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(54) Title: SYSTEMS AND METHODS FOR CAPTURING AND REMOVING BLOOD CLOTS

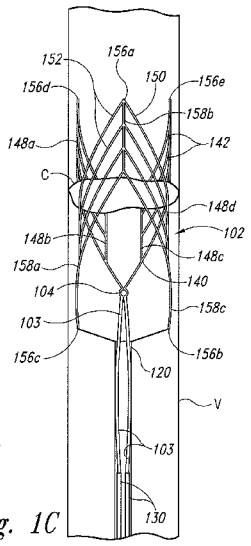

Fig. 1C

(57) Abstract: The present technology relates to systems and methods for removingblood clots in blood vessels. In some embodiments, the systems include a clot removal device endovascularly deliverable to a treatment site. The clot removal device includes a capture structure comprising a first arm (140) having a plurality of laterally-extending first arm fins (142) and a second arm (150) having a plurality of laterally-extending second arm fins (152) configured to interleave with the first arm fins. In certain embodiments, the first arm fins are configured in a winged arrangement and the second arm fins are configured in a chevron arrangement. The clot removal device can further include a plurality of protruding peripheral points (156) configured to engage with the clot.

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SYSTEMS AND METHODS FOR CAPTURING AND REMOVING BLOOD CLOTS

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] The present application claims the benefit of pending U.S. Provisional Patent Application No. 61/493,385, filed on June 3, 2011, and incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The present technology relates to systems and methods for removing blood clots in a blood vessel.

BACKGROUND

[0003] A blood clot can decrease or cut off blood flow through a blood vessel, and may result in damage or death to tissue supplied by that vessel. Further, if a blood clot dislodges and becomes free-floating, it can cause a stroke, heart attack, pulmonary embolism, or other negative condition. While early stage clots may be treatable with drugs, more advanced clots may have to be physically removed from the patient's vasculature using a treatment device.

[0004] Delivering a treatment device to a blood clot site can be difficult because of complex patient vasculature and/or particularities of the blood clot. For example, narrow and/or tortuous vasculature near the clot site can be very complicated to navigate. Additionally, several particularized treatment devices may be required for capturing variously sized and shaped blood clots.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] Figure 1A is a partially schematic view of a clot removal device being endovascularly delivered proximate a blood clot in accordance with an embodiment of the technology.

[0006] Figures 1B and 1C are partially schematic views of the clot removal device of Figure 1A in a deployed configuration proximate the blood clot in accordance with an embodiment of the technology.

DETAILED DESCRIPTION

[0007] The present disclosure describes therapeutic devices and associated methods for removing blood clots in a blood vessel. For example, the therapeutic devices and associated methods can be used to remove blood clots in the treatment of ischemic stroke. In particular, selected embodiments of the present technology are directed to capture structures that are alternately configurable to engage with the blood clot in a low-profile configuration and in a deployed configuration. The following description provides many specific details for a thorough understanding of, and enabling description for, embodiments of the disclosure. Well-known structures, systems, and methods often associated with such systems have not been shown or described in detail to avoid unnecessarily obscuring the description of the various embodiments of the disclosure. In addition, those of ordinary skill in the relevant art will understand that additional embodiments may be practiced without several of the details described below.

[0008] Figures 1A-1C are partially schematic views of a clot removal device 100 being delivered proximate to a blood clot C in a blood vessel V of a patient in accordance with an embodiment of the technology. In particular, Figures 1A-1C illustrate the clot removal device 100 being deployed from a low-profile, collapsed delivery state (Figure 1A) to a deployed state in which the clot removal device 100 is in an expanded configuration (Figure 1C). The clot removal device 100 can include a capture structure 102, a supplemental stabilizer 103, and a junction or joint 104 between the capture structure 102 and the supplemental stabilizer 103. As will be described in further detail below, the capture structure 102 is configured to transform between the low-profile delivery arrangement and the expanded or deployed arrangement and can be used to capture and remove the clot C obstructing or partially obstructing the blood vessel V.

