(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 307 212 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
04.03.2020 Bulletin 2020/10

(21) Application number: **16808447.3**

(22) Date of filing: **10.06.2016**

(51) Int Cl.:
A61F 2/954 *(2013.01)* ***A61F 2/958*** *(2013.01)*
A61F 2/962 *(2013.01)* ***A61F 2/966*** *(2013.01)*
A61M 25/04 *(2006.01)* ***A61M 25/10*** *(2013.01)*
A61B 5/0215 *(2006.01)* ***A61B 5/00*** *(2006.01)*

(86) International application number:
PCT/US2016/037037

(87) International publication number:
WO 2016/201336 (15.12.2016 Gazette 2016/50)

(54) **SYSTEM FOR DELIVERING AN IMPLANTABLE DEVICE**

SYSTEM ZUR FREISETZUNG EINER IMPLANTIERBAREN VORRICHTUNG

SYSTÈME DE POSE D'UN DISPOSITIF IMPLANTABLE

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **11.06.2015 US 201562174267 P**

(43) Date of publication of application:
18.04.2018 Bulletin 2018/16

(73) Proprietor: **Ohio State Innovation Foundation**
Columbus, OH 43201 (US)

(72) Inventor: **KAHWASH, Rami**
New Albany, Ohio 43054 (US)

(74) Representative: **Icely, Dominic Michael**
The IP Asset Partnership Limited
Prama House
267 Banbury Road
Oxford OX2 7HT (GB)

(56) References cited:
US-A- 5 947 985
US-A1- 2001 047 184
US-A1- 2003 204 138
US-A1- 2012 046 560
US-A1- 2012 265 283
US-A1- 2013 116 549
US-A1- 2013 253 347
US-A1- 2013 261 544
US-B1- 6 485 500
US-B2- 7 998 162

EP 3 307 212 B1

Description

BACKGROUND

[0001] CARDIOMEMS, which is owned by St. Jude Medical, is a new FDA-approved device used for monitoring pulmonary artery pressures in patients with a history of systolic or diastolic heart failure and prior heart failure hospitalization within one year. The data from the device is transmitted wirelessly to a secure website and reviewed by health professionals. The sensor is very durable as it does not require a battery and does not have any moving parts. The sensor allows volume status of millions of patients worldwide to be managed more accurately and precisely. Various implementations of the CARDIOMEMS device are described in several U.S. Patents, including U.S. Patent Nos. 6,855,115, 7,966,886, and 8,353,841.

[0002] To deliver the CARDIOMEMS device to the left pulmonary artery, a guide wire and catheter are engaged in the left pulmonary artery using fluoroscopy, followed by obtaining an angiography of the left pulmonary branches. The branch of interest is located, and a picture of it is saved into the catheterization lab monitor. Then, the branch of interest is accessed with a delivery catheter over the wire. The device is deployed based on the assumption that the location has not changed.

[0003] For example, as described in U.S. Patent No. 8,353,841, the CARDIOMEMS device may be delivered and deployed in its intended location in an artery using the delivery assembly shown in FIG. 1. The delivery assembly includes a main lumen 202 through which a core wire 204 is disposed and a secondary lumen having four sections 224A-224D through which a tether wire 211 is disposed. The tether wire 211 enters and exits the secondary lumen sections 224A-224D to attach wire loops 255, 235 of the CARDIOMEMS device 251 to the delivery assembly. The core wire 204 is fixed to the main lumen 202 and provides columnar stiffness to the delivery assembly, which facilitates advancement of the delivery assembly through the vasculature and prevents buckling of the delivery assembly when the tether wire is pulled proximally during deployment of the device 251. The main lumen 202 also includes a guide wire aperture 212 through which guide wire 210 extends into the main lumen 202. The delivery apparatus may be moved along the guide wire 210 through the artery in which the device 251 is to be deployed.

[0004] The lung is a very dynamic organ. For example, a wire within the left pulmonary artery may move 3 inches axially as the patient breathes. Therefore, establishing landmarks for delivering devices within the pulmonary artery can be very difficult. If the device is deployed distally of the branch of interest, the pressure waves are dampened. And, if the device is deployed proximally of the branch of interest, there is an increased risk that the device will dislodge in the main pulmonary artery, where it cannot be retrieved.

[0005] Documents US 2003/204138 A1, US 2013/116549 A1, US 2013/261544 A1 and US 2012/265283 A1 disclose delivery systems for delivering implantable devices.

[0006] Accordingly, there is a need for an improved system and method for delivering an implantable device within a patient.

BRIEF SUMMARY

[0007] Described herein are various systems and methods of delivering an implantable device within a vessel of a patient. For example, in certain implementations, the delivery system includes an outer catheter having a distal tip and an inner support member disposed within the outer catheter. The inner support member includes an anchor member disposed adjacent a distal tip of the inner support member and a support portion axially inward of the anchor member. The support portion is configured for supporting an implantable device thereon. A diameter of the anchor member corresponds to a diameter of a portion of a vessel in which the anchor member is to be disposed. The anchor member is configured to be lodged in the portion of the vessel to locate an intended position of the anchor member and to prevent movement of the inner support member relative to the vessel during release of the implantable device.

[0008] In some implementations, the anchor member is a first anchor member, and the distal tip of the outer catheter includes a second anchor member. The second anchor member has a second diameter that corresponds to a second diameter of a portion of a second vessel in which the second anchor member is to be disposed. The first vessel and second vessel may be separate and adjacent arteries. For example, the first vessel may be a separate branch of the second vessel. Alternatively, the first vessel may be a distal, narrower portion of the second vessel.

