

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
20 January 2005 (20.01.2005)

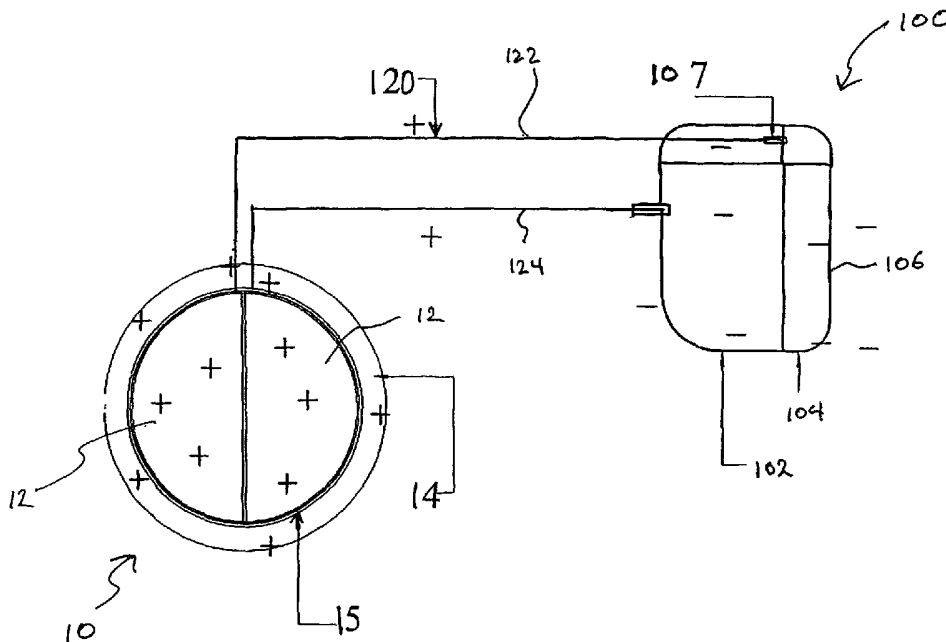
PCT

(10) International Publication Number
WO 2005/004754 A3

- (51) International Patent Classification⁷: A61F 2/24
- (21) International Application Number: PCT/US2004/021214
- (22) International Filing Date: 30 June 2004 (30.06.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 60/484,038 30 June 2003 (30.06.2003) US
- (71) Applicant (for all designated States except US): JS VASCULAR, INC. [US/US]; 8960 East Raintree Drive, Suite 200, Scottsdale, AZ 85260 (US).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): OPIE, John, C. [NZ/US]; 8310 N. Via de Lago, Scottsdale, AZ 85258 (US).
- (74) Agents: ROGERS, David, E. et al.; Squire, Sanders & Dempsey L.L.P., Two Renaissance Square, 40 North Central Avenue, Suite 2700, Phoenix, AZ 85004-4498 (US).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: SUBCUTANEOUS IMPLANTABLE NON-THROMBOGENIC MECHANICAL DEVICES



(57) Abstract: A mechanical device (10) for implantation into a patient's body is designed or modified to be electrically charged to prevent coagulation on the device, thereby extending the life of the device and alleviating the need for the patient to utilize anticoagulant therapy. The device may be a heart valve and is electrically charged by being connected to a power source (100). The power source is preferably a battery pack (102, 104) implanted in the body and is connected to the device by connector wires (122, 124). The charge applied to the device may be negative or positive, as long as it helps to repel platelets and/or red blood cells from the device in order to help prevent coagulation on one or more surfaces of the device.

WO 2005/004754 A3



Published:

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(88) Date of publication of the international search report:

21 April 2005

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/021214

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61F2/24

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 A61F

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

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 4 979 955 A (SMITH ROBERT M) 25 December 1990 (1990-12-25) the whole document	1-13,17, 23,26 14-16, 18,19, 21,22, 27,28, 30,32
X	----- US 4 038 702 A (SAWYER PHILIP NICHOLAS) 2 August 1977 (1977-08-02) the whole document	1-9,17
X	----- US 5 348 553 A (WHITNEY DOUGLASS G) 20 September 1994 (1994-09-20) abstract; figure 7 column 2, line 18 - line 33 column 4, line 11 - line 66 ----- -/--	1,7-11, 17,24

Further documents are listed in the continuation of box C.

Patent family members are listed in 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.
- "&" document member of the same patent family

Date of the actual completion of the international search

22 November 2004

Date of mailing of the international search report

17. 02. 2005

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

Newman, B

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US2004/021214

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 3 609 768 A (AYRES WALDEMAR A) 5 October 1971 (1971-10-05) the whole document -----	1,7-12, 17,31
Y	US 3 757 794 A (CANNON R ET AL) 11 September 1973 (1973-09-11) the whole document -----	14-16, 19,21, 22,30,32
Y	HEHRLEIN, ZIMMERMANN, METZ, ENSINGER, KÜBLER: "Influence of surface texture and charge on the biocompatibility of endovascular stents" CORONARY ARTERY DISEASE, vol. 6, no. 7, July 1995 (1995-07), pages 581-586, XP009040220 the whole document -----	18
Y	US 6 110 204 A (LAZAROV MILADIN ET AL) 29 August 2000 (2000-08-29) column 1, line 1 - line 39 -----	27
Y	US 5 895 419 A (BERGMAN DARRIN J ET AL) 20 April 1999 (1999-04-20) the whole document -----	28

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2004/021214

Box 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.: 48 - 54
because they relate to subject matter not required to be searched by this Authority, namely:
Rule 39.1(iv) PCT - Method for treatment of the human or animal body by surgery
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 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 all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
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.:

1-32

Remark on Protest

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-32

A mechanical device for implantation into the body. The device is suitable for connecting to a power source in order to electrically charge the device

2. claims: 33 - 47

A power source for implantation into the body.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US2004/021214

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4979955	A	25-12-1990	NONE

US 4038702	A	02-08-1977	NONE

US 5348553	A	20-09-1994	NONE

US 3609768	A	05-10-1971	NONE

US 3757794	A	11-09-1973	AU 465527 B2 13-09-1973
		AU 3972672 A	13-09-1973
		DE 2214215 A1	22-02-1973
		GB 1400070 A	09-07-1975
		JP 56010068 B	05-03-1981
		NL 7203826 A	21-02-1973

US 6110204	A	29-08-2000	DE 19506188 A1 29-08-1996
		AT 202489 T	15-07-2001
		WO 9625960 A1	29-08-1996
		DE 59607173 D1	02-08-2001
		DK 810889 T3	22-10-2001
		EP 0810889 A1	10-12-1997
		JP 11500040 T	06-01-1999

US 5895419	A	20-04-1999	AU 4604997 A 24-04-1998
		BR 9712169 A	31-08-1999
		CA 2267612 A1	09-04-1998
		CN 1231591 A	13-10-1999
		CZ 9901070 A3	11-08-1999
		EP 0948297 A1	13-10-1999
		HU 9904668 A2	28-05-2000
		JP 2001501516 T	06-02-2001
		KR 2000048716 A	25-07-2000
		NZ 334489 A	24-11-2000
		PL 332498 A1	13-09-1999
		TR 9900728 T2	21-07-1999
		WO 9814139 A1	09-04-1998