[0009] Referring first to Figure 1A, the clot removal device 100 is carried by a delivery device including an elongated, flexible introducer sheath 120 and a positioning mechanism 130, such as one or more delivery wires. The clot removal device 100 is generally radially compressed along its longitudinal axis and arranged in a substantially cylindrical, low-profile arrangement within the sheath 120. A proximal portion of the supplemental stabilizer 103 is attached to a distal portion of the positioning mechanism 130. The clot removal device 100 may be collapsed into the low-profile arrangement shown in Figure 1A using a loading sheath (not shown) into which the clot removal device 100 is loaded to assume a smaller diameter

delivery arrangement before being transferred to the delivery sheath 120. In other embodiments, however, the clot removal device 100 may be installed within the delivery sheath 120 using other techniques.

[0010] The positioning mechanism 130 can be a pusher system associated with the proximal or distal portions of the supplemental stabilizer 103 and/or the capture structure 102. The positioning mechanism 130 can move within the delivery sheath 120 to translate the clot removal device 100 relative to the delivery sheath 120. The clot removal device 100 may be deployed by actively driving the positioning mechanism 130 distally to push the clot removal device 100 out of the delivery sheath 120 and/or by actively withdrawing the delivery sheath 120 while maintaining the positioning mechanism 130 and clot removal device 100 at a desired location. As described in more detail below, the clot removal device 100 and/or the positioning mechanism 130 can incorporate detachment elements or detachment mechanisms (not shown) for releasing the clot removal device 100. Detachment mechanisms known in the art, including mechanical, electrical, hydraulic, thermal, and/or other such systems may be used.

[0011] The capture structure 102 can include a first arm 140 and a second arm 150 proximally offset from the first arm 140 when the clot removal device 100 is in the compressed arrangement. As best seen in Figures 1B and 1C, the first arm 140 includes a plurality of fins 142 extending laterally in a winged shape. In the illustrated embodiment, for example, the fins 142 are coupled to one another with central and peripheral shafts, identified individually as shafts 148a-d. In some embodiments, the fins 142 are spaced apart from one another by a distance of from about 0.5 to about 3.0 cm and, in a particular embodiment, from about 0.5 to about 2.0 cm. In other embodiments, however, the fins 142 may have a different arrangement relative to each other and/or different dimensions.

[0012] The second arm 150 can likewise include a plurality of fins 152 extending in a chevron shape. In the illustrated embodiment, for example, the fins 152 are coupled to one another with a central shaft and peripheral shafts 158a-c. In some embodiments, the fins 152 are spaced apart from one another by a distance of from about 0.5 to about 3.0 cm and, in a particular embodiment, from about 0.5 to about 2.0 cm. In other embodiments, however, the fins 152 may have a different arrangement relative to each other. The capture structure 102 can also include pointed or protruding peripheral points 156a-e. In some embodiments, the clot removal device 100 can include multiple capture structures 102, laterally or proximally positioned relative to each other.

[0013] In operation, the clot removal device 100 and delivery device can be passed through the patient's vasculature using a guide catheter (not shown) or other known techniques while the clot removal device 100 is in the low-profile delivery arrangement illustrated in Figure 1A. In the illustrated embodiment, the arms 140 and 150 can be proximally offset (e.g., not interweaved), with one arm 140 ahead of the other 150. In further embodiments, the arms 140, 150 can be overlapped or interlaced in the low-profile arrangement. When the clot removal device 100 is positioned within the vasculature (e.g., the vessel V) at a treatment site (e.g., at, in, or beyond the clot C), the positioning mechanism 130 is moved distally and/or the delivery sheath 120 is moved proximally until the capture structure 102 is positioned beyond the distal end of the delivery sheath 120 (Figures 1B and 1C). In some methods of use, one or more of the protruding peripheral points 156a-e can engage with the clot C prior to or during deployment of the capture structure 102. In one embodiment, for example, the distal-most peripheral point 156a can pierce or pass through the clot C before the clot removal device 100 is fully deployed. The connections of the arms 140, 150 to a central shaft and peripheral shafts 158a-c can provide grabbing action by advancing or retracting the delivery sheath 120 relative to the device 100. In other embodiments, the grabbing action can also be performed by advancing and/or retracting the guide catheter (not shown).