[0009] According to the invention, the anchor members are inflatable balloons that have an inflated diameter. The inflated diameter of the first balloon is selected to lodge the first balloon in the portion of the vessel in which the first balloon is to be disposed. Similarly, the inflated diameter of the second balloon is selected to lodge the second balloon in the portion of the second vessel in which the second balloon is to be disposed. In certain implementations, the inflated diameter of the first balloon is smaller than the inflated diameter of the second balloon.

[0010] In addition, in some implementations, the inner support member may be an inner catheter.

[0011] According to certain implementations, the implantable device may include a hemodynamic sensor, such as, for example, the CARDIOMEMS sensor.

[0012] According to other various implementations, not being part of the invention, a method of delivering an implantable device within a body includes: (1) inserting a portion of a delivery system within a vessel of a patient,

(2) extending a distal tip of an inner support member of the device past a distal tip of an outer catheter of the device such that an anchor member is outside of the outer catheter; (3) urging the anchor member through the vessel until the anchor member is lodged within the vessel; and (4) releasing the implantable device into a space within the vessel proximal of the anchor member. The delivery system may include one or more of the implementations described above.

[0013] The method may also include urging a second anchor member through a second vessel until the second anchor member is lodged within the second vessel after the first anchor member is lodged within the first vessel and prior to releasing the implantable device into the space between the first anchor member and the second anchor member.

[0014] In addition, the method may also include deflating the first inflatable balloon and retracting the distal tip of the inner support member into the outer catheter after releasing the implantable device and deflating the second inflatable balloon and retracting the outer catheter from the body after the distal tip of the inner support member has been retracted into the outer catheter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The components in the drawings are not necessarily to scale relative to each other. Like reference numerals designate corresponding parts throughout the several views.

FIG. 1 illustrates a delivery apparatus for a CARDIOMEMS device according to the prior art.

FIG. 2A illustrates branches in the left pulmonary artery.

FIG. 2B illustrates a hemodynamic sensor, according to one implementation.

FIG. 3 illustrates a system for deploying the hemodynamic sensor shown in FIG. 2, according to one implementation.

FIGS. 4-7 illustrate steps of deploying the hemodynamic sensor using the system shown in FIG. 3.

FIGS. 8-10 illustrates steps of retracting the system shown in FIG. 3 after the hemodynamic sensor is disposed in the intended position.

DETAILED DESCRIPTION

[0016] Described herein are various systems and methods of delivering an implantable device within a vessel of a patient. For example, the device may be a hemodynamic sensor, such as a CARDIOMEMS sensor, and delivered to a portion of a patient's left pulmonary artery, according to certain implementations. A portion of the left pulmonary artery 12 is shown in FIG. 2A, and a hemodynamic sensor 14 is shown in FIG. 2B. However, other implementations may be configured for delivering other types of implantable devices, and those devices may be intended for other vessels within the patient's body.

[0017] The delivery system may include, for example, an outer catheter having a distal tip and an inner support member, such as an inner catheter, disposed within the outer catheter. The inner support member includes an anchor member adjacent a distal tip of the inner support member and a support portion axially inward of the anchor member. The support portion is configured for supporting an implantable device thereon. A diameter of the anchor member corresponds to a diameter of a portion of a vessel in which the anchor member is to be disposed. The anchor member is configured to be lodged in the vessel to locate an intended position of the anchor member and to prevent movement of the inner support member relative to the vessel during release of the implantable device.

[0018] FIG. 3 illustrates a delivery system 100 according to one implementation. FIGS. 4-7 illustrate steps of deploying the hemodynamic sensor using the delivery system shown in FIG. 3. The delivery system 100 is shown in its extended, or delivery, position and includes an outer catheter 102 having a distal tip 104 and an inner support member 106 disposed within the outer catheter 102. The inner support member 106 may be an inner catheter according to some implementations. As shown in FIG. 4, the inner support member 106 includes an anchor member 110 disposed adjacent a distal tip 116 of the inner support member 106 and a support portion 114 axially inward of the anchor member 110. A diameter of the anchor member 110 corresponds to a diameter of a portion of a vessel in which the anchor member 110 is to be disposed, as shown in FIG. 5. The anchor member 110 is configured to be lodged in the portion of the vessel to locate an intended position of the anchor member 110 and to prevent movement of the inner support member 106 relative to the vessel during release of the implantable device.

[0019] Referring to FIGS. 4 and 6, the system 100 also includes a second anchor member 112 at the distal tip 104 of the outer catheter 102. The second anchor member 112 has a second diameter that corresponds to a second diameter of a portion of a second vessel in which the second anchor member 112 is to be disposed. The second anchor member 112 is configured to be lodged in the portion of the vessel to locate an intended position of anchor member 112 and to prevent movement of the outer support member 102 relative to the vessel during release of the implantable device.

[0020] As shown in FIG. 4, the support portion 114 is configured for supporting an implantable device, such as hemodynamic sensor 14, thereon. For example, according to one implementation, the implantable device may be tied to the support portion 114, and during release, the surgeon may pull a string to release the implantable device within the vessel. However, other implementations may include other suitable types of coupling mechanisms to removably secure the implantable device to

the support portion 114.

[0021] The first vessel and second vessel may be separate and adjacent arteries. For example, the first vessel may be a separate branch of the second vessel. Alternatively, the first vessel may be a distal, narrower portion of the second vessel.

