section 220 and the annulus 210 when the component 212 is implanted, as described in greater detail below. As shown in FIG. 9, the proximal section 220 defines a passageway 232 in the outer frame 216.

[0084] In the illustrative embodiment, collagen fibers 234 are attached to the proximal section 220 to aid in preventing paravalvular leaks and migration of the proximal component 212 within the aortic walls. The fibers 234 extend outwardly from the proximal section 220 and inwardly into the passageway 232. It should be appreciated that in other embodiments the outer frame 216 may be covered with hydrogel or other sealing materials. In other embodiments, a plurality of barbs or hooks may be attached to the proximal section 220. The hooks may be configured to further engage the tissue of the aorta and inhibit or prevent migration of the device 10.

[0085] The inwardly tapered section 222 of the outer frame 216 includes the proximal end 226 and has a distal end 236 connected to the proximal end 68 of the outwardly tapered middle section 62. The section 222 tapers inwardly between the ends 226, 236 from approximately 32 mm at the end 226 to approximately 22 mm at the end 236. In the illustrative embodiment, the inwardly tapered section 222 has a length 238 of approximately 10 mm.

[0086] The outwardly tapered middle section 62 of the self-expanding frame 216 has the proximal end 68 and a distal end 72 connected to the proximal end 74 of the elongated distal section 64. The section 62 tapers outwardly from a diameter of approximately 22 mm at the end 68 to a diameter of approximately 28 mm at the end 72. In the illustrative embodiment, the middle section 62 has a length 76 of approximately 10 mm. In other embodiments, the dimensions of the section 62 may vary depending on, for example, the patient's anatomy.

[0087] The elongated distal section 64 of the self-expanding frame 216 extends distally from the proximal end 74 to the distal end 30 of the component 212. In the illustrative embodiment, the section 64 has a length 78 that is greater than the combined length of the tapered sections 60, 62. In one particular non-limiting example, the length 78 of the elongated distal section 64 is

approximately 30 mm and has a diameter 80 of approximately 34 mm. In other embodiments, the dimensions of the section 64 may vary depending on, for example, the patient's anatomy. In one exemplary embodiment, the distal section 64 may taper between the proximal end 74 and the distal end 30.

[0088] As shown in FIG. 9, the proximal section 220 and the inwardly tapered section 222 of the self-expanding frame 216 are formed in an open-cell stent configuration, and the sections 62, 64 are formed in a Z-stent configuration. It should be appreciated that in other embodiments the sections 62, 64, 220, 222 may be formed in a single configuration, including an open-cell stent configuration or Z-stent configuration. The sections 62, 64, 220, 222 may also be formed as a single monolithic component. The outer surface 240 of the sections 62, 64, 222 are covered with low profile polyester, ePTFE, or other nonporous covering material 242 such that fluid is prevented from passing through the surface 240. The covering material 242 immediately distal to the proximal section 220 is equipped with a "trap door" 86, which may be opened to permit the passage of one or more surgical instruments for embolization of possible paravalvular leaks. The outer surface 240 of the sections 62, 64, 222 may be also covered with low-profile Dacron or other synthetic material. It should also be appreciated that all or part of the frame 216 may be covered with hydrogel or other sealing material.

[0089] As described above, the outer frame 216 of the dual-frame 214 is secured to a balloon-expandable inner frame 218, which is positioned in the passageway 232. As shown in FIG. 10, the frame 218 houses the valve 32. The balloon-expandable frame 218 is embodied as a balloon-expandable tubular stent 244 that has a length 246 of approximately 15 mm. In other embodiments, the stent 244 may be longer or shorter depending on, for example, the patient's anatomy. The stent 244 is tubular and is constructed of a metallic material, such as, nitinol,

stainless steel, or other implant grade metallic material, in an open-cell configuration. It should be appreciated that in other embodiments the stent 244 may be formed from a polymeric material and may be formed in, for example, a Z-stent configuration. In the illustrative embodiment, the outer surface 248 of the stent 244 is covered with low-profile polyester, ePTFE, or other nonporous covering material 250 that prevents fluid from passing through the outer surface 248. However, it should be appreciated that the stent 244 may be covered with standard polyester, ePTFE or other nonporous materials.

[0090] As shown in FIG. 10, the stent 244 of the inner frame 218 has a diameter 252. As described in greater detail below, the balloon-expandable frame 218 is expandable during implantation from an unexpanded diameter (not shown) to the expanded diameter 252. In the illustrative embodiment, the expanded diameter 252 is equal to approximately 26 mm when the inner frame 218 is expanded. In other embodiments, the expanded diameter may be equal to, or greater than, the diameter 230 of the proximal section 220 of the outer frame 216. In the illustrative embodiment, the expanded diameter 252 is oversized relative to the diameter of the aortic annulus 210 such that an interference fit is created between the proximal section 220 and the annulus 210 when the component 212 is implanted, and the inner frame 218 is expanded, as described in greater detail below.

[0091] Referring now to FIG. 11, the inner frame 218 of the dual-frame component 214 is secured to the outer frame 216 via a plurality of stitches 260. It should be appreciated that in other embodiments soldering, welding or other fasteners may be used to secure the inner frame 218 to the outer frame 216. As shown in FIGS. 11-14, the inner frame 218 and the valve component 32 are positioned in the passageway 232 defined in the self-expanding frame 216. When the inner frame 218 is unexpanded, the outer surface 248 of the stent 244 is spaced apart from the fibers 234

attached to the outer frame 216. In the illustrative embodiment, a gap 264 is defined therebetween, and the gap 264 has a magnitude of about 2 mm to about 3 mm.

[0092] As shown in FIG. 14, the balloon-expandable inner frame 218 may be expanded in the direction indicated by arrows 266. As described above, the diameter 230 of the proximal section 220 of the outer frame 216 is oversized relative to the diameter of the aortic annulus 210. As such, when the component 212 is implanted, the proximal section 220 is reduced to the diameter of the annulus 210. Because the expanded diameter 252 of the stent 244 is greater than the diameter of the annulus, the outer surface 248 of the stent 244 engages the fibers 234 (and hence the inner surface of the proximal section 220 of the outer frame 216) through the covering material 250. In that way, the gap 264 is closed, and the fibers 234 and the covering material 250 create a seal between the inner frame 218 and the outer frame 216.

[0093] To implant an endograft device 10 that includes proximal component 212 in the patient's aorta 16, a surgeon may obtain open exposure or percutaneous access to the common femoral artery. The surgeon may then implant the distal component 14 in the manner described above in regard to FIGS. 1-7 and advance the stents 24 into position in the arteries 182. The proximal component 212 may be deployed after the implantation of the distal component 14. To do so, a stiff wire is passed through the aortic valve 202 into the left ventricle 204. The delivery system for the proximal component 212 is then passed through the valve 202.

[0094] When the delivery system is in position, the proximal component 212 is released by unsheathing the system, thereby permitting expansion of the self-expanding frame 216. The self-expanding frame 216 engages the proximal end 102 of the distal component 14 to secure the components 212, 14 together and seal the distal end 30 of the component 212 within the distal component 14.

[0095] When the frame 216 is unsheathed, the proximal section 220 expands into engagement with the aortic annulus 210, thereby creating an interference fit between the frame 216 and the annulus 210 and stabilizing the device 10 in place. As shown in FIG. 15, the inner frame 218 is initially unexpanded within the outer frame 216. The inner frame 218 may be deployed by expanding the balloon assembly. Expansion of the balloon-expandable inner frame 218 engages the inner frame 218 with the outer frame 216 and compresses the collagen fiber/hydrogel coated proximal section 220 of the outer frame 216 against the aortic annulus 210. As shown in FIG. 16, the combined engagement of the frames 216, 218 seals the annulus 210 and the paravalvular areas, and thus, prevents paravalvular leakage. As such, fluid is permitted to pass from the left ventricle 204 only through the valve 32 of the component 212. As shown FIGS. 15-16, the valve 32 is positioned in the aortic annulus 210 proximal to the coronary arteries 182. It should be appreciated that the deployment of the component 212 may be performed during rapid ventricular pacing (RVP). In cases with aortic stenosis, the valve 32 may be dilated with balloon angioplasty prior to the introduction of the proximal component 212.

[0096] In each of the embodiments described above, the self-expanding frame portion of proximal components 12, 212 significantly improves the accuracy and control of the deployment of the device 10. The bicuspid configuration of the valve 32 serves three distinct purposes, including (1) by reducing the number of valve commissures to two, the profile will be reduced, (2) the valve 32 may conform better to the aortic annulus, and (3) when the annulus is asymmetrical, the incidence of aortic insufficiency may be reduced.

[0097] Referring now to FIGS. 17-22, the proximal component 12 or the proximal component 212 may be used as a transcatheter valve with slight modification. Such a valve may be deployed via a transfemoral or trans-axillary route, as will be described in further detail below.

[0098] Referring now to FIGS. 17-19, one embodiment of a transcatheter valve component 312 is shown. Some features of the embodiment illustrated in FIGS. 17-19 are substantially similar to those described above in reference to the proximal component 12 of FIGS. 1-7. Such features are designated in FIGS. 17-19 with the same reference numbers as those used in FIGS. 1-7. Similar to the proximal component 12 of FIGS. 1-7, the transcatheter valve component 312 includes a frame 26 that extends from a proximal end 28 to a distal end 30. The frame 326 is attached to a valve 32 (shown in phantom), which is positioned at the proximal end 28 of the valve component 312. When the valve component 312 is implanted into the patient's aorta 16, the valve 32 replaces the aortic valve and permits fluid (i.e., blood) to selectively pass from the heart and into a passageway 36 extending through the valve component 312.

[0099] The valve 32 is housed in a balloon-expandable frame 34 of the frame 26. As shown in FIG. 17, the balloon-expandable frame 34 is embodied as a balloon-expandable stent 38 that extends distally from the proximal end 28 of the transcatheter valve component 312 and has a length 40 of approximately 15 mm. In other embodiments, the stent 38 may be longer or shorter depending on, for example, the patient's anatomy. The stent 38 is tubular and is constructed of a metallic material, such as, nitinol, stainless steel, or other implant grade metallic material, in an open-cell configuration. It should be appreciated that in other embodiments the stent 38 may be formed from a polymeric material and may be formed in, for example, a Z-stent configuration. In the illustrative embodiment, the outer surface 42 of the stent 38 is covered with low-profile polyester, ePTFE, or other nonporous covering material 44 that prevents fluid from passing through the outer surface 42. However, it should be appreciated that the stent 38 may be covered with standard polyester, ePTFE or other nonporous materials.

[00100] As shown in FIG. 17, the stent 38 of the balloon-expandable frame 34 has a diameter 46. As described in greater detail below, the balloon-expandable frame 34 is expandable during implantation from an unexpanded diameter (not shown) to the expanded diameter 46. In the illustrative embodiment, the expanded diameter 46 is equal to approximately 26 mm when the frame 34 is expanded. In other embodiments, the expanded diameter may be greater than or less than 26 mm depending on, for example, the patient's anatomy. In the illustrative embodiment, the diameter 46 is oversized relative to the diameter of the aortic annulus 210 such that an interference fit is created between the stent 38 and the annulus 210 when the transcatheter valve component 312 is implanted.

[00101] The balloon-expandable frame 34 is attached to a self-expanding frame 350. In the illustrative embodiment, the distal end 52 of the balloon-expandable frame 34 is secured to the proximal end 54 of the frame 350 by stitching or sewing the frames 34, 350 together, thereby forming the frame 26 of the transcatheter valve component 312. It should be appreciated that in other embodiments the frames 34, 350 may be secured together via welding or other fasteners. The frames 34, 350 may also be formed as a single, monolithic frame.