[0014] Referring to Figures 1B and 1C together, as the clot removal device 100 exits the delivery sheath 120, the capture structure 102 expands into the deployed arrangement in which the fins 142 of the first arm 140 are interleaved with the fins 152 of the second arm 150 such that the fins 142, 152 engage one another when pulled at a proximal end. In some embodiments, when deployed, the protruding peripheral points 156a-e can further engage with (e.g., pierce) the clot C. The arms 140 and 150 can slide through, surround, or partially surround a portion of the clot C. In some embodiments, the number and spacing of the fins 142 and 152 in the capture structure 102 can be controlled to control the amount of engagement of the fins 142 and 152 with the clot C. The fins 142 and 152 can together compress the clot C to engage it, and the capture structure 102 and the clot C can then be pulled from the blood vessel V to remove the clot C. In further embodiments, the clot removal device 100 can be deployed in the vessel V at a point beyond the clot C. Upon withdrawing the clot removal device 100, the clot C is also withdrawn from the vessel V. In some embodiments, the arms 140 and 150 can be staggered along the clot removal device 100

to reduce the profile of the device and better engage the clot C. In further embodiments, there can be a multiplicity of staggered arms to engage clots C of longer lengths.

[0015] The clot removal device 100 offers several advantages over conventional systems and techniques for clot removal. For example, the clot removal device 100 is transformable into the compressed or low-profile delivery arrangement illustrated in Figure 1A. This arrangement can allow the clot removal device 100 to more easily navigate within narrow and/or tortuous vasculature to a clot site. Navigation capability can be further improved by using flexible or somewhat flexible materials for all or a portion of the clot removal device 100. Additionally, the variable profile size of the clot removal device 100 (e.g., from the compressed, low-profile state to a fully deployed state—and positions in between) offers additional flexibility in effectively capturing and removing clots of varying sizes/shapes.

[0016] The clot removal device 100 can additionally improve the effectiveness of the clot removal process as compared with conventional devices. For example, the low profile arrangement of the clot removal device 100 can provide more push force to drive through and engage with clot(s) C. Furthermore, the clot removal device 100 can include a plurality of capture structures 102 to more completely remove clot(s) C, and offers flexibility for varying clot sizes. For example, the clot removal device 100 having two capture structures 102 is expected to effectively capture a large clot C (e.g., the device 100 can engage with the clot C at multiple locations to improve the grasp of the clot C). In another method of operation, a more proximal capture structure can pierce through and be deployed beyond the clot C while a more distal capture structure can be deployed within the clot C. A portion of the clot C can be removed with the distal capture structure, and the proximal capture structure can remove portions of the clot C not caught by the distal capture structure.

Examples

1. A clot removal device endovascularly deliverable to a treatment site, the clot removal device comprising:

a capture structure transformable between a delivery arrangement and a deployed arrangement, the capture structure comprising—

a first arm having a plurality of laterally-extending first arm fins, wherein the first arm fins, when deployed, are configured in a winged arrangement;

a second arm having a plurality of laterally-extending second arm fins configured to interleave with the first arm fins, wherein the second arm fins, when deployed are configured in a chevron arrangement; and

a plurality of protruding peripheral points configured to engage with the clot.

2. The clot removal device of example 1 wherein the capture structure further comprises:

a third arm distally offset from the first arm and the second arm, the third arm, when deployed, having a plurality of laterally-extending third arm fins; and

a fourth arm distally offset from the first arm and the second arm, the fourth arm, when deployed, having a plurality of laterally-extending fourth arm fins configured to interleave with the third arm fins.

3. The clot removal device of example 1, further comprising a positioning mechanism comprising a plurality of wires including a first wire and a second wire, wherein the first wire and the second wire are attached to different sites on the capture structure.

4. The clot removal device of example 3, further comprising a delivery sheath configured to at least partially surround the capture structure.

5. The clot removal device of example 4 wherein the first and second wires are attached to the capture structure at a proximal portion of at least one of the first arm or the second arm, and wherein the first and second wires are configured to move proximally/distally relative to the delivery sheath.

6. The clot removal device of example 1 wherein, when the capture structure is in the delivery arrangement, the first arm is proximally displaced from the second arm.

7. The clot removal device of example 6, further comprising an introducer sheath configured to at least partially surround the capture structure when the capture structure is in the delivery arrangement.

8. The clot removal device of example 1 wherein individual first arm fins are spaced apart from one another from about 0.5 cm to about 3.0 cm, and individual second arm fins are spaced apart from one another from about 0.5 cm to about 3.0 cm.