[0022] In the implementation according to the invention shown in FIG. 4, the anchor members 110, 112 are inflatable balloons that each have an inflated diameter. The inflated diameter of the first balloon 110 is selected to lodge the first balloon 110 in the portion of the vessel in which the first balloon is to be disposed. Similarly, the inflated diameter of the second balloon 112 is selected to lodge the second balloon in the portion of the second vessel in which the second balloon is to be disposed. In other words, the expected diameters of the first and second vessels may be the respective inflated diameters of the first and second balloons. In certain implementations in which the second vessel 12b is larger than the first vessel 12a, such as when the device 14 is to be disposed adjacent a branch between vessels 12a, 12b, (as shown in FIG. 6) the inflated diameter of the first balloon is smaller than the inflated diameter of the second balloon. For example, the inflated diameter of the first balloon 110 may be around 7 mm, and the inflated diameter of the second balloon 112 may be around 15 mm, according to one implementation. According to some implementations, balloons allow the surgeon to control the size of the anchor and are less traumatic to the vessel than other anchoring mechanism. However, other suitable anchoring mechanisms may be used in other implementations.

[0023] According to one exemplary implementation in which hemodynamic sensor 14 is to be delivered within the left pulmonary artery branch, at least a portion of the system 100 is inserted within a vessel of a patient, as shown in FIG. 5. The system 100 may be inserted over a guide wire 108, for example. The distal tip 116 of the inner support member 106 is extended past the distal tip 104 of the outer catheter 102 such that anchor balloon 110 is outside of the outer catheter 102, which is also shown in FIG. 5. The first balloon 110 is inflated, and the balloon 110 is urged through vessel 12a until the balloon 110 is lodged within the vessel 12a, which is shown in FIG. 5. The second balloon 112 is then inflated and urged through a second vessel 12b until it is lodged within the second vessel 12b, which is shown in FIG. 6. Then, the hemodynamic sensor 14 may be released into a space between the first balloon 110 and the second balloon 112, which is shown in FIG. 7.

[0024] Prior to releasing the hemodynamic sensor 14 within the left pulmonary artery branch, the strength of a signal from the sensor 14 may be tested by using a transceiver device (not shown) that is outside of the patient's body. The transceiver device is disposed on or near a patient's back adjacent the location of the sensor 14. If the signal received from the sensor 14 is sufficient, then the sensor 14 location is confirmed as being correct and the sensor 14 is released into the vessel. However, if the signal received from the sensor 14 is weak or inadequate, one or both of the balloons 110, 112 may be deflated to allow the support portion 114 and the sensor 14 to be moved to a more ideal location within the vessel. Once in the new position, the balloons 110, 112 are re-inflated and the signal strength of the sensor 14 is tested to confirm the placement of the sensor 14.

[0025] Once the hemodynamic sensor 14 is in its intended position, the delivery system 100 may be retracted. To retract the system 100, the first balloon 110 is deflated, which is shown in FIG. 8, and the distal tip 116 of the inner catheter 106 is retracted into the outer catheter 102, which is shown in FIG. 9. Then, the second inflatable balloon 112 is deflated, and the outer catheter 102 is retracted from the body, as shown in FIG. 10.

[0026] This system 100 and method of delivery of an implantable device within a vessel of a patient does not require catheter exchange over a guide wire or contrast dye, which is more efficient, less traumatic to the vasculature, has less side effects for the patient, and allows the surgeon to identify the best location for releasing the implantable device with minimal manipulations. For example, this system 100 may be used safely with patients having higher body mass, which are excluded from being subject to known delivery techniques.

[0027] Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art. Methods and materials similar or equivalent to those described herein can be used in the practice or testing of the present disclosure. As used in the specification, and in the appended claims, the singular forms "a," "an," "the" include plural referents unless the context clearly dictates otherwise. The term "comprising" and variations thereof as used herein is used synonymously with the term "including" and variations thereof and are open, non-limiting terms. While implementations will be described for steering wheel hand detection systems, it will become evident to those skilled in the art that the implementations are not limited thereto.

[0028] As utilized herein, the terms "approximately," "about," "substantially", and similar terms are intended to have a broad meaning in harmony with the common and accepted usage by those of ordinary skill in the art to which the subject matter of this disclosure pertains. It should be understood by those of skill in the art who review this disclosure that these terms are intended to allow a description of certain features described and claimed without restricting the scope of these features to the precise numerical ranges provided. Accordingly, these terms should be interpreted as indicating that insubstantial or inconsequential modifications or alterations of the subject matter described and claimed are considered to be within the scope of the invention as recited in the appended claims.

[0029] It should be noted that the term "exemplary" as used herein to describe various embodiments is intended to indicate that such embodiments are possible exam-

ples, representations, and/or illustrations of possible embodiments (and such term is not intended to connote that such embodiments are necessarily extraordinary or superlative examples).

[0030] The terms "coupled," "connected," and the like as used herein mean the joining of two members directly or indirectly to one another. Such joining may be stationary (e.g., permanent) or moveable (e.g., removable or releasable). Such joining may be achieved with the two members or the two members and any additional intermediate members being integrally formed as a single unitary body with one another or with the two members or the two members and any additional intermediate members being attached to one another.

[0031] Although only a few embodiments have been described in detail in this disclosure, those skilled in the art who review this disclosure will readily appreciate that many modifications are possible (e.g., variations in sizes, dimensions, structures, shapes and proportions of the various elements, values of parameters, mounting or layering arrangements, use of materials, colors, orientations, etc.). For example, elements shown as integrally formed may be constructed of multiple parts or elements, the position of elements may be reversed or otherwise varied, and the nature or number of discrete elements or positions may be altered or varied. The order or sequence of any process or method steps may be varied or re-sequenced according to alternative embodiments.

