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[Continued on nextpage]

(54) Title: EMBOLIC DEVICE AND METHODS OF USE

(57) Abstract: An embolic device and methods of use are disclosed. The embolic device can be a soft braided structure. The embolic device can be deployed with a deployment tool that can maintain the longitudinal structural integrity of the embolic device while the embolic device is being translated along a catheter to the target site.

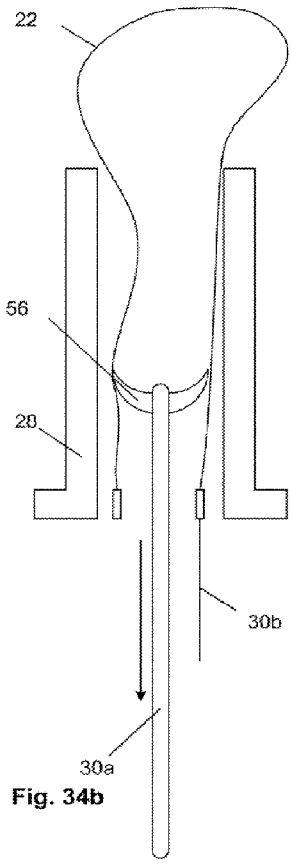

Fig. 34b

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NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, 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.

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Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(H))*

Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(88) Date of publication of the international search report:
3 October 2013

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

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

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

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

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

Box No. Ill 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:

Group I: Claims 1-11 and 25-31 are directed toward a system and method for deployment of an embolic device to a vascular target site comprising: a leader; a first radially expandable element; and a catheter.

Group II: Claims 12-16 are directed toward an embolic device for deployment in a vascular target site comprising: a leader; a coil; a winding with several lengths arid diameters; and a radially expandable element attached to the leader.

Group III: Claims 17-21 are directed toward an embolic device for deployment in a vascular target site comprising: a leader; a first coil and a second coil; a flexible element; and a braid attached to the leader.

Group IV: Claims 22-24 and 32-41 are directed toward an apparatus for deployment of an embolic device to a vascular target site comprising: a force-transfer element; a leader; a radial force transferor; a coil; and a radial bump.

-***- Please See Supplemental Page -***-

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

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

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

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-11 and 25-31

Remark on Protest

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

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

No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US13/00033

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A61M 31/00 (2013.01)
USPC - 606/200; 604/509, 508

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC(8): A61M 31/00 (2013.01)
USPC: 606/200; 604/509, 508

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)

MicroPatent (US-G, US-A, EP-A, EP-B, WO, JP-bib, DE-C.B, DE-A, DE-T, DE-U, GB-A, FR-A); IP.com; Google/Google Scholar; PubMed/MEDLINE: embolic, catheter, tension, braid, bump, force, longitudinal, axial, fold

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 2006/0030876 A1 (PEACOCK. III, JC et al.) February 9, 2006; figures 2A, 2B, 4A; paragraphs [0081]-[0082], [0085]-[0086]	1, 2, 4, 11 --- 3, 5-10
X --- Y	US 7828816 B2 (MAZZOCCHI, R et al.) November 9, 2010; figures 11A, 11B, 12A, 12B; column 3, lines 3-13; column 19, lines 26-39; column 21, lines 21-21 , 43-53; column 24, lines 57-62	25-31 --- 3, 5-10

☐ **Further documents are listed in the continuation of Box C.** ☐

* Special categories of cited documents:

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

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

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

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
05 August 2013 (05.08.2013)	09 AUG 2013

Name and mailing address of the ISA/US	Authorized officer:
Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Shane Thomas PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

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

The inventions listed as Groups I-IV do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the special technical features of Group I include a catheter; wherein the embolic device is slidably positioned in the catheter, and wherein a first radially expandable element is in a folded configuration such that a first layer and a second layer of the first radially expandable element are positioned between the catheter and the leader; translating the embolic device along the hollow channel of a catheter; wherein translating comprising maintaining longitudinal tension in the embolic device, which are not present in Groups II, III, IV; the special technical features of Group II include a coil comprising a winding with a first length, a second length distal to the first length, and a third length distal to the second length, and wherein the first length has a first diameter and wherein the second length has a second diameter larger than the first diameter, and wherein the third length has a third diameter smaller than the second diameter, which are not present in Group I, III, IV; the special technical features of Groups III include a first coil and a second coil, wherein the first coil is separate from the second coil, and wherein the first coil is proximal to the second coil; a flexible element attached to the proximal end of the leader and the distal end of the leader; and a braid attached to the leader, which are not present in Groups I, II, IV; the special technical features of Group IV include a force-transfer element; a radial force transferor; and wherein the radial force transferor comprises a radial bump; and an inner force-transferring element configured to transfer force to the embolic device during the deployment of the embolic device, which are not present in Groups I, II, III.

The common technical features of Groups I-IV are an embolic device; a vascular target site; and a leader.

These common technical features are disclosed by US 2009/0105748 A1 to Fogarty, et al. (hereinafter 'Fogarty'). Fogarty discloses an embolic device (vascular embolization device 24; figure 3a; paragraph [0041]); a vascular target site (device volume can be large enough to substantially fill the vascular site; paragraph [0058]); and a leader (flexible leader 26; figure 3a; paragraph [0041]).

Since the common technical features are previously disclosed by the Fogarty reference, the common features are not special and so Groups I-IV lack unity.