[00102] As shown in FIG. 17, the self-expanding frame 350 has a generally hourglass shape and is formed from a metallic material, such as, nitinol, stainless steel, or other implant grade metallic material. It should be appreciated that in other embodiments the frame 350 may be formed from a polymeric material. The frame 350 includes an inwardly tapered proximal section 360, an outwardly tapered middle section 62, and an elongated distal section 64. The section 360 includes the proximal end 54 of the frame 350 and has a distal end 66 connected to the proximal end 68 of the outwardly tapered middle section 62. The section 360 tapers inwardly between the ends 54, 66

from approximately 26 mm at the end 54 to approximately 22 mm at the end 66. In the illustrative embodiment, the proximal section 360 has a length 70 of approximately 15 mm.

[00103] The outwardly tapered middle section 62 of the self-expanding frame 350 has the proximal end 68 and a distal end 72 connected to the proximal end 74 of the elongated distal section 64. The section 62 tapers outwardly from a diameter of approximately 22 mm at the end 68 to a diameter of approximately 28 mm at the end 72. In the illustrative embodiment, the middle section 62 has a length 76 of approximately 10 mm. In other embodiments, the dimensions of the section 62 may vary depending on, for example, the patient's anatomy.

[00104] The elongated distal section 64 of the self-expanding frame 350 extends distally from the proximal end 74 to the distal end 30 of the valve component 312. In the illustrative embodiment, the section 64 has a length 78 that is greater than the combined length of the tapered sections 60, 62. In one particular non-limiting example, the length 78 of the elongated distal section 64 is approximately 30 mm and has a diameter 80 of approximately 34 mm. In other embodiments, the dimensions of the section 64 may vary depending on, for example, the patient's anatomy. In one exemplary embodiment, the distal section 64 may taper between the proximal end 74 and the distal end 30.

[00105] As shown in FIG. 3, the proximal section 360 of the self-expanding frame 350 is formed in an open-cell stent configuration, and each of the sections 62, 64 is formed in a Z-stent configuration. It should be appreciated that in other embodiments the sections 360, 62, 64 may be formed in a single configuration, including the open-cell stent configuration, mesh-like stent configuration, or Z-stent configuration. The sections 60, 62, 64 may also be formed as a single monolithic component.

[00106] As shown in FIG. 17, the outer surface 314 of the proximal section 360 of the frame 350 is uncovered such that fluid is permitted to pass through the openings 318. The outer surface 316 of the sections 62, 64 are covered with low profile polyester, ePTFE, or other nonporous covering material 84 such that fluid is prevented from passing through the surface 320. The outer surface 320 of the valve component 312 may also be covered with low-profile Dacron or other synthetic material. The uncovered, open cell stent section 360 is configured to allow for coronary artery perfusion. The covered sections 62, 64 serve to stabilize the valve component 312 against the aorta 18 and provide a docking station to ascending aortic extensions or fenestrated/ branch arch grafts. The covered sections 62, 64 would also permit endograft extension of the valve component 312 for suitable type B aneurysms without dilation of the sinutubular junction.

[00107] The delivery of the transcatheter valve component 312 may begin by gaining access to the left ventricle across the native aortic valve. An ascending aortogram may be performed to locate the right and left coronary arteries. An over the wire introducer system, including a guidewire, is used to introduce the valve component 312 into the aorta 18. After the guidewire has been placed into the left ventricle 204 via the iliofemoral, subclavian, or carotid vessels, the valve component 312 may be delivered through the common femoral artery and passed across the native aortic valve 202. After performing an angiogram to delineate the location of the coronary arteries 182, the valve component 312 is released by unsheathing the delivery system, thereby permitting expansion of the self-expanding frame 350, as shown in FIGS. 18-19.

[00108] The balloon-expandable frame 34 may be now deployed by inflating the balloon within the delivery system. This deploys the frame 34 to the predetermined expanded diameter 46 and advances the frame 34 into engagement with the aortic annulus 210, thereby sealing the aortic annulus 210 such that fluid is permitted to pass from the left ventricle 204 only through the valve

32 and the valve 32 is positioned in the aortic annulus 210 proximal to the coronary arteries 182, as shown in FIGS. 18-19. The openings 318 of the uncovered section 360 of the valve component 312 permit blood flow to the coronary arteries 182 for promote circulation. It should be appreciated that the deployment of the valve component 312 may be performed during rapid ventricular pacing (RVP).

[00109] Referring now to FIGS. 20-22, another embodiment of a transcatheter valve component (hereinafter valve component 412) is shown. Some features of the embodiment illustrated in FIGS. 20-22 are substantially similar to those described above in reference to the proximal component 212 of FIGS. 8-16. Such features are designated in FIGS. 20-22 with the same reference numbers as those used in FIGS. 8-16. Similar to the proximal component 212 of FIGS. 8-16, the valve component 412 includes a dual-frame 414 that extends from a proximal end 28 to a distal end 30. The frame 414 is attached to a valve 32 (shown in phantom), which is positioned at the proximal end 28 of the component 412. In the illustrative embodiment, the valve 32 is configured as a bicuspid valve. When the valve component 412 is implanted into the patient's aorta 16, the valve 32 replaces the aortic valve and permits fluid (i.e., blood) to selectively pass from the heart and into a passageway 36 extending through the valve component 412.

[00110] The dual-frame 414 includes a self-expanding outer frame 416 and a balloon-expandable inner frame 218 that is secured to the self-expanding outer frame 416 and houses the valve 32. Referring now to FIG. 9, the self-expanding outer frame 416 has a generally hourglass shape and is formed from a metallic material, such as, nitinol, stainless steel, or other implant grade metallic material. It should be appreciated that in other embodiments the outer frame 416 may be formed from a polymeric material. The outer frame 416 includes an elongated proximal section

220, an inwardly tapered section 422, an outwardly tapered middle section 62, and an elongated distal section 64.

[00111] The elongated proximal section 220 of the outer frame 416 includes the proximal end 28 of the component 412 and has a distal end 224 connected to a proximal end 226 of the inwardly tapered section 222. The proximal section 220 is embodied as a tubular stent. It should be appreciated that in other embodiments the section 220 may be shaped as a prism, cone, or other geometric shape depending on the patient's anatomy.

[00112] In the illustrative embodiment, the proximal section 220 has a length 228 that is equal to approximately 15 mm. The proximal section 220 also has a diameter 230 of approximately 32 mm. It should be appreciated that in other embodiments the dimensions of the frame 416 may vary according to the anatomy of the patient. In the illustrative embodiment, the diameter 230 is oversized relative to the diameter of the aortic annulus 210 such that an interference fit is created between the proximal section 220 and the annulus 210 when the valve component 412 is implanted, as described in greater detail below. As shown in FIG. 9, the proximal section 220 defines a passageway 232 in the outer frame 416.

[00113] In the illustrative embodiment, collagen fibers 234 are attached to the proximal section 220 to aid in preventing paravalvular leaks and migration of the valve component 412 within the aortic walls. The fibers 234 extend outwardly from the proximal section 220 and inwardly into the passageway 232. It should be appreciated that in other embodiments the outer frame 216 may be covered with hydrogel or other sealing materials. In other embodiments, a plurality of barbs or hooks may be attached to the proximal section 220. The hooks may be configured to further engage the tissue of the aorta and inhibit or prevent migration of the device 10.

[00114] The inwardly tapered section 422 of the outer frame 416 includes the proximal end 226 and a distal end 236 connected to the proximal end 68 of the outwardly tapered middle section 62. The section 422 tapers inwardly between the ends 226, 236 from approximately 32 mm at the end 226 to approximately 22 mm at the end 236. In the illustrative embodiment, the inwardly tapered section 422 has a length 238 of approximately 10 mm.

[00115] The outwardly tapered middle section 62 of the self-expanding frame 416 has the proximal end 68 and a distal end 72 connected to the proximal end 74 of the elongated distal section 64. The section 62 tapers outwardly from a diameter of approximately 22 mm at the end 68 to a diameter of approximately 28 mm at the end 72. In the illustrative embodiment, the middle section 62 has a length 76 of approximately 10 mm. In other embodiments, the dimensions of the section 62 may vary depending on, for example, the patient's anatomy.

[00116] The elongated distal section 64 of the self-expanding frame 416 extends distally from the proximal end 74 to the distal end 30 of the component 412. In the illustrative embodiment, the section 64 has a length 78 that is greater than the combined length of the tapered sections 60, 62. In one particular non-limiting example, the length 78 of the elongated distal section 64 is approximately 30 mm and has a diameter 80 of approximately 34 mm. In other embodiments, the dimensions of the section 64 may vary depending on, for example, the patient's anatomy. In one exemplary embodiment, the distal section 64 may taper between the proximal end 74 and the distal end 30.

[00117] As shown in FIG. 20, each of the proximal section 220 and the inwardly tapered section 422 of the self-expanding frame 416 is formed in an open-cell stent configuration, and each of the sections 62, 64 is formed in a Z-stent configuration. It should be appreciated that in other embodiments the sections 62, 64, 220, 422 may be formed in a single configuration, including the

open-cell stent configuration, mesh-like stent configuration, or Z-stent configuration. The sections 62, 64, 220, 422 may also be formed as a single monolithic component. The outer surfaces 440 of the sections 62, 64 are covered with low profile polyester, ePTFE, or other nonporous covering material 442 such that fluid is prevented from passing through the surface 440. The outer surface 444 of the section 422 is uncovered such that fluid is permitted to pass through openings 446 defined in the surface 444. The uncovered, open cell section 422 is configured to allow for coronary artery perfusion. The covered sections 62, 64 serve to stabilize the valve component 412 against the aorta 18 and provide a docking station to ascending aortic extensions or fenestrated/ branch arch grafts.

[00118] As described above, the outer frame 416 of the dual-frame 414 is secured to a balloon-expandable inner frame 218, which is positioned in the passageway 232 and houses the valve 32. As described above, the balloon-expandable frame 218 is expandable during implantation from an unexpanded diameter 450 to the expanded diameter (not shown).

[00119] To deploy the valve component 412, a stiff wire is passed through the aortic valve 202 into the left ventricle 204. The delivery system for the valve component 412 is then passed through the valve 202. When the delivery system is in position, the valve component 412 is released by unsheathing the system, thereby permitting expansion of the self-expanding frame 416. The proximal section 220 of the frame 416 expands into engagement with the aortic annulus 210, thereby creating an interference fit between the frame 416 and the annulus 210 and stabilizing the valve component 412 in place. As shown in FIG. 21, the inner frame 218 is initially unexpanded within the outer frame 416. The inner frame 218 may be deployed by expanding the balloon assembly. Expansion of the balloon-expandable inner frame 218 engages the inner frame 218 with

the outer frame 416 and compresses the collagen fiber/hydrogel coated proximal section 220 of the outer frame 416 against the aortic annulus 210.

[00120] As shown in FIG. 22, the combined engagement of the frames 218, 416 seals the annulus 210 and the paravalvular areas, and thus, prevents paravalvular leakage. As such, fluid is permitted to pass from the left ventricle 204 only through the valve 32 of the component 412. The openings 446 of the uncovered section 422 of the valve component 412 permit blood flow to the coronary arteries 182 for promote circulation.

[00121] It should be appreciated that the design of components 12, 14, 212 and the transcatheter valves 312, 412 has intentionally taken into account the potential failure modes and allows for correction of any such failure modes. For example, with respect to components 12, 14, 212, paravalvular leaks may be corrected. More specifically, with respect to a paravalvular leak (type Ia endoleak), leakage around the valve 32 would act as a type la endoleak. The trapdoors 86 in components 12, 312 would allow for coil embolization of the area of the leak. Two trapdoors at 180 degree location would allow access to the entire area above the aortic annulus. Since the coronary arteries 182 are protected by the conduits 22 in the distal component 14, coil embolization of this area would not compromise the coronary blood flow. Coil embolization of paravalvular leaks are already being performed clinically after heart valve surgery if there are additional leaks around the valve.