9. A system for removing a blood clot, comprising:

a capture structure configured for delivery proximate the blood clot via a blood vessel, wherein the capture structure is movable between a compressed arrangement and an expanded arrangement, the capture structure comprising—

a first arm having a plurality of first arm lateral fins; and

a second arm having a plurality of second arm lateral fins configured to interleave with the first arm lateral fins;

a delivery sheath configured to radially compress the capture structure when the capture structure is in the compressed arrangement; and

a positioning mechanism coupled to the capture structure and proximally moveable relative to the delivery sheath to alter the capture structure between the compressed arrangement and the expanded arrangement.

10. The system of example 9 wherein:

the first arm lateral fins are coupled to one another via a first central shaft and a first peripheral shaft;

the second arm lateral fins are coupled to one another via a second central shaft and a second peripheral shaft; and

at least one of the first central shaft, first peripheral shaft, second central shaft, and second peripheral shaft comprises a protruding peripheral point configured to engage with the blood clot.

11. The system of example 9 wherein, when the capture structure is in the expanded arrangement, the first arm lateral fins are configured in a winged arrangement and the second arm lateral fins are configured in a chevron arrangement interleavable with the winged arrangement.

12. The system of example 9 wherein the positioning mechanism comprises a plurality of wires attached to the capture structure at a proximal portion of at least one of the

first arm or the second arm, and wherein the plurality of wires are configured to move proximally/distally relative to the delivery sheath.

13. The system of example 9 wherein, when the capture structure is in the compressed arrangement, the first arm is proximally displaced from the second arm.

14. A method of removing a blood clot, the method comprising:

expanding a radially-compressed capture structure having a plurality of laterally-extending first arm fins in a winged arrangement and laterally-extending second arm fins in a chevron arrangement;

engaging the blood clot with the capture structure; and

applying a proximal force to the capture structure and the blood clot.

15. The method of example 14 wherein expanding the radially-compressed capture structure comprises interleaving the first arm fins with the second arm fins.

16. The method of example 14, further comprising positioning the capture structure within vasculature of a human patient and proximate the blood clot using a plurality of wires including a first wire and a second wire, wherein the first wire and the second wire are attached to different sites on the capture structure.

17. The method of example 14 wherein engaging the blood clot with the capture structure comprises piercing the blood clot with a protruding peripheral point of the capture structure.

18. The method of example 14 wherein expanding the radially-compressed capture structure comprises expanding the capture structure at a treatment site within a patient vasculature distal to the blood clot.

19. The method of example 14 wherein expanding the radially-compressed capture structure comprises displacing the capture structure from a delivery sheath.

20. The method of example 19 wherein displacing the capture structure from the delivery sheath comprises at least one of (a) driving the capture structure in a distal direction, or (b) withdrawing the delivery sheath in a proximal direction.

[0017] The above detailed descriptions of embodiments of the technology are not intended to be exhaustive or to limit the technology to the precise form disclosed above. Although specific embodiments of, and examples for, the technology are described above for illustrative purposes, various equivalent modifications are possible within the scope of the technology, as those skilled in the relevant art will recognize. For example, while steps are presented in a given order, alternative embodiments may perform steps in a different order. The various embodiments described herein may also be combined to provide further embodiments. In particular, the clot removal devices described above with reference to particular embodiments can include one or more additional features or components, or one or more of the features described above can be omitted.

[0018] From the foregoing, it will be appreciated that specific embodiments of the technology have been described herein for purposes of illustration, but well-known structures and functions have not been shown or described in detail to avoid unnecessarily obscuring the description of the embodiments of the technology. Where the context permits, singular or plural terms may also include the plural or singular term, respectively.

[0019] Moreover, unless the word "or" is expressly limited to mean only a single item exclusive from the other items in reference to a list of two or more items, then the use of "or" in such a list is to be interpreted as including (a) any single item in the list, B all of the items in the list, or (c) any combination of the items in the list. Additionally, the term "comprising" is used throughout to mean including at least the recited feature(s) such that any greater number of the same feature and/or additional types of other features are not precluded. It will also be appreciated that specific embodiments have been described herein for purposes of illustration, but that various modifications may be made without deviating from the technology. Further, while advantages associated with certain embodiments of the technology have been described in the context of those embodiments, other embodiments may also exhibit such advantages, and not all embodiments need necessarily exhibit such advantages to fall within the scope of the technology. Accordingly, the disclosure and associated technology can encompass other embodiments not expressly shown or described herein.