Claims

1. A delivery system configured for delivering an implantable device within a vessel (12A, 12B) of a patient (2), the delivery system comprising: an outer catheter (102) having a distal tip (104); and an inner support member (106) disposed within the outer catheter (102), the inner support member (106) comprising an anchor member (110, 112) disposed adjacent a distal tip (104) of the inner support member (106) and a support portion (114) axially inward of the anchor member (110, 112), the support portion (114) being configured for supporting the implantable device to be delivered thereon; wherein: the anchor member (110, 112) is an inflatable balloon (110, 112) having an inflated diameter, and the inflated diameter of the anchor member (110, 112) corresponds to a diameter of a portion of a vessel (12A, 12B) in which the anchor member (110, 112) is to be disposed, and the anchor member (110, 112) is configured to be lodged in the portion of the vessel (12A, 12B) to locate an intended position of the anchor member (110, 112) and to prevent movement of the inner support member (106) relative to the vessel (12A, 12B) during release of the implantable device.

2. The delivery system of Claim 1, wherein the support portion configured to support an implantable device thereon comprises a coupling mechanism to removably secure the implantable device to be delivered to the support portion.

3. The delivery system of Claims 1 or 2, wherein the inflated diameter of the anchor member is selected to lodge the balloon in the portion of the vessel in which the balloon is to be disposed.

4. The delivery system of any one of Claims 1-3, wherein the anchor member is a first anchor member, and the distal tip of the outer catheter comprises a second anchor member, the second anchor member having a second diameter corresponds to a second diameter of a portion of a second vessel in which the second anchor member is to be disposed.

5. The delivery system of Claim 4, wherein:

   the first anchor member is a first inflatable balloon having a first inflated diameter, wherein the first inflated diameter is selected to lodge the first balloon in the portion of the vessel in which the first balloon is to be disposed, and
   the second anchor member is a second inflatable balloon having a second inflated diameter, wherein the second inflated diameter is selected to lodge the second balloon in the portion of the second vessel in which the second balloon is to be disposed.

6. The delivery system of Claim 5, wherein the first inflated diameter is smaller than the second inflated diameter.

7. The delivery system of any one of Claims 1 to 6, wherein the implantable device to be delivered is a hemodynamic sensor.

8. The delivery system of Claim 7, wherein the hemodynamic sensor is a CARDIOMEMS sensor.

9. The delivery system of any one of Claims 1 to 8, wherein the inner support member is an inner catheter.

10. The delivery system of any one of claims 1-9, further comprising a string configured to be tied to the implantable device to be delivered to the inner support member and pulled to release the implantable device to be delivered from the inner support member.

11. The delivery system of any one of claims 1-10, further comprising a transceiver device configured to test the strength of a signal from the implantable device to be delivered.

Patentansprüche

1. Zufuhrsystem, das zum Zuführen einer implantierbaren Vorrichtung innerhalb eines Gefäßes (12A, 12B) eines Patienten (2) konfiguriert ist, das Zufuhrsystem umfassend: einen äußeren Katheter (102) mit einer distalen Spitze (104); und ein inneres Stützglied (106), das innerhalb des äußeren Katheters (102) angeordnet ist, wobei das innere Stützglied (106) ein Ankerglied (110, 112), das einer distalen Spitze (104) des inneren Stützglieds (106) benachbart angeordnet ist, und einen Stützabschnitt (114) axial einwärts zum Ankerglied (110, 112) umfasst, wobei der Stützabschnitt (114) zum Stützen der implantierbaren Vorrichtung konfiguriert ist, die darauf zugeführt werden soll; wobei: das Ankerglied (110, 112) ein aufblasbarer Ballon (110, 112) mit einem aufgeblasenem Durchmesser ist und der aufgeblasene Durchmesser des Ankerglieds (110, 112) einem Durchmesser eines Abschnitts eines Gefäßes (12A, 12B) entspricht, in dem das Ankerglied (110, 112) angeordnet werden soll, und das Ankerglied (110, 112) dazu konfiguriert ist, in dem Abschnitt des Gefäßes (12A, 12B) festgesetzt zu werden, um eine beabsichtigte Position des Ankerglieds (110, 112) zu fixieren und Bewegung des inneren Stützglieds (106) bezüglich des Gefäßes (12A, 12B) während der Freigabe der implantierbaren Vorrichtung zu verhindern.

2. Zufuhrsystem nach Anspruch 1, wobei der Stützabschnitt, der zum Stützen einer implantierbaren Vorrichtung darauf konfiguriert ist, einen Kupplungsmechanismus zum lösbaren Befestigen der implantierbaren Vorrichtung, die zugeführt werden soll, am Stützabschnitt umfasst.

3. Zufuhrsystem nach Anspruch 1 oder 2, wobei der aufgeblasene Durchmesser des Ankerglieds zum Festsetzen des Ballons im Abschnitt des Gefäßes, in dem der Ballon angeordnet werden soll, ausgewählt ist.

4. Zufuhrsystem nach einem der Ansprüche 1 bis 3, wobei das Ankerglied ein erstes Ankerglied ist und die distale Spitze des äußeren Katheters ein zweites Ankerglied umfasst, wobei das zweite Ankerglied einen zweiten Durchmesser aufweist, der einem zweiten Durchmesser eines Abschnitts eines zweiten Gefäßes entspricht, in dem das zweite Ankerglied angeordnet werden soll.

5. Zufuhrsystem nach Anspruch 4, wobei:

   das erste Ankerglied ein erster aufblasbarer Ballon mit einem ersten aufgeblasenen Durchmesser ist, wobei der erste aufgeblasene Durchmesser zum Festsetzen des ersten Ballons im Abschnitt des Gefäßes, in dem der erste Ballon angeordnet werden soll, ausgewählt ist, und
   das zweite Ankerglied ein zweiter aufblasbarer Ballon mit einem zweiten aufgeblasenen Durchmesser ist, wobei der zweite aufgeblasene Durchmesser zum Festsetzen des zweiten Ballons im Abschnitt des zweiten Gefäßes, in dem der zweite Ballon angeordnet werden soll, ausgewählt ist.

6. Zufuhrsystem nach Anspruch 5, wobei der erste aufgeblasene Durchmesser kleiner als der zweite aufgeblasene Durchmesser ist.