[00122] Aortic insufficiency (Al) after implantation may also be corrected. Significant Al has been documented in up to 17% of patients after transcatheter valve implantation. Except heavy annular calcification, the tricuspid morphology of the current valves and the ovoid shape of the aortic annulus can cause malcoaptation of the valve leaflets causing Al. The bicuspid valve nature

of the designs discussed herein potentially eliminates the problem with malcoaptation and AI secondary to that.

[00123] Structural valve degeneration may also be corrected. More specifically, the bicuspid valve design allows for placement of another transcatheter valve across the first device without compromising valvular flow area.

[00124] Coronary insufficiency may also be corrected. The Cabrol endo-conduits 22 in conjunction with the tapered section 128 of component 14 ensure uninterrupted coronary blood flow. By first deploying the component 14, the surgeon will be able to work through the Cabrol conduits 22 and using standard catheters and guidewires to cannulate the right and left coronary arteries. Stents 24 are deployed from the coronary arteries into the Cabrol conduits 22. Deployment the component 12 or component 212 may be delayed until coronary blood flow is secured. The tapered design will mitigate the risk of compression of the coronary stents between the device 10 and the aortic wall.

[00125] For the transcatheter valves 312, 412, paravalvular leaks may also be corrected in that the open cell midsections 360, 422 of the valve allow the cannulation and stenting of the coronary arteries with potential coil embolization of the leak after the protection of the coronary artery if necessary.

[00126] Structural valve degeneration in the transcatheter valves 312, 412 may be corrected in that the bicuspid valve design permit for placement of another transcatheter valve across the first device without compromising valvular flow area.

[00127] The dual frame component may also take the form of other transcatheter valvular replacement devices such as, for example, prosthetic mitral and tricuspid valves. The dual frame

component may also be used to enhance sealing zones of endovascular devices to treat abdominal and thoracic aneurysms, and in applications to treat peripheral vascular disease.

[00128] It will be appreciated that the devices and methods described herein have broad applications. The foregoing embodiments were chosen and described in order to illustrate principles of the methods and apparatuses as well as some practical applications. The preceding description enables others skilled in the art to utilize methods and apparatuses in various embodiments and with various modifications as are suited to the particular use contemplated. In accordance with the provisions of the patent statutes, the principles and modes of operation of this disclosure have been explained and illustrated in exemplary embodiments.

[00129] It is intended that the scope of the present methods and apparatuses be defined by the following claims. However, it must be understood that this disclosure may be practiced otherwise than is specifically explained and illustrated without departing from its spirit or scope. It should be understood by those skilled in the art that various alternatives to the embodiments described herein may be employed in practicing the claims without departing from the spirit and scope as defined in the following claims.

[00130] The scope of the disclosure should be determined, not with reference to the above description, but should instead be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled. It is anticipated and intended that future developments will occur in the arts discussed herein, and that the disclosed systems and methods will be incorporated into such future examples. Furthermore, all terms used in the claims are intended to be given their broadest reasonable constructions and their ordinary meanings as understood by those skilled in the art unless an explicit indication to the contrary is made herein. In particular, use of the singular articles such as "a," "the," "said," etc. should be read to recite one

or more of the indicated elements unless a claim recites an explicit limitation to the contrary. It is intended that the following claims define the scope of the disclosure and that the method and apparatus within the scope of these claims and their equivalents be covered thereby. In sum, it should be understood that the disclosure is capable of modification and variation and is limited only by the following claims.

CLAIMS

1. An endograft device for endovascular repair of ascending aortic aneurysms, comprising:

a first prosthetic component comprising (i) a proximal frame, and (ii) a distal frame secured to the proximal frame and extending to a distal end of the first prosthetic component,

at least one conduit secured to the first prosthetic component and positioned adjacent to the proximal frame,

a second prosthetic component secured to a proximal end of the first prosthetic component, the second prosthetic component comprising (i) a balloon-expandable frame extending distally from a proximal end of the second prosthetic component, and (ii) a self-expanding frame connected to the balloon-expandable frame and extending to a distal end of the second prosthetic component, and

a valve element secured to the balloon-expandable frame at the proximal end of the second prosthetic component.

2. The endograft device of claim 1, wherein the self-expanding frame has an hourglass shape.

3. The endograft device of claim 2, wherein the self-expanding frame includes:

a first section that tapers inwardly between a proximal end and a distal end, and

a second section having a proximal end that is connected to the distal end of the first section, the second section tapering outwardly between the proximal end of the second section and a distal end of the second section.

4. The endograft device of claim 3, wherein the proximal end of the first section is secured to a distal end of the balloon-expandable frame.

5. The endograft device of claim 3, wherein:

the self-expanding frame includes a third section extending proximally from the proximal end of the first section, the third section having a passageway defined therein, and

the balloon-expandable frame is positioned in the passageway of the third section of the self-expanding frame.

6. The endograft device of claim 5, wherein the balloon-expandable frame is expandable between (i) an unexpanded position in which an outer surface of the balloon-expandable frame is spaced apart from an inner surface of the self-expanding frame and (ii) an expanded position in which the outer surface of the balloon-expandable frame is engaged with the inner surface of the self-expanding frame.

7. The endograft device of claim 6, wherein a plurality of fibers are attached to the third section of the self-expanding frame, and when the balloon-expandable frame is in the expanded position, the outer surface of the balloon-expandable frame is engaged with the plurality of fibers.

8. The endograft device of claim 1, wherein the proximal frame of the first prosthetic component has a passageway defined therein, and the distal end of the second prosthetic component is positioned in the passageway of the first prosthetic component.

9. The endograft device of claim 1, wherein the at least one conduit includes a pair of conduits positioned on opposite sides of the first prosthetic component.

10. A method of implanting a heart valve in a stent component, the method comprising:

placing a heart valve in a first component;

securing the first component within a second component,

wherein the deployment occurs endovascularly.

ABSTRACT OF THE DISCLOSURE

A prosthetic component for repair of a patient's aorta includes an uncovered portion spanning the innominate arteries, and a graft material on a proximal end thereof.