CLAIMS

I/We claim:

1. A clot removal device endovascularly deliverable to a treatment site, the clot removal device comprising:

a capture structure transformable between a delivery arrangement and a deployed arrangement, the capture structure comprising—

a first arm having a plurality of laterally-extending first arm fins, wherein the first arm fins, when deployed, are configured in a winged arrangement;

a second arm having a plurality of laterally-extending second arm fins configured to interleave with the first arm fins, wherein the second arm fins, when deployed are configured in a chevron arrangement; and

a plurality of protruding peripheral points configured to engage with the clot.

2. The clot removal device of claim 1 wherein the capture structure further comprises:

a third arm distally offset from the first arm and the second arm, the third arm, when deployed, having a plurality of laterally-extending third arm fins; and

a fourth arm distally offset from the first arm and the second arm, the fourth arm, when deployed, having a plurality of laterally-extending fourth arm fins configured to interleave with the third arm fins.

3. The clot removal device of claim 1, further comprising a positioning mechanism comprising a plurality of wires including a first wire and a second wire, wherein the first wire and the second wire are attached to different sites on the capture structure.

4. The clot removal device of claim 3, further comprising a delivery sheath configured to at least partially surround the capture structure.

5. The clot removal device of claim 4 wherein the first and second wires are attached to the capture structure at a proximal portion of at least one of the first arm or the

second arm, and wherein the first and second wires are configured to move proximally/distally relative to the delivery sheath.

6. The clot removal device of claim 1 wherein, when the capture structure is in the delivery arrangement, the first arm is proximally displaced from the second arm.

7. The clot removal device of claim 6, further comprising an introducer sheath configured to at least partially surround the capture structure when the capture structure is in the delivery arrangement.

8. The clot removal device of claim 1 wherein individual first arm fins are spaced apart from one another from about 0.5 cm to about 3.0 cm, and individual second arm fins are spaced apart from one another from about 0.5 cm to about 3.0 cm.

9. A system for removing a blood clot, comprising:

a capture structure configured for delivery proximate the blood clot via a blood vessel, wherein the capture structure is movable between a compressed arrangement and an expanded arrangement, the capture structure comprising—

a first arm having a plurality of first arm lateral fins; and

a second arm having a plurality of second arm lateral fins configured to interleave with the first arm lateral fins;

a delivery sheath configured to radially compress the capture structure when the capture structure is in the compressed arrangement; and

a positioning mechanism coupled to the capture structure and proximally moveable relative to the delivery sheath to alter the capture structure between the compressed arrangement and the expanded arrangement.

10. The system of claim 9 wherein:

the first arm lateral fins are coupled to one another via a first central shaft and a first peripheral shaft;

the second arm lateral fins are coupled to one another via a second central shaft and a second peripheral shaft; and

at least one of the first central shaft, first peripheral shaft, second central shaft, and second peripheral shaft comprises a protruding peripheral point configured to engage with the blood clot.

11. The system of claim 9 wherein, when the capture structure is in the expanded arrangement, the first arm lateral fins are configured in a winged arrangement and the second arm lateral fins are configured in a chevron arrangement interleavable with the winged arrangement.

12. The system of claim 9 wherein the positioning mechanism comprises a plurality of wires attached to the capture structure at a proximal portion of at least one of the first arm or the second arm, and wherein the plurality of wires are configured to move proximally/distally relative to the delivery sheath.

13. The system of claim 9 wherein, when the capture structure is in the compressed arrangement, the first arm is proximally displaced from the second arm.

14. A method of removing a blood clot, the method comprising:

expanding a radially-compressed capture structure having a plurality of laterally-extending first arm fins in a winged arrangement and laterally-extending second arm fins in a chevron arrangement;

engaging the blood clot with the capture structure; and

applying a proximal force to the capture structure and the blood clot.

15. The method of claim 14 wherein expanding the radially-compressed capture structure comprises interleaving the first arm fins with the second arm fins.

16. The method of claim 14, further comprising positioning the capture structure within vasculature of a human patient and proximate the blood clot using a plurality of wires including a first wire and a second wire, wherein the first wire and the second wire are attached to different sites on the capture structure.