7. Zufuhrsystem nach einem der Ansprüche 1 bis 6, wobei die implantierbare Vorrichtung, die zugeführt werden soll, ein hämodynamischer Sensor ist.

8. Zufuhrsystem nach Anspruch 7, wobei der hämodynamische Sensor ein CARDIOMEMS-Sensor ist.

9. Zufuhrsystem nach einem der Ansprüche 1 bis 8, wobei das innere Stützglied ein innerer Katheter ist.

10. Zufuhrsystem nach einem der Ansprüche 1 bis 9, ferner umfassend einen Faden, der dazu konfiguriert ist, an der implantierbaren Vorrichtung, die zugeführt werden soll, am inneren Stützglied festgebunden zu werden und zum Freigeben der implantierbaren Vorrichtung, die zugeführt werden soll, vom inneren Stützglied gezogen zu werden.

11. Zufuhrsystem nach einem der Ansprüche 1 bis 10, ferner umfassend eine Transceiver-Vorrichtung, die zum Testen der Stärke eines Signals von der implantierbaren Vorrichtung, die zugeführt werden soll, konfiguriert ist.

Revendications

1. Système de pose configuré pour poser un dispositif implantable à l'intérieur d'un vaisseau (12A, 12B) d'un patient (2), le système de pose comprenant: un cathéter externe (102) ayant une pointe distale (104) ; et un élément de support interne (106) disposé à l'intérieur du cathéter externe (102), l'élément de support interne (106) comprenant un élément d'ancrage (110, 112) disposé adjacent à une pointe distale (104) de l'élément de support interne (106) et une partie de support (114) axialement vers l'intérieur de l'élément d'ancrage (110, 112), la partie de support (114) étant configurée pour supporter sur elle le dispositif implantable devant être posé ; dans lequel : l'élément d'ancrage (110, 112) est un ballonnet gonflable (110, 112) ayant un diamètre gonflé, et le diamètre gonflé de l'élément d'ancrage (110, 112) correspond à un diamètre d'une partie d'un

vaisseau (12A, 12B) dans lequel l'élément d'ancrage (110, 112) doit être disposé, et l'élément d'ancrage (110, 112) est configuré pour être logé dans la partie du vaisseau (12A, 12B) pour situer une position prévue de l'élément d'ancrage (110, 112) et pour empêcher un mouvement de l'élément de support interne (106) par rapport au vaisseau (12A, 12B) pendant une libération du dispositif implantable.

2. Système de pose selon la revendication 1, dans lequel la partie de support configurée pour supporter sur elle un dispositif implantable comprend un mécanisme de couplage pour fixer de manière amovible le dispositif implantable devant être posé à la partie de support.

3. Système de pose selon les revendications 1 ou 2, dans lequel le diamètre gonflé de l'élément d'ancrage est choisi pour loger le ballonnet dans la partie du vaisseau dans laquelle le ballonnet doit être disposé.

4. Système de pose selon l'une quelconque des revendications 1 à 3, dans lequel l'élément d'ancrage est un premier élément d'ancrage, et la pointe distale du cathéter externe comprend un second élément d'ancrage, le second élément d'ancrage ayant un second diamètre correspond à un second diamètre d'une partie d'un second vaisseau dans lequel le second élément d'ancrage doit être disposé.

5. Système de pose selon la revendication 4, dans lequel :

le premier élément d'ancrage est un premier ballonnet gonflable ayant un premier diamètre gonflé, dans lequel le premier diamètre gonflé est choisi pour loger le premier ballonnet dans la partie du vaisseau dans laquelle le premier ballonnet doit être disposé, et
le second élément d'ancrage est un second ballonnet gonflable ayant un second diamètre gonflé, dans lequel le second diamètre gonflé est choisi pour loger le second ballonnet dans la partie du second vaisseau dans laquelle le second ballonnet doit être disposé.

6. Système de pose selon la revendication 5, dans lequel le premier diamètre gonflé est inférieur au second diamètre gonflé.

7. Système de pose selon l'une quelconque des revendications 1 à 6, dans lequel le dispositif implantable devant être posé est un capteur hémodynamique.

8. Système de pose selon la revendication 7, dans lequel le capteur hémodynamique est un capteur CARDIOMEMS.

9. Système de pose selon l'une quelconque des revendications 1 à 8, dans lequel l'élément de support interne est un cathéter interne.

10. Système de pose selon l'une quelconque des revendications 1 à 9, comprenant en outre un cordon configuré pour être attaché au dispositif implantable devant être posé à l'élément de support interne et tiré pour libérer le dispositif implantable devant être posé de l'élément de support interne.

11. Système de pose selon l'une quelconque des revendications 1 à 10, comprenant en outre un dispositif émetteur-récepteur configuré pour tester la force d'un signal provenant du dispositif implantable devant être posé.