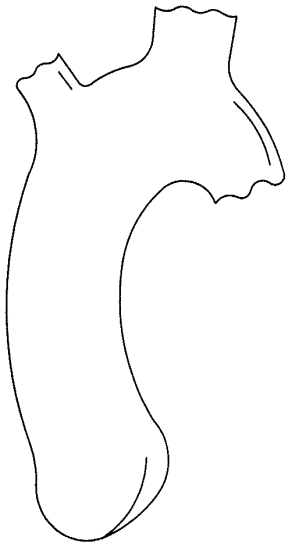


Fig. 1

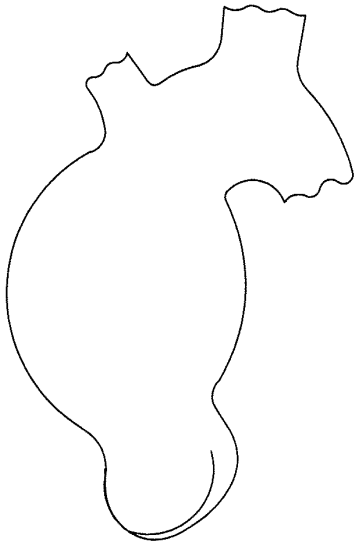


Fig. 1B

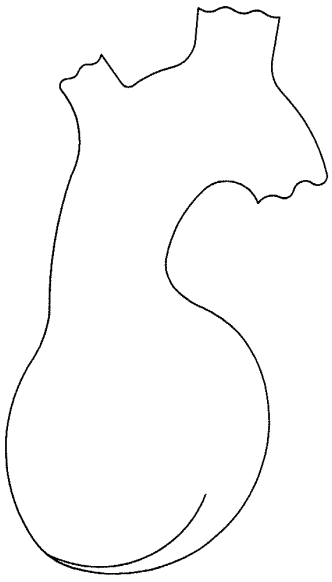


Fig. 1A



Fig. 1C

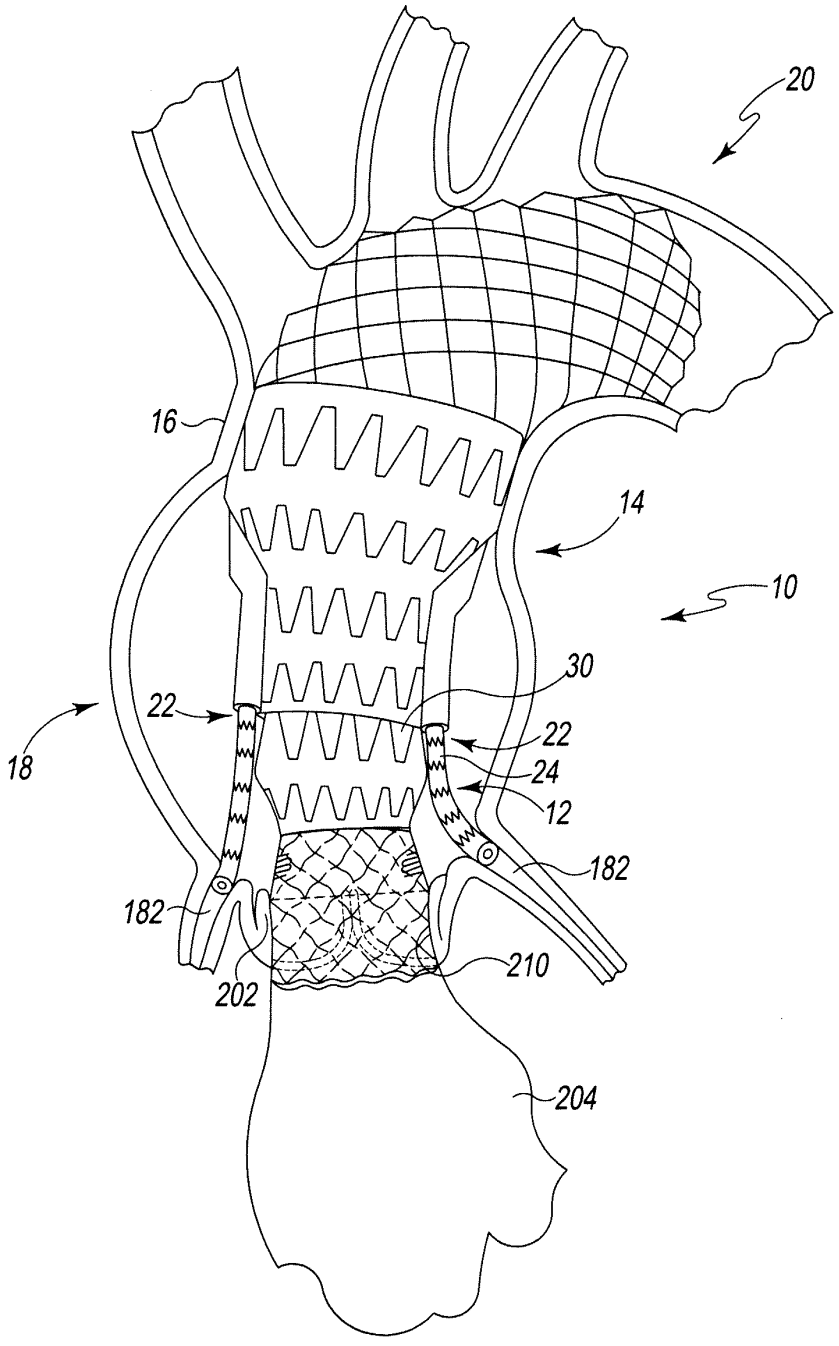


Fig. 2

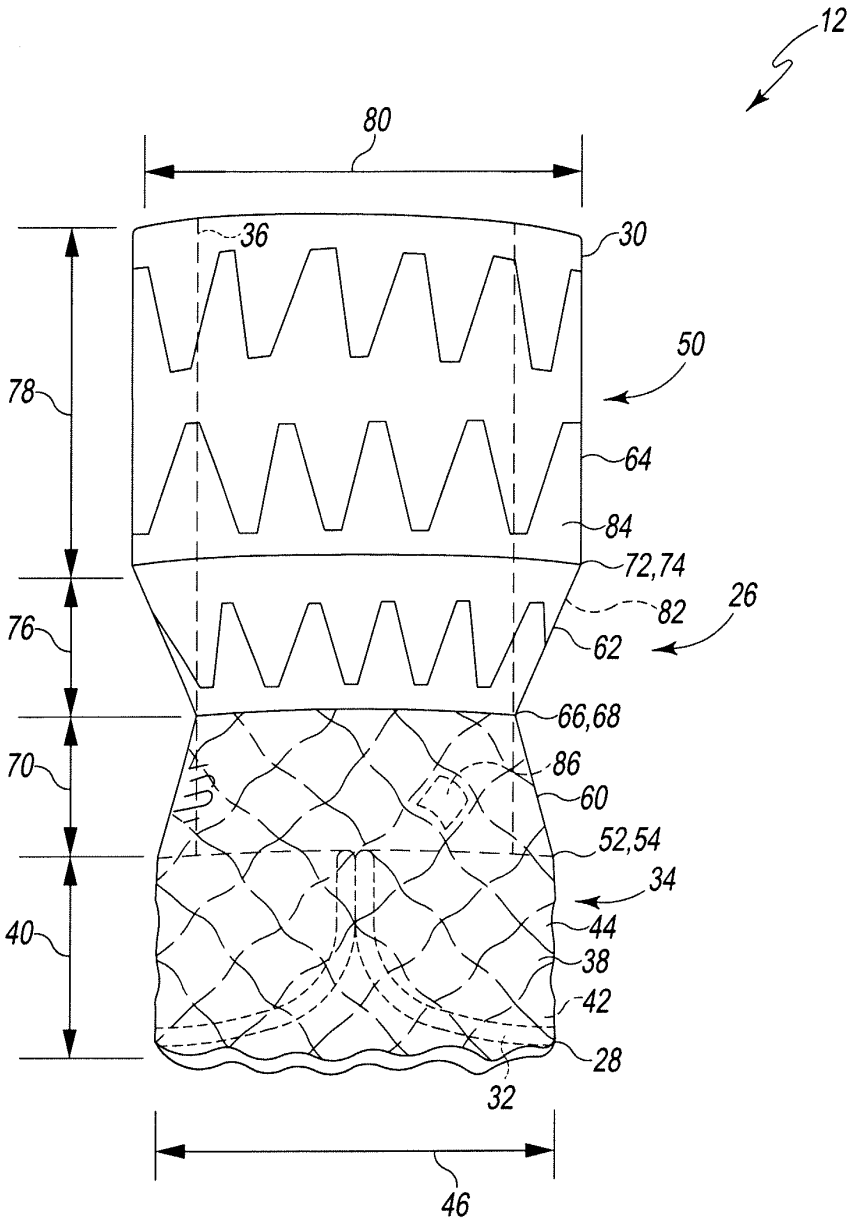

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Fig. 3

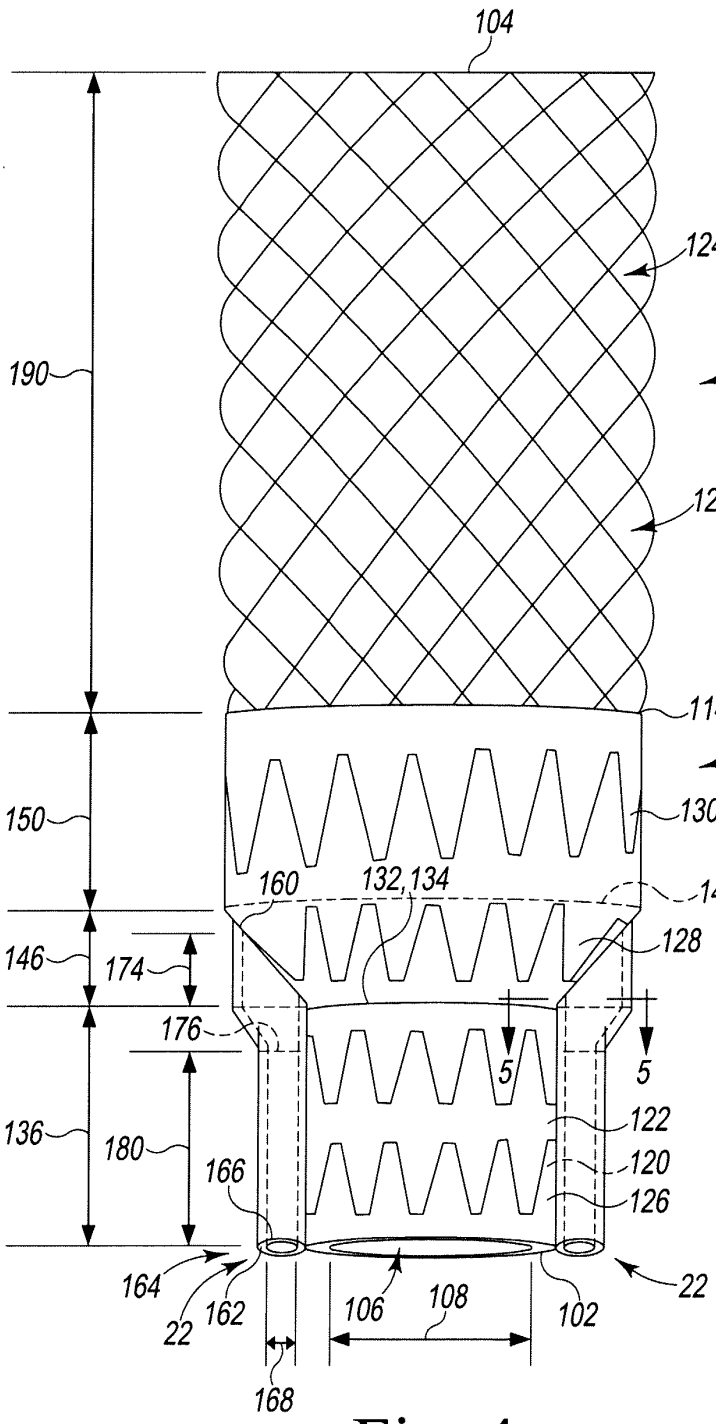

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Fig. 4

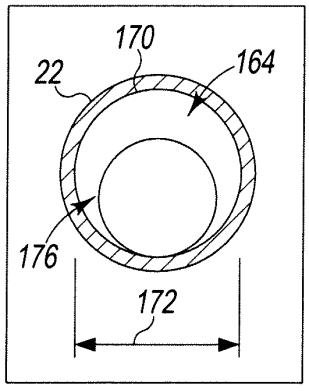

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Fig. 5

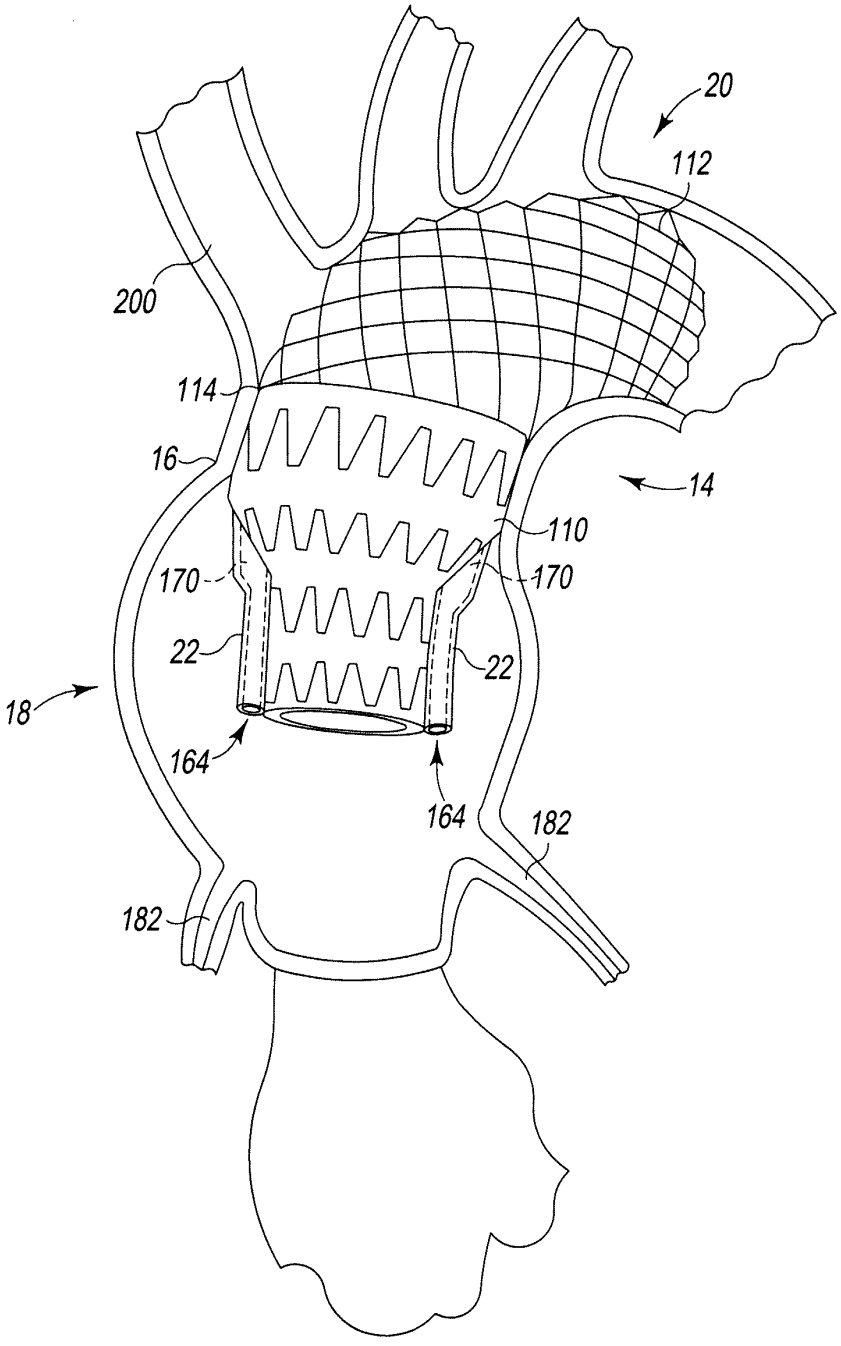


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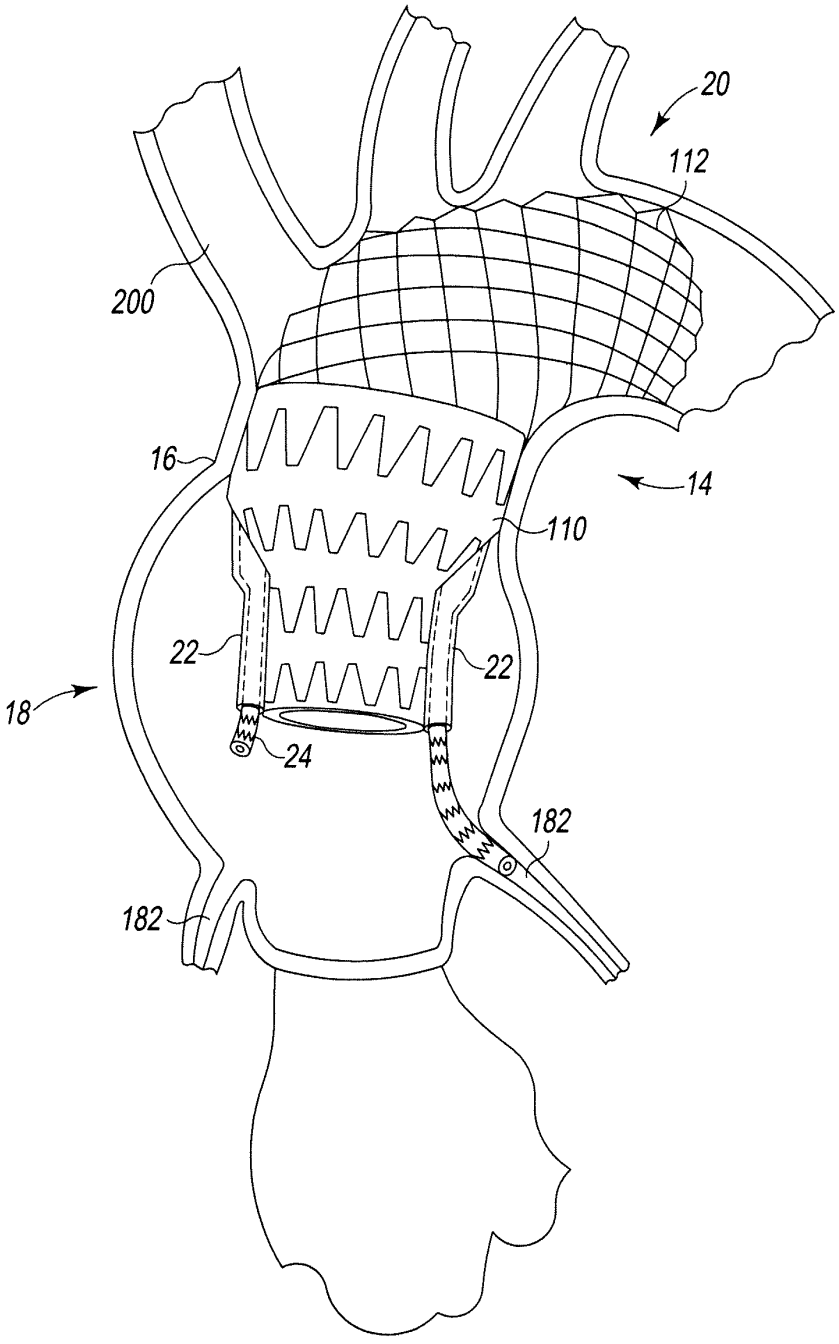