17. The method of claim 14 wherein engaging the blood clot with the capture structure comprises piercing the blood clot with a protruding peripheral point of the capture structure.

18. The method of claim 14 wherein expanding the radially-compressed capture structure comprises expanding the capture structure at a treatment site within a patient vasculature distal to the blood clot.

19. The method of claim 14 wherein expanding the radially-compressed capture structure comprises displacing the capture structure from a delivery sheath.

20. The method of claim 19 wherein displacing the capture structure from the delivery sheath comprises at least one of (a) driving the capture structure in a distal direction, or (b) withdrawing the delivery sheath in a proximal direction.

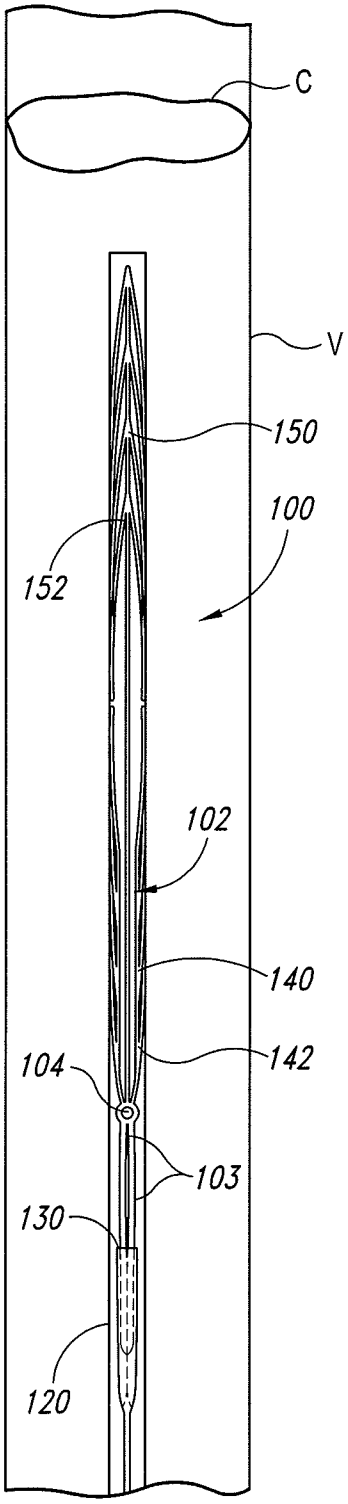
C
V
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Fig. 1A