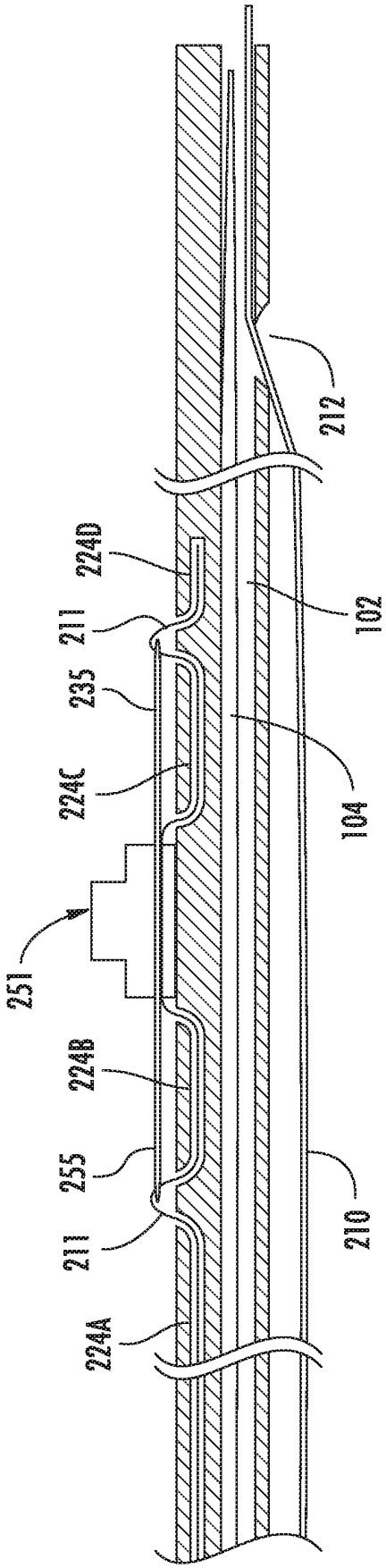

FIG. 1

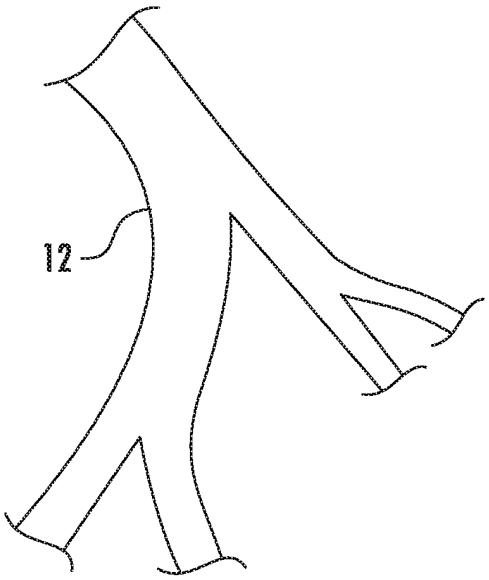

FIG. 2A

FIG. 2B

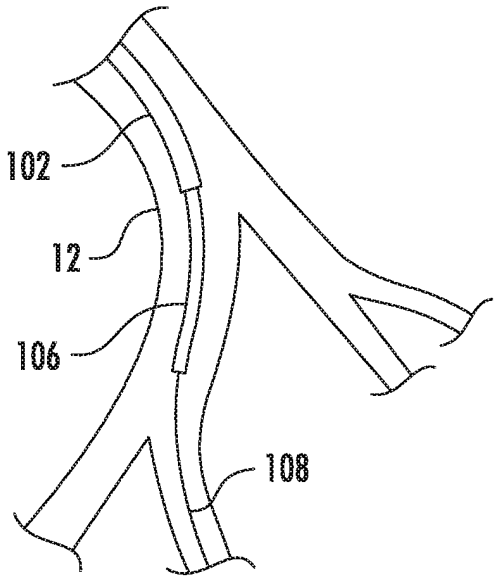

FIG. 3

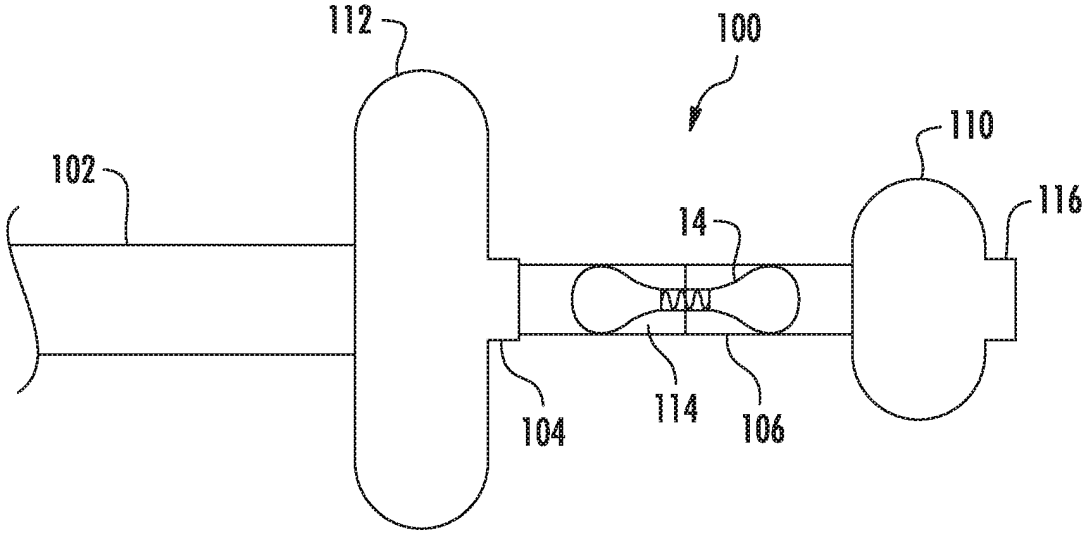

FIG. 4

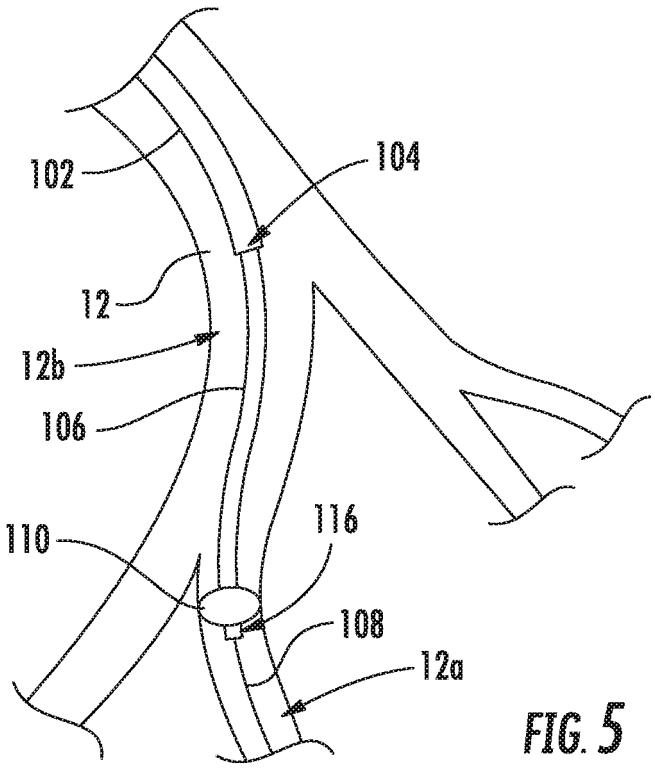

FIG. 5

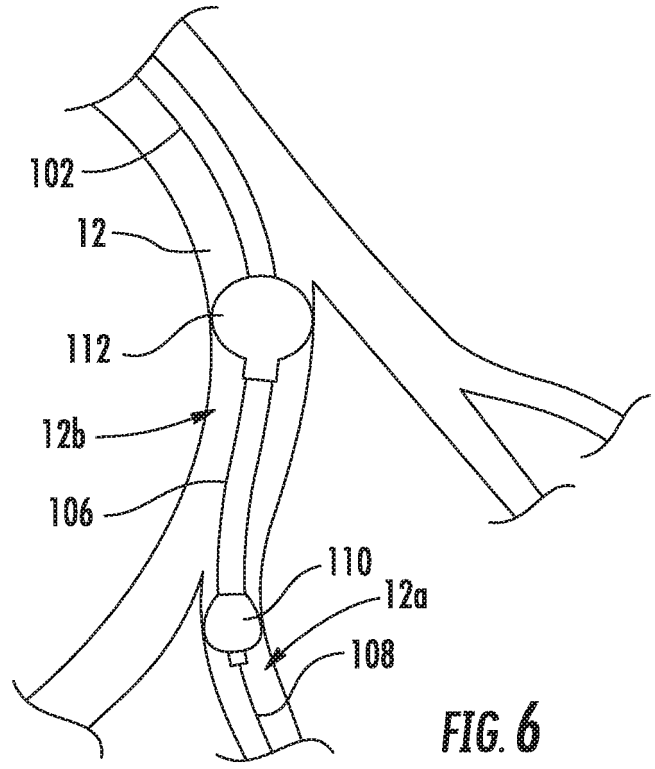

FIG. 6

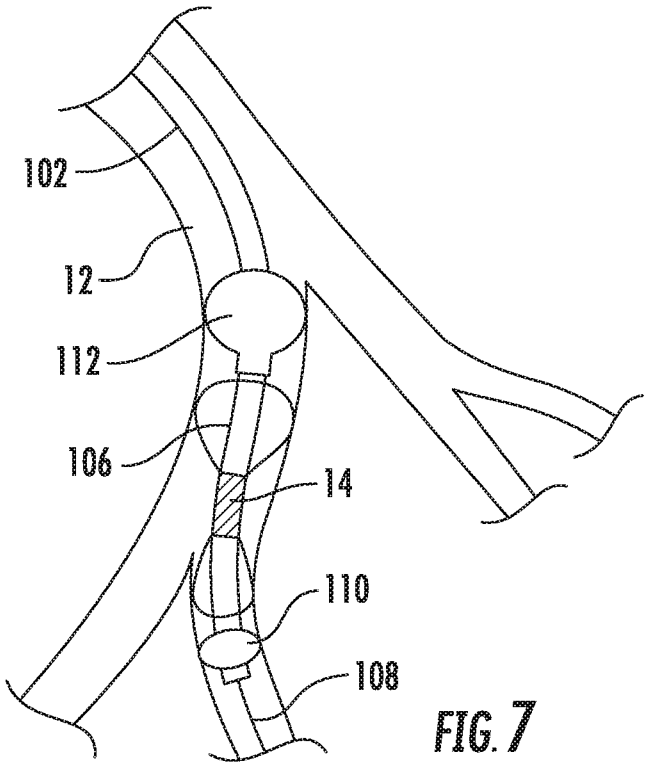

FIG. 7

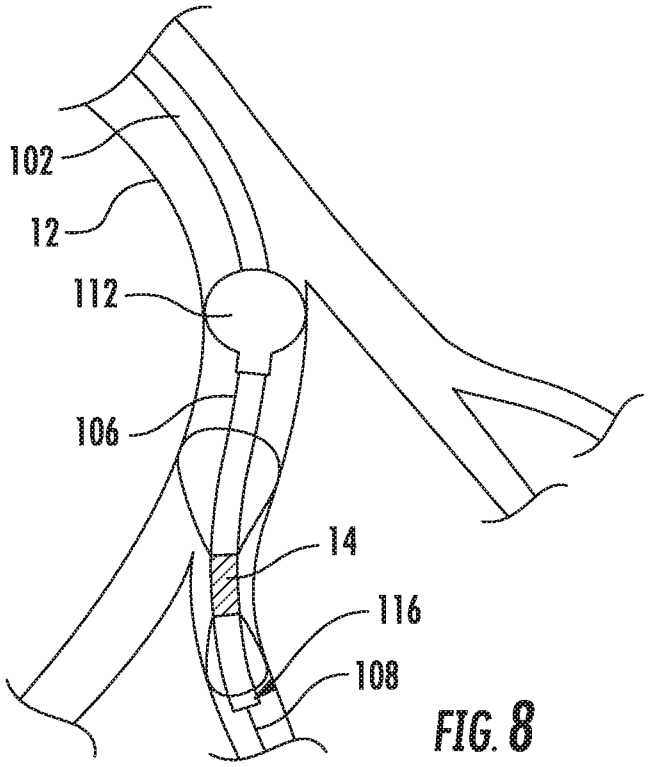

FIG. 8

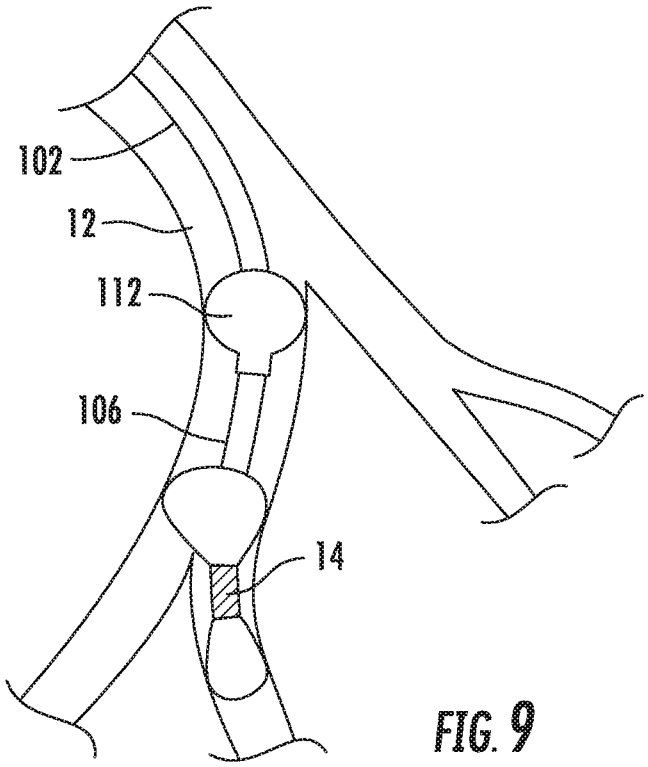

FIG. 9

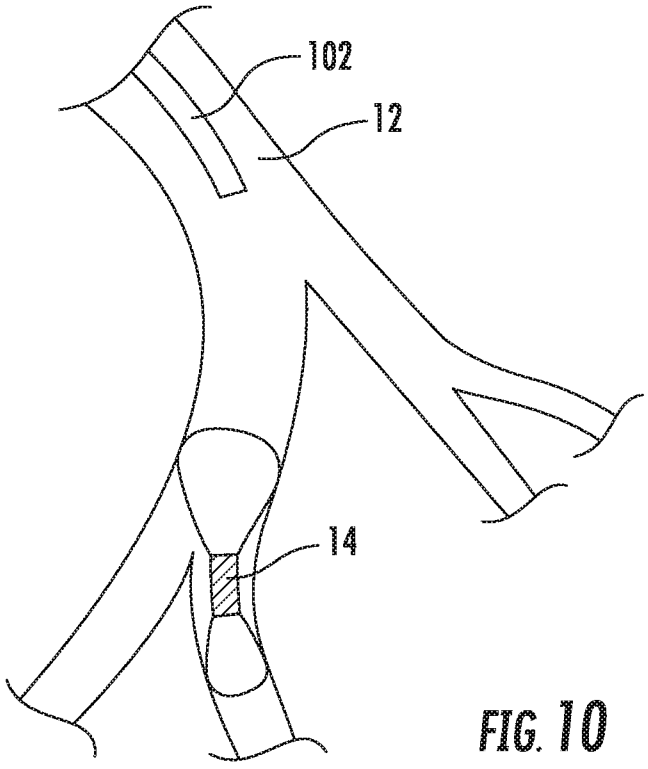