Fig. 7

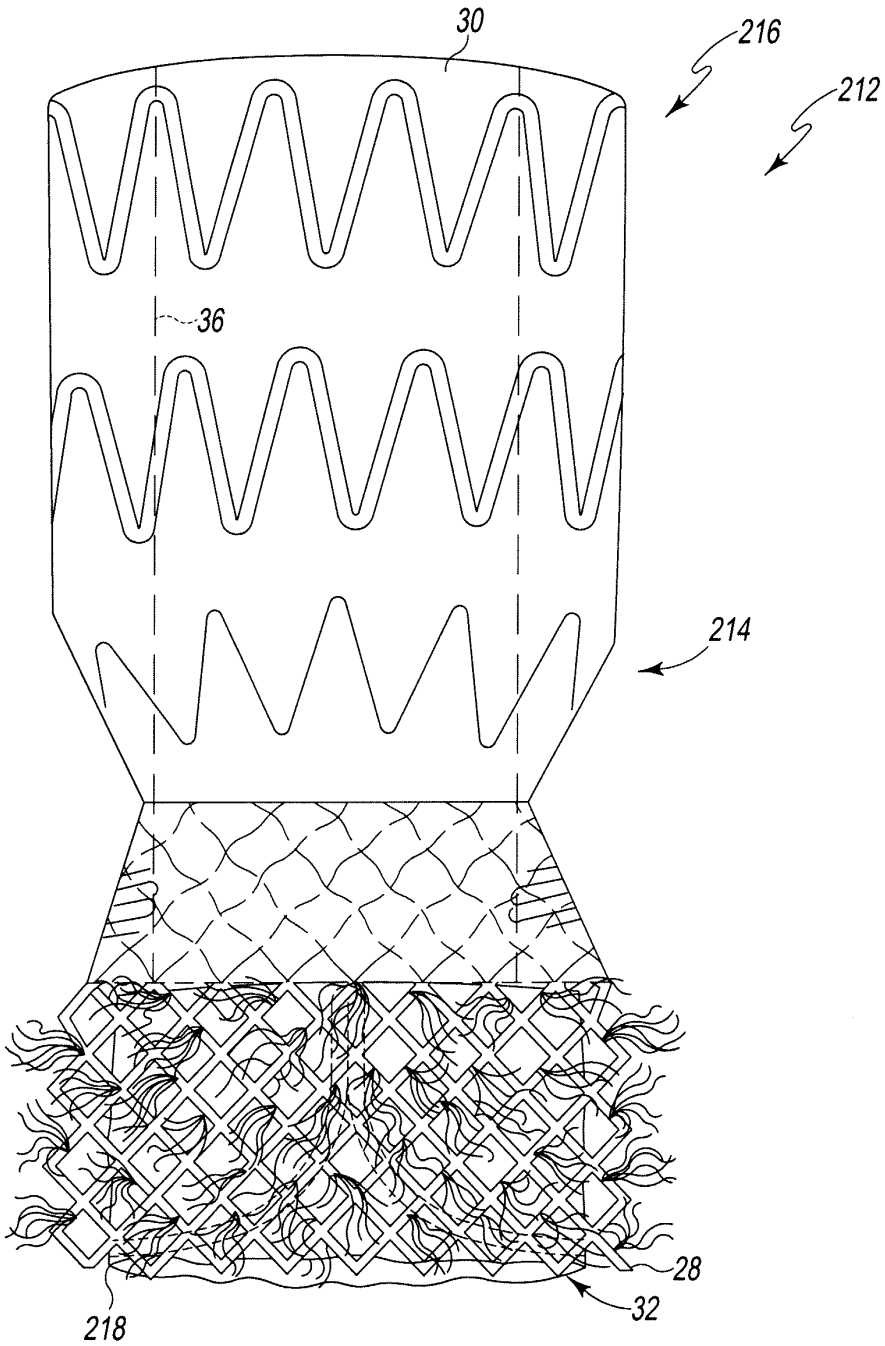


Fig. 8

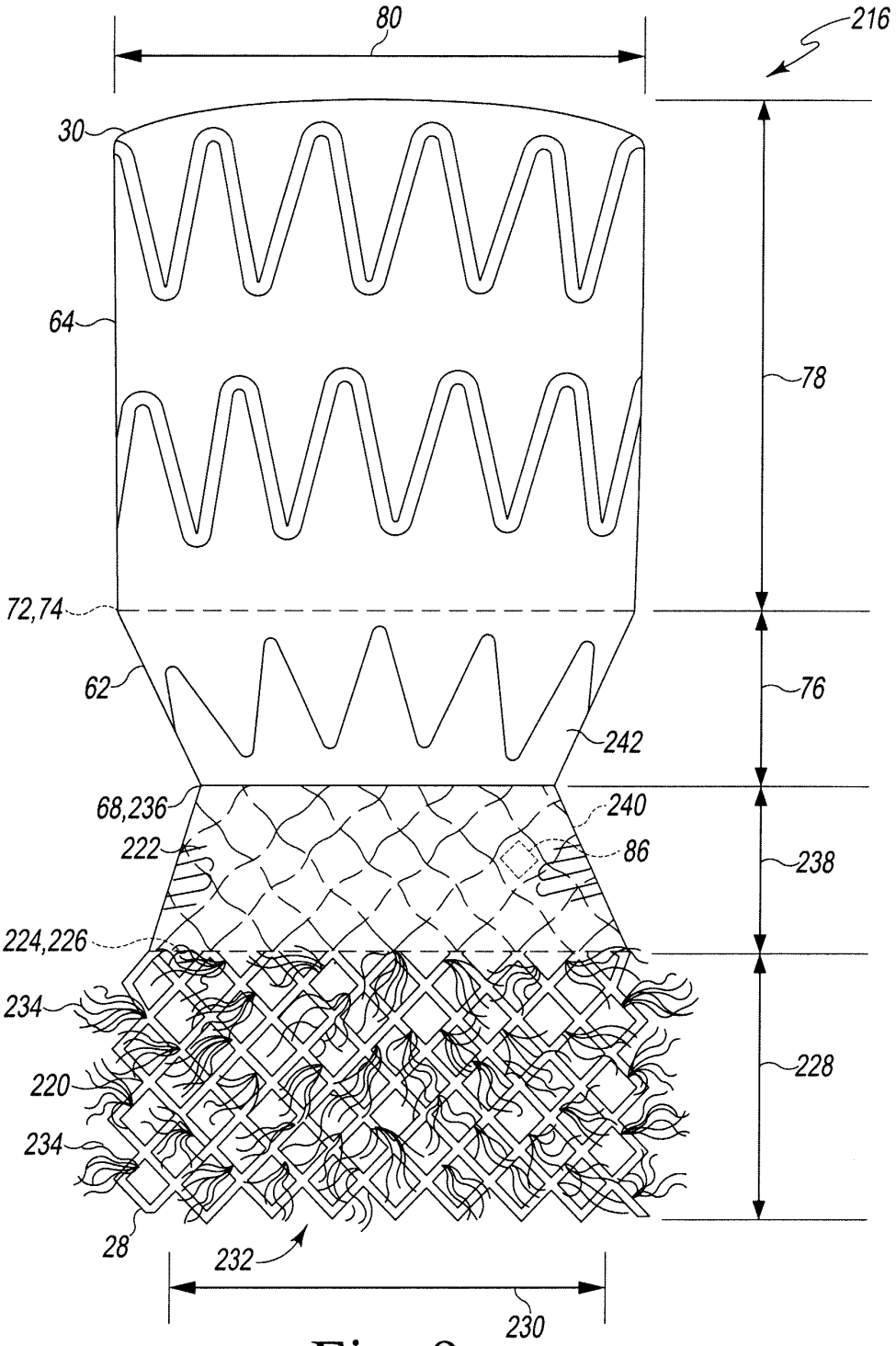

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Fig. 9

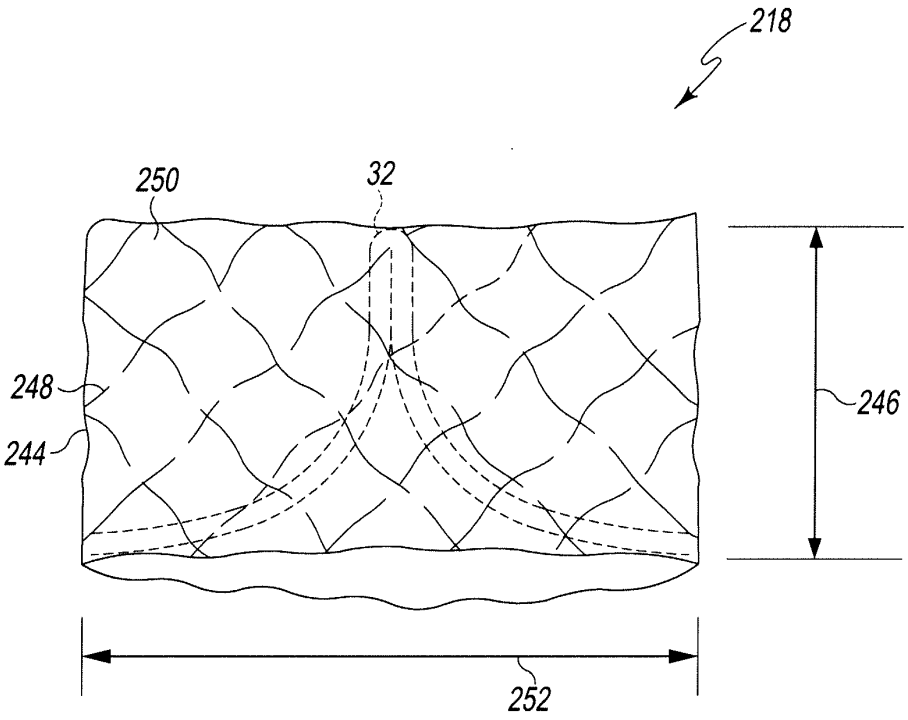


Fig. 10

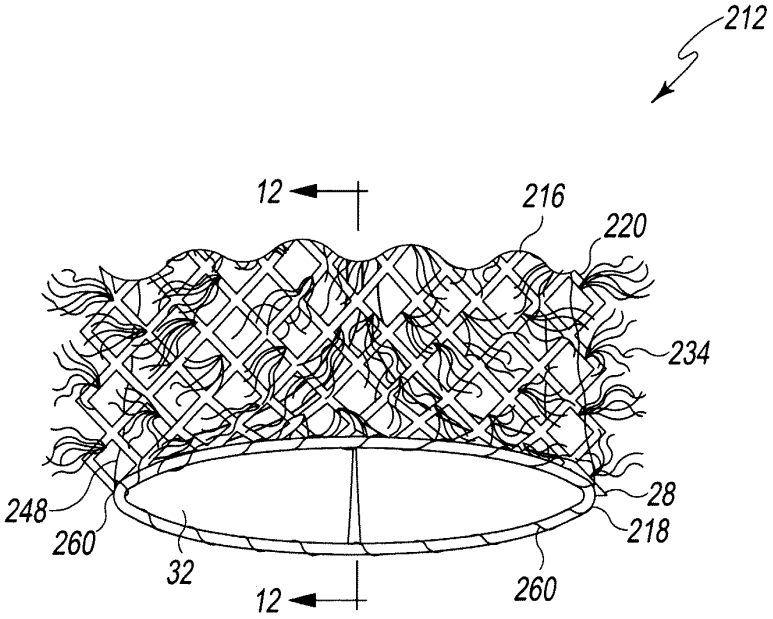


Fig. 11

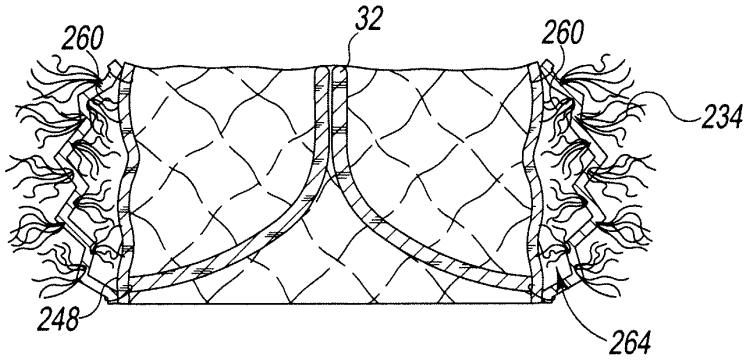


Fig. 12

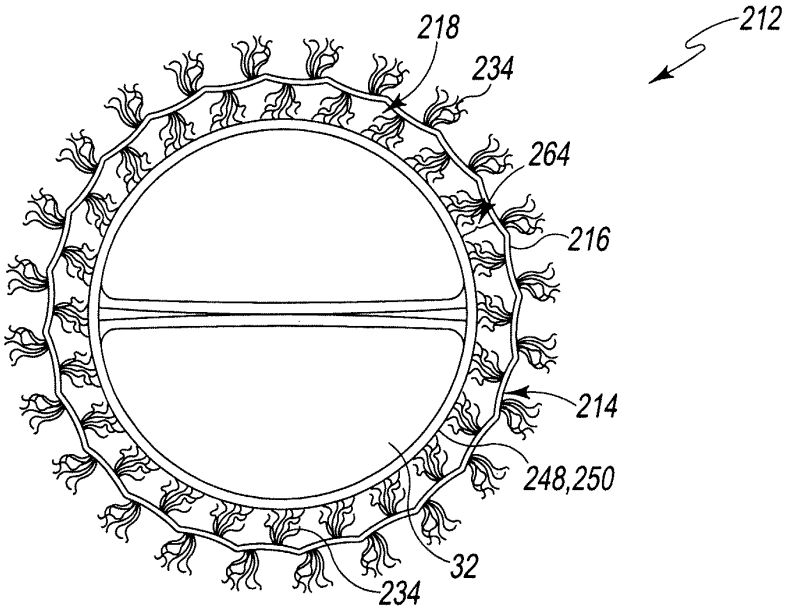

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Fig. 13

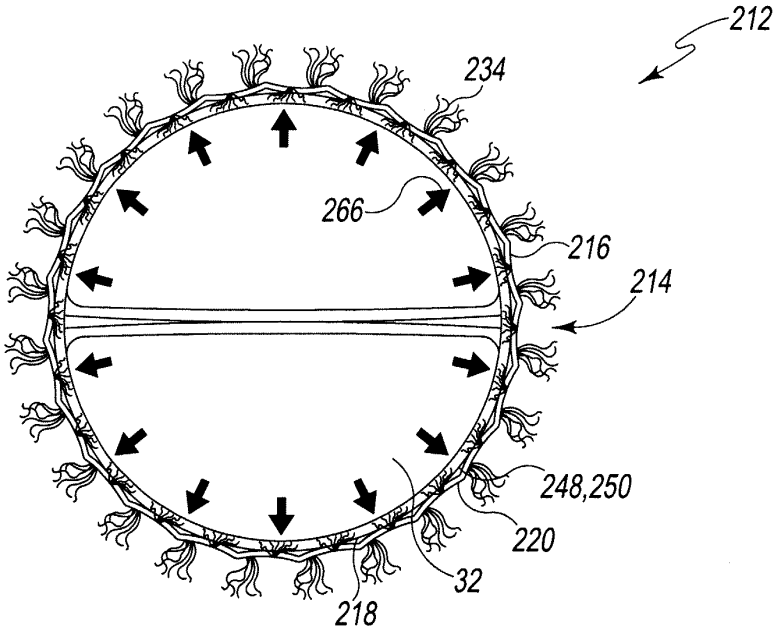

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Fig. 14

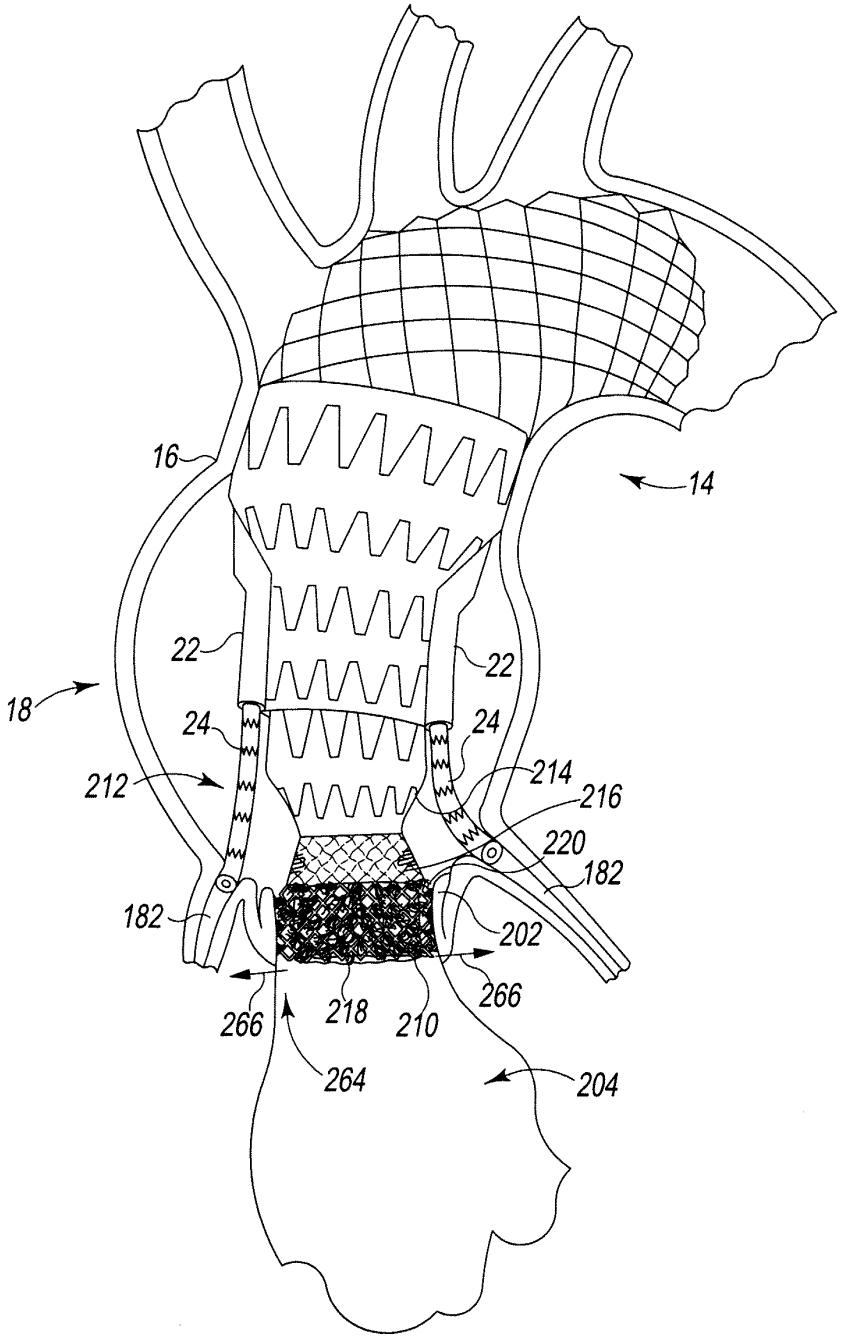

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Fig. 15

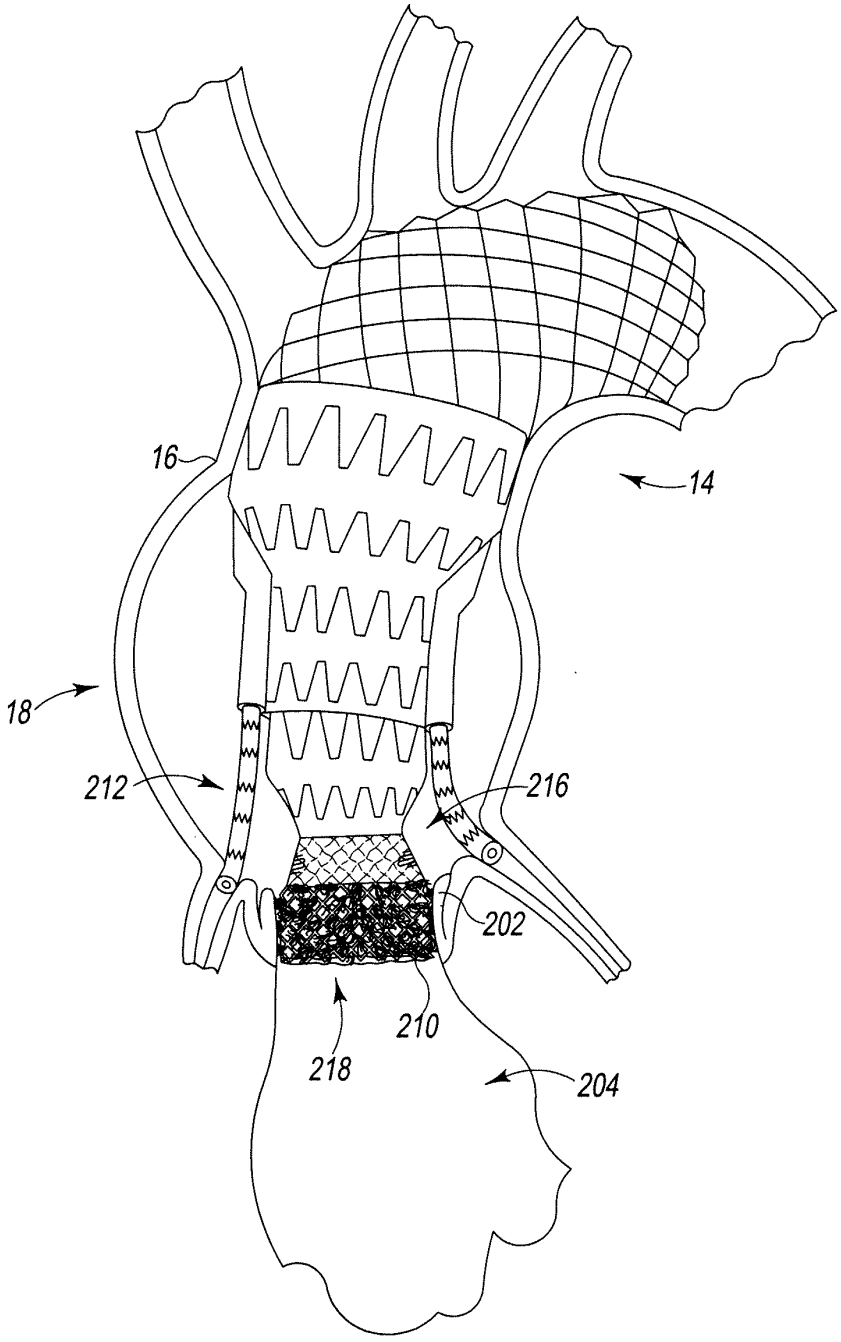


Fig. 16

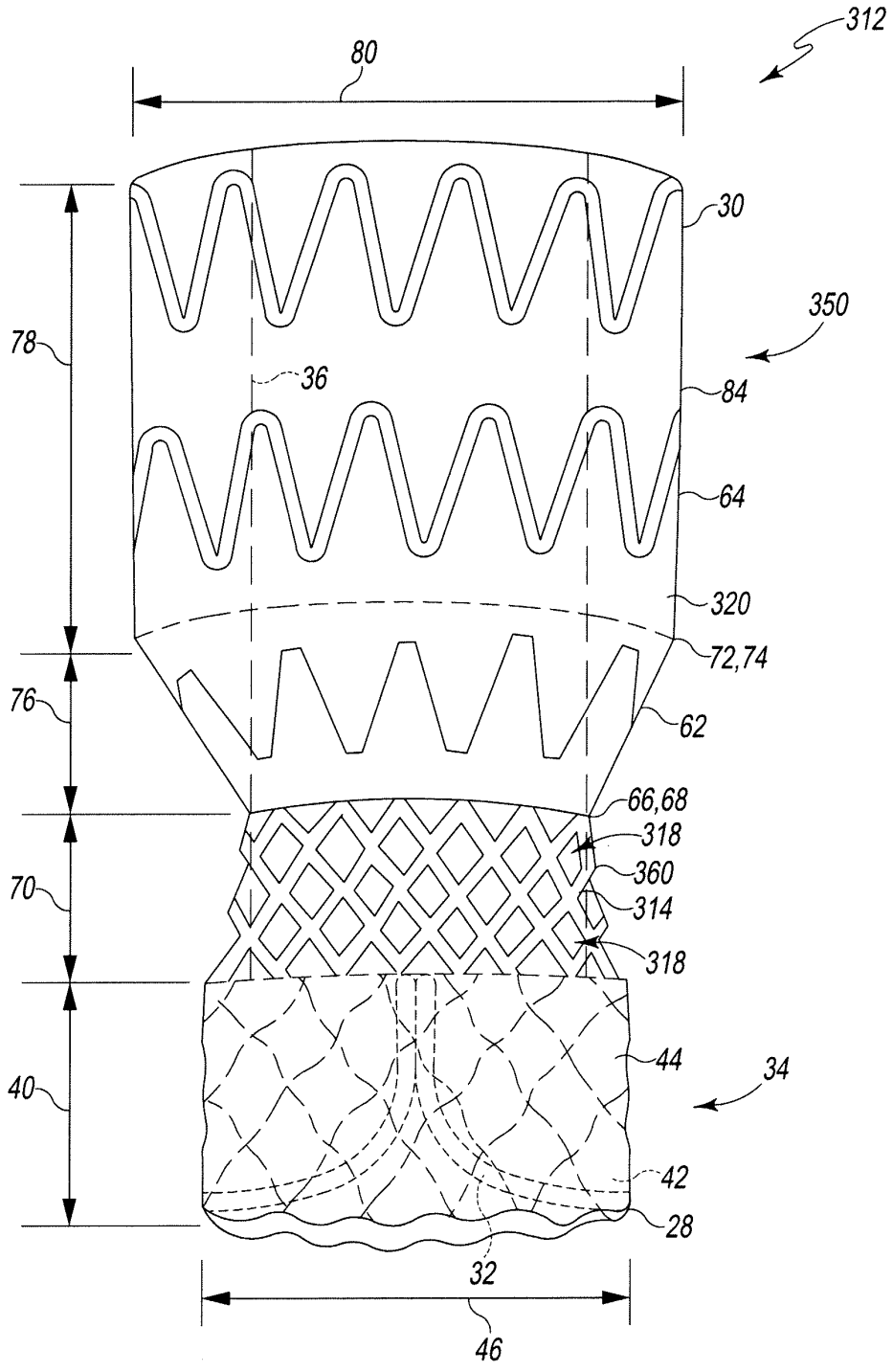

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Fig. 17

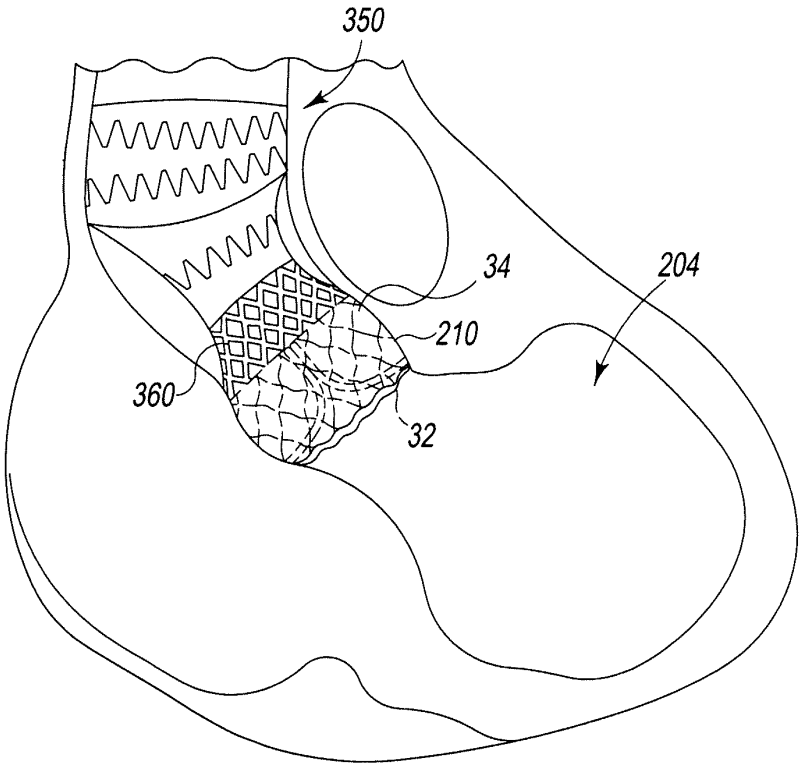


Fig. 18

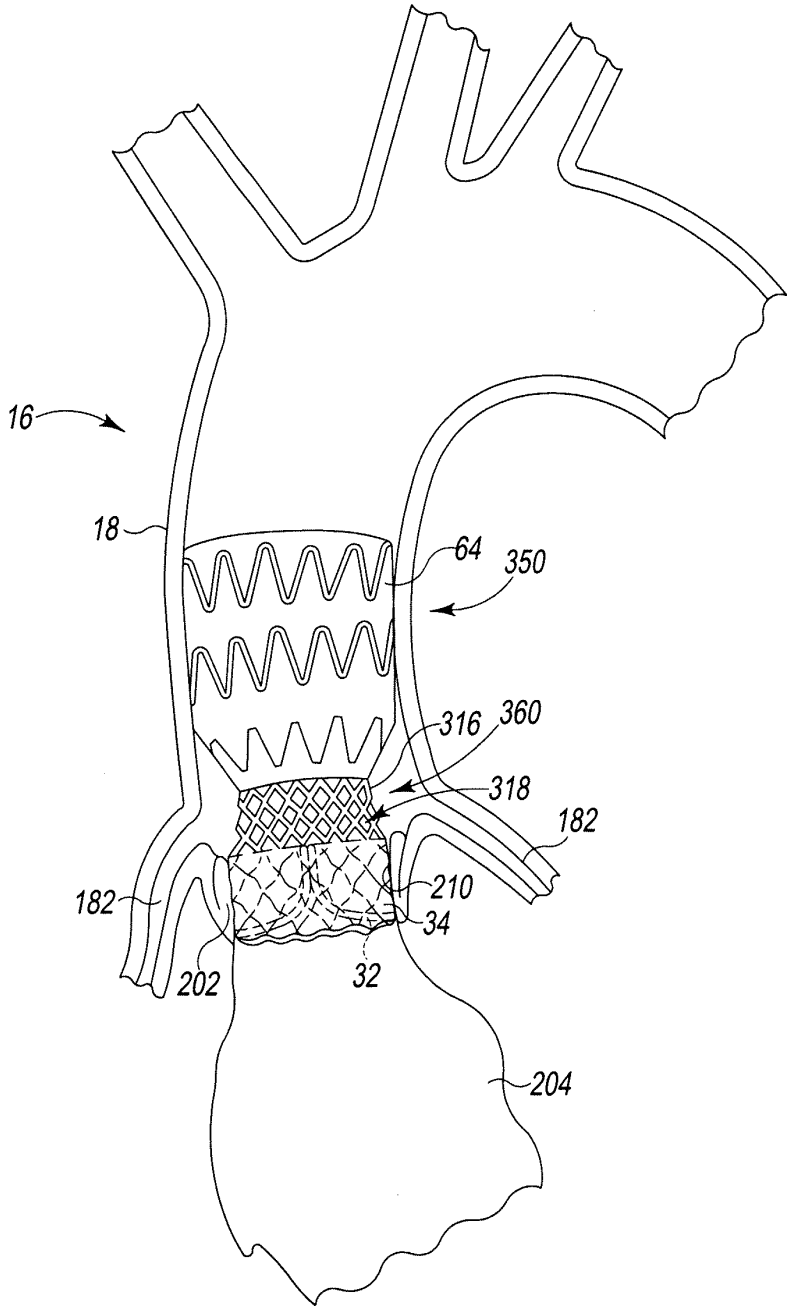


Fig. 19

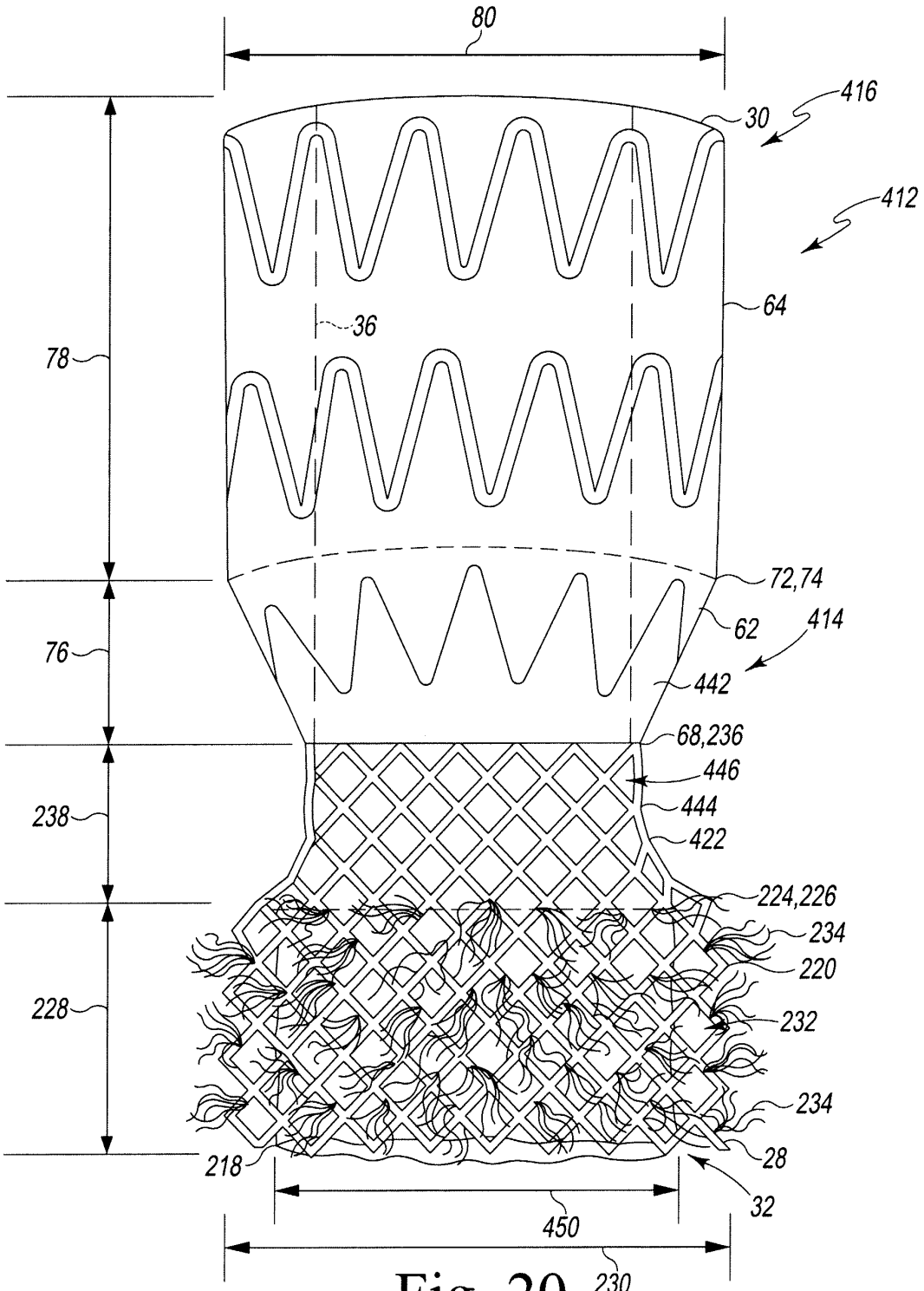

