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(71) Applicant (*for all designated States except US*): **REVA MEDICAL INC.** [US/US]; 5751 Copley Drive, Suite B, San Diego, California 92111 (US).

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): **BRANDOM, Donald K.** [US/US]; P.O. Box 2033, Davis, California 95617 (US). **MCGRATH, James E.** [US/US]; 902 Elliott Drive, Blacksburg, Virginia 24060 (US). **ZELTINGER, Joan** [US/US]; 230 Coneflower Street, Encinitas, California 92024 (US). **SCHMID, Eric V.** [US/US]; 12248

Meadow Grass Court, San Diego, California 92128 (US). **SCHULTZ, Robert K.** [US/US]; 14240 Palisades Drive, Poway, California 92064-6443 (US).

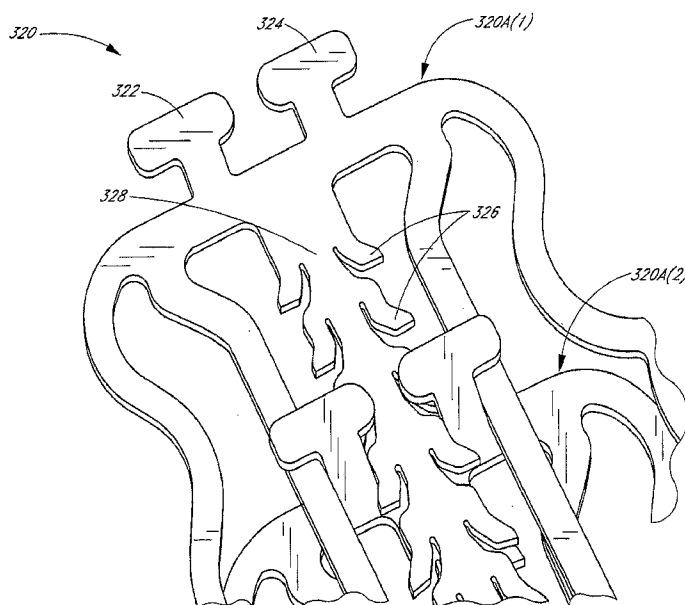
(74) Agent: **ALTMAN, Daniel E.**; KNOBBE, MARTENS, OLSON & BEAR, LLP, 2040 Main Street, 14th Floor, Irvine, California 92614 (US).

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[Continued on next page]

(54) Title: SIDE-CHAIN CRYSTALLIZABLE POLYMERS FOR MEDICAL APPLICATIONS



(57) Abstract: Side-chain crystallizable (SCC) polymers are useful in various medical applications. In certain applications, heavy atom containing side-chain crystallizable polymers (HACSCCP's) are particularly useful. An example of a HACSCCP is a polymer that comprises a main chain, a plurality of crystallizable side chains, and a plurality of heavy atoms attached to the polymer. In certain configurations, the heavy atoms are present in an amount that is effective to render the polymer radiopaque. A polymeric material that includes an HACSCCP may be fabricated into a medical device useful for at least partially occluding a body cavity. For example, such a medical device may be an embolotherapy product. A polymeric material that includes a SCC polymer may also be fabricated into other medical devices, such as stents.

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Declaration under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

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INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
INV. A61L31/06 A61L31/18

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)

A61L C08F

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, COMPENDEX, EMBASE, BIOSIS, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 98/20928 A (QUANAM MEDICAL CORP [US]) 22 May 1998 (1998-05-22) page 16 - page 17; example 3	1-20
A	the whole document	21-26
X	US 2004/086458 A1 (KOHN JOACHIM B [US] ET AL) 6 May 2004 (2004-05-06) claims 7-9	1-13
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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

E earlier document 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.

8 document member of the same patent family

Date of the actual completion of the international search

30 May 2008

Date of mailing of the international search report

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Name and mailing address of the ISA/

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

Authorized officer

Rouault, Yannick

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2007/001011

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KRUFT M-A B ET AL: "Studies on radio-opaque polymeric biomaterials with potential applications to endovascular prostheses" BIOMATERIALS, ELSEVIER SCIENCE PUBLISHERS BV., BARKING, GB, vol. 17, no. 18, September 1996 (1996-09), pages 1803-1812, XP004032993 ISSN: 0142-9612 cited in the application page 1804, left-hand column pages 1804-1805, section: polymer preparation page 1811; figure 9A -----	1-20
X	WO 2004/110313 A (MNEMOSCIENCE GMBH [DE]; SIMON PETER [DE]; KRATZ KARL [DE]; LENDLEIN AN) 23 December 2004 (2004-12-23) page 5, lines 9-13 -----	1-20
X	WO 99/24391 A (UNIV RUTGERS [US]; KOHN JOACHIM B [US]; BOLIKAL DURGADAS [US]; PENDHAR) 20 May 1999 (1999-05-20) claims 20,46,47 -----	1-13
A	GB 1 244 207 A (PHARMACIA AKTIEBOLAGET [SE]) 25 August 1971 (1971-08-25) abstract -----	1-13
P,X	WO 2006/020616 A (REVA MEDICAL INC [US]; BRANDOM DONALD K [US]; ZELTINGER JOAN [US]) 23 February 2006 (2006-02-23) the whole document -----	1-13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2007/001011

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

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

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

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

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

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable 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 reportcovers 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.

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-20

are directed to a stent selected from the group of sheet stent, a braided stent, a self-expanding stent, a wire stent a deformable stent and a slide-and-lock stent comprising a side chain crystallizable polymer (SSC polymer) and a method of treatment comprising such a stent.

2. claims: 21-26

are directed to a polymer comprising a main chain, a plurality of heavy atoms attached to the polymer, wherein the polymer comprises a recurring unit of the formula VI.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2007/001011

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9820928	A	22-05-1998	AU 5590098 A	03-06-1998
US 2004086458	A1	06-05-2004	US 2004086461 A1	06-05-2004
			US 2004086462 A1	06-05-2004
			US 2004191175 A1	30-09-2004
WO 2004110313	A	23-12-2004	BR PI0411437 A	18-07-2006
			CA 2527976 A1	23-12-2004
			EP 1633281 A1	15-03-2006
			JP 2006527038 T	30-11-2006
			US 2007129784 A1	07-06-2007
WO 9924391	A	20-05-1999	AT 273341 T	15-08-2004
			AT 307110 T	15-11-2005
			AU 740380 B2	01-11-2001
			AU 1386999 A	31-05-1999
			AU 737151 B2	09-08-2001
			AU 1519999 A	31-05-1999
			CA 2308520 A1	20-05-1999
			CA 2308721 A1	20-05-1999
			DE 69825619 D1	16-09-2004
			DE 69825619 T2	01-09-2005
			DE 69831973 T2	27-07-2006
			EP 1028991 A1	23-08-2000
			EP 1036057 A1	20-09-2000
			ES 2226191 T3	16-03-2005
			JP 2001522826 T	20-11-2001
			JP 2001522909 T	20-11-2001
			WO 9924490 A1	20-05-1999
GB 1244207	A	25-08-1971	BE 723882 A	14-05-1969
			CH 495752 A	15-09-1970
			DE 1809014 A1	14-08-1969
			DK 119675 B	08-02-1971
			FI 47524 B	01-10-1973
			FR 334 F	26-10-1970
			NL 6816303 A	20-05-1969
			SE 348111 B	28-08-1972
WO 2006020616	A	23-02-2006	AU 2005272944 A1	23-02-2006
			CA 2577018 A1	23-02-2006
			CN 101014642 A	08-08-2007
			EP 1778761 A1	02-05-2007
			JP 2008510034 T	03-04-2008