FIG. 10

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 6855115 B **[0001]**
- US 7966886 B **[0001]**
- US 8353841 B **[0001] [0003]**
- US 2003204138 A1 **[0005]**
- US 2013116549 A1 **[0005]**
- US 2013261544 A1 **[0005]**
- US 2012265283 A1 **[0005]**

专利名称(译)	用于发布可植入设备的系统		
公开(公告)号	EP3307212B1	公开(公告)日	2020-03-04
申请号	EP2016808447	申请日	2016-06-10
[标]申请(专利权)人(译)	俄亥俄州国家创新基金会		
申请(专利权)人(译)	俄亥俄州创新基金		
当前申请(专利权)人(译)	俄亥俄州立大学创新基金		
[标]发明人	KAHWASH RAMI		
发明人	KAHWASH, RAMI		
IPC分类号	A61F2/954 A61F2/958 A61F2/962 A61F2/966 A61M25/04 A61M25/10 A61B5/0215 A61B5/00		
CPC分类号	A61B5/0031 A61B5/0215 A61B5/6853 A61B5/6876 A61B5/6882 A61B5/6886 A61B2560/066 A61M25/04 A61M2025/1015 A61M2025/1054 A61M25/10		
优先权	62/174267 2015-06-11 US		
其他公开文献	EP3307212A1 EP3307212A4		
外部链接	Espacenet		

摘要(译)

输送系统可包括例如具有远侧末端的外部导管和设置在外部导管内的内部支撑构件，例如内部导管。 内部支撑构件包括邻近内部支撑构件的远侧末端的锚固构件和在锚固构件的轴向内侧的支撑部分。 支撑部分构造成用于在其上支撑可植入装置。 锚固构件的直径对应于将要布置锚固构件的容器的一部分的直径。 锚定构件被构造成安置在血管的该部分中，以定位锚定构件的预期位置并在释放可植入装置期间防止内部支撑构件相对于血管运动。