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Fig. 20

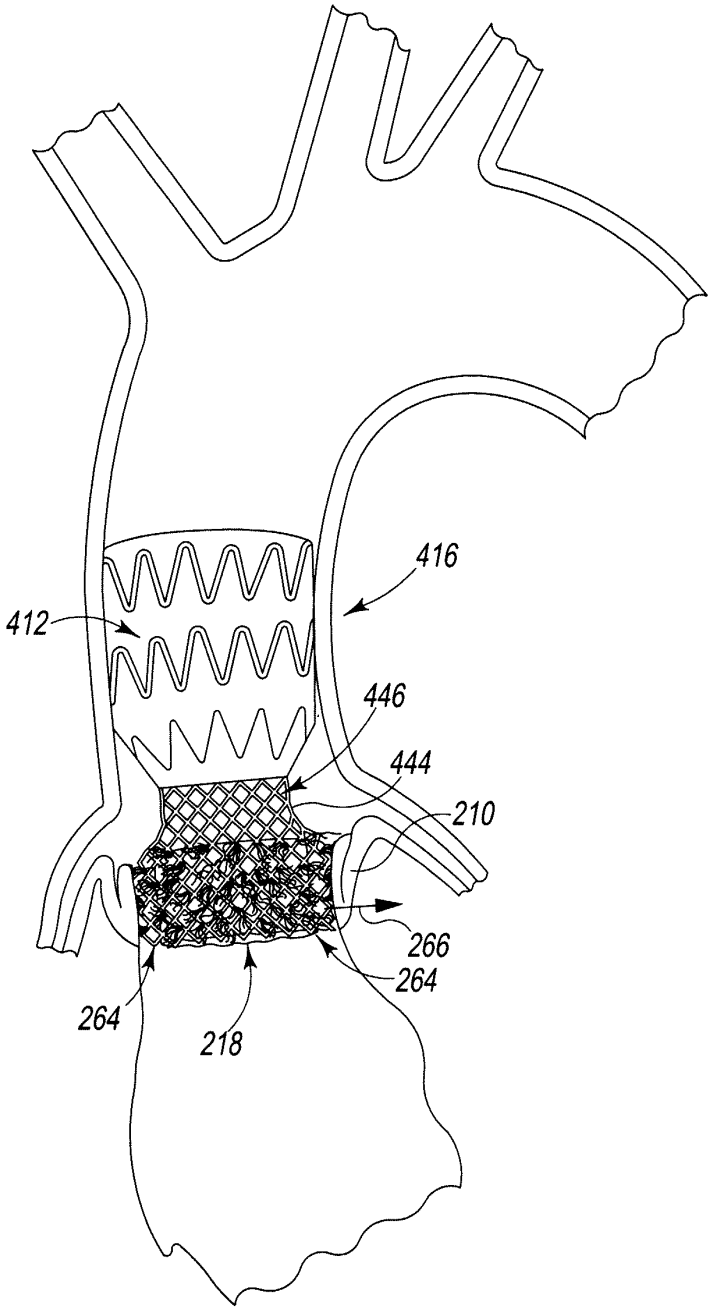


Fig. 21

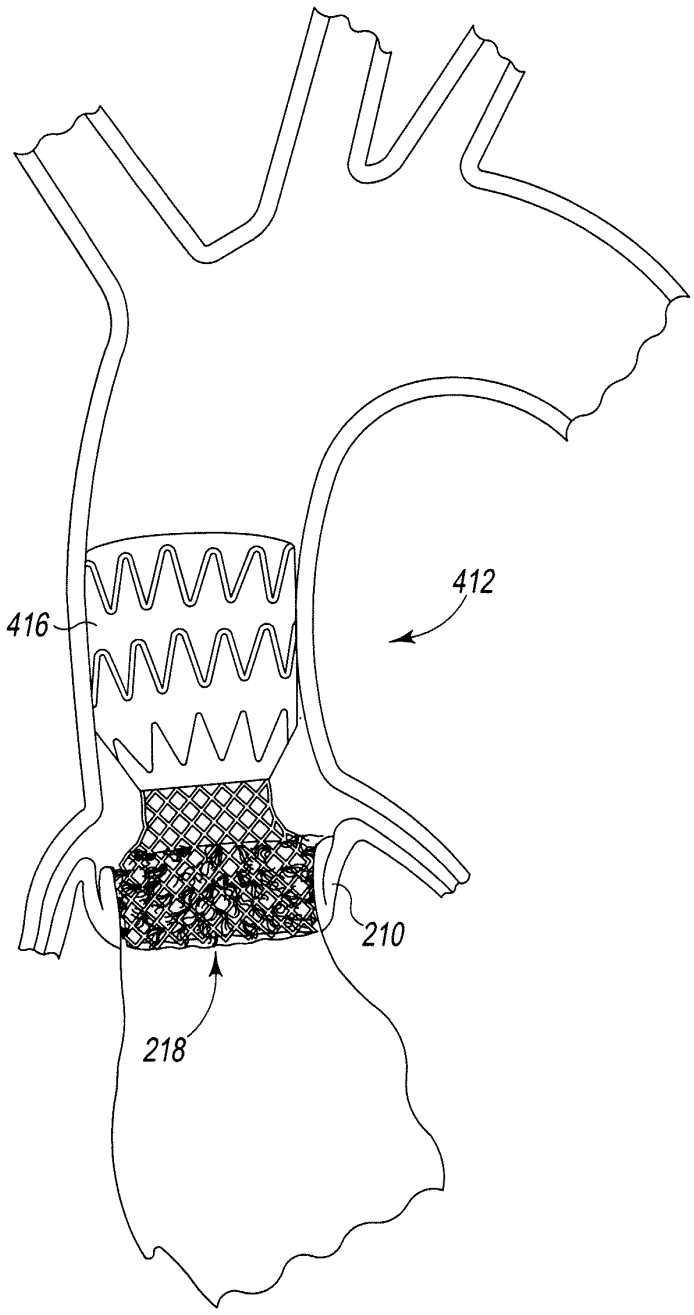


Fig. 22

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

Title of Invention	DEVICE FOR ENDOVASCULAR AORTIC REPAIR AND METHOD OF USING THE SAME

As the below named inventor, I hereby declare that:

This declaration is directed to:

- [■] The attached application, or
- [ ] United States application or PCT international application number _____ filed on _____.

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

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

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

WARNING:

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

LEGAL NAME OF INVENTOR

Inventor: Ali SHAHRIARI Date (Optional): 12/5/12

Signature: A. Shah

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

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