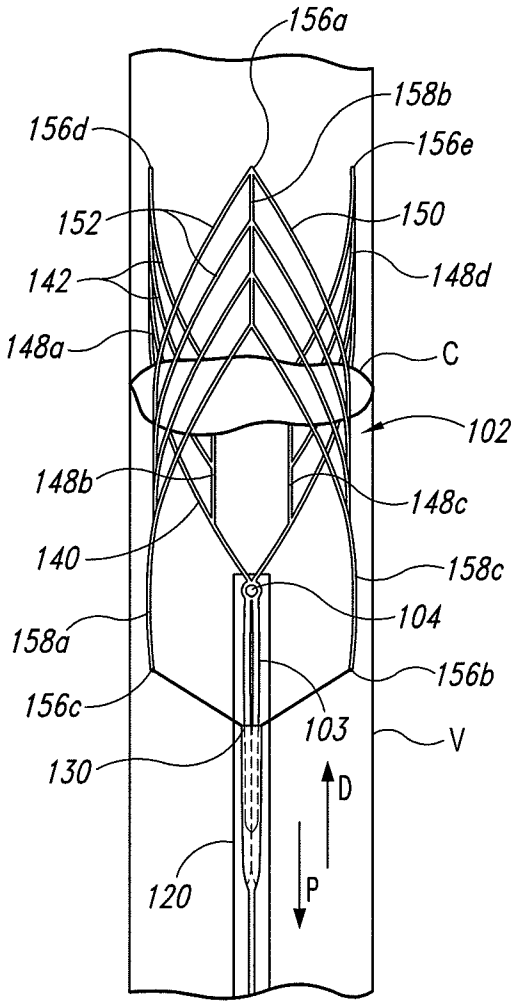
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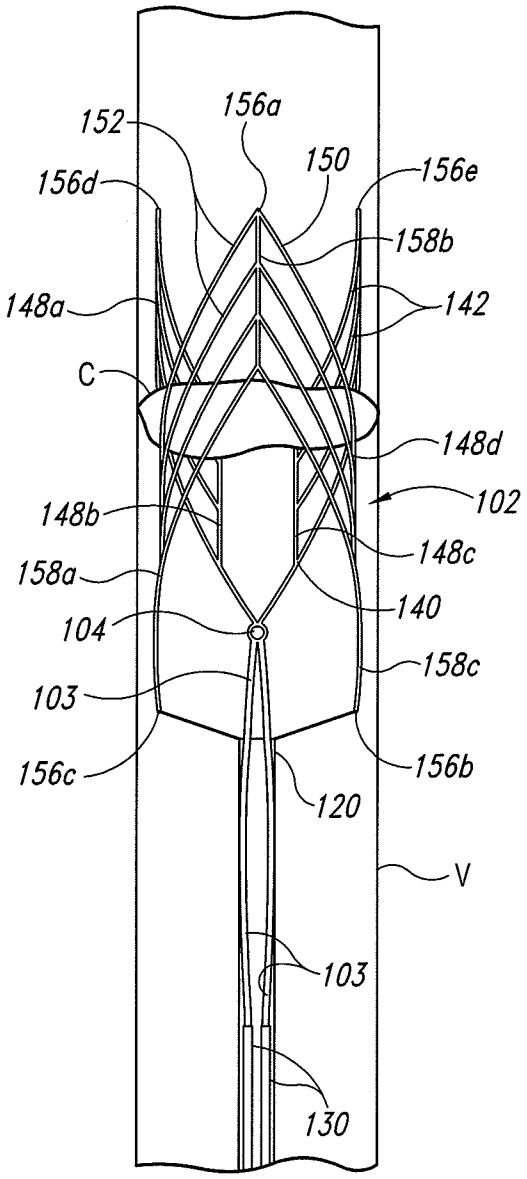
Fig. 1B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103
156c
156b
120
V
103
130

Fig. 1C

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/040536

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61B17/3207
ADD. A61B17/221

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)
A61B

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 practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2009/306678 A1 (HARDERT MICHAEL W [US] ET AL) 10 December 2009 (2009-12-10) the whole document	1-5,8-12
X	US 2008/269774 A1 (GARCIA ADRIAN [US] ET AL) 30 October 2008 (2008-10-30) paragraphs [0082] - [0084]; figure 14	1-5,9-12
X	US 2006/058837 A1 (BOSE ARANI [US] ET AL) 16 March 2006 (2006-03-16) paragraphs [0051] - [0066]; figures 4,5, 8, 25-28	1-5,8-12
X	WO 03/075793 A1 (SCIMED LIFE SYSTEMS INC [US]) 18 September 2003 (2003-09-18) figures 1-8	1-5,8-12

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
2 October 2012	15/10/2012

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2

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/040536

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 873 978 A (GINSBURG ROBERT [US]) 17 October 1989 (1989-10-17) figures 2,3 -----	1-5,8-12

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/040536

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

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

1. [X] Claims Nos.: 14-20
because they relate to subject matter not required to be searched by this Authority, namely:

see FURTHER INFORMATION sheet PCT/ISA/210

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

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

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

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

1. [ ] As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. [ ] As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. [ ] As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. [ ] No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

[ ] The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

[ ] The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

[ ] No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.1

Claims Nos.: 14-20

Claims 14-20 refer to a method of removing blood clots, the method comprising expanding a capture structure within a blood vessel, engaging the blood clot and applying a proximal force to the capture structure and the blood clot. All these steps are of surgical nature: they are performed in a medical environment, require special training, and entail a substantial health risk even if performed with the required skills. Furthermore, the removal of the clot is of therapeutic nature. The method defined in claims 12-20 is therefore a method of treatment of the human or animal body by surgery as well as a method of treatment of the human or animal body by therapy. No international search and no preliminary examination are required for such methods (Art. 17(2)(a)i, Rule 39.1(iv); Art. 34(4)(a)I, Rule 67.1(iv), PCTGL 9.08-9.10)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2012/040536

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