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Electronic Patent Application Fee Transmittal	
Application Number:	
Filing Date:	
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Filer:	Justin Robert Nifong/Taylor Murphy
Attorney Docket Number:	426/2/12 UTIL
Filed as Small Entity	
Filing Fees for Utility under 35 USC 111(a)	

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	75	75
UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**785**

Electronic Acknowledgement Receipt	
EFS ID:	40128584
Application Number:	16941117
International Application Number:	
Confirmation Number:	1876
Title of Invention:	DEVICE FOR AORTIC REPAIR AND METHOD OF USING THE SAME
First Named Inventor/Applicant Name:	Ali Shahriari
Customer Number:	115007
Filer:	Justin Robert Nifong/Taylor Murphy
Filer Authorized By:	Justin Robert Nifong
Attorney Docket Number:	426/2/12 UTIL
Receipt Date:	28-JUL-2020
Filing Date:	
Time Stamp:	16:59:17
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$785
RAM confirmation Number	E20207RG59391236
Deposit Account	506191
Authorized User	Taylor Murphy
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	WebADS.pdf	142035 d9ec7476814e3802f5ca29aa03fa0bb5a217b9dd	no	8
Warnings:					
Information:					
2		426-2-12UTIL-20200728-Spec-claims-abs.pdf	183040 b46214f5dc236e3ec2b5bbae0caddf837c3e4fdd	yes	42

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	39
Claims	40	41
Abstract	42	42

Warnings:					
Information:					
3	Drawings-only black and white line drawings	426-2-12UTIL-20200728-Drwgs.pdf	2395058 be03dc592ee94bc804d0b0c880b346d0285322b6	no	19
Warnings:					
Information:					
4	Oath or Declaration filed	426-2-12UTIL-20200728-Executed-dec.pdf	71448 b55f98749de83436d74cbcf8fd6dfe80810401aa	no	1
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	35256 a6d3206dffbc70ff1ee65fe046ebf59df42fc5b5	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	2826837

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.