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[Continued on next page]

(54) Title: TRANSSEPTAL CANNULA, TIP, DELIVERY SYSTEM, AND METHOD

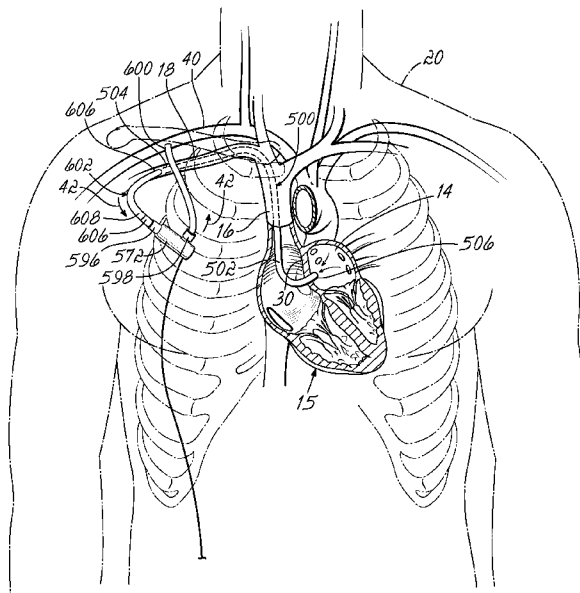
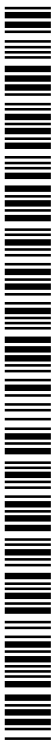


FIG. 23B

(57) Abstract: A circulatory assist system for assisting the flow of blood through a patient circulatory system, comprising a cannula assembly (500) for directing blood from a heart of the patient, the cannula assembly (500) comprising a flexible cannula body (502) including a proximal end (504), a distal end (506), and a lumen (508) therebetween. A pump (594) for drawing blood from the heart into the cannula body (502) and dispensing the blood from the cannula body (502) and into the patient circulatory system, the pump (594) further including an inlet (596) and an outlet (598). An outflow cannula (600) configured to fluidically communicate the outlet (598) and an artery of a patient. An adaptor device (602) configured to fluidically communicate the inlet (596) and the cannula body (598), the adaptor device (602) including a proximal portion (604), a distal portion (606), and a body (608) therebetween.





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- *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))*

6 November 2014

INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2014/020474

A. CLASSIFICATION OF SUBJECT MATTER  
INV. A61M1/10 A61M1/12  
ADD.  
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)  
A61M  
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	WO 2005/037345 A2 (UNIV VANDERBILT [US]; SALLOUM JOSEPH G [US]; ABSI TAREK S [US]) 28 April 2005 (2005-04-28) page 7, line 12 - line 28; figure 1 page 12, line 23 - page 13, line 3; figure 2	1-3
A	----- US 2009/182188 A1 (MARSEILLE OLIVER [DE] ET AL) 16 July 2009 (2009-07-16) paragraphs [0031], [0032]; figures 1A, 1A-1	1-3
A	----- US 2005/033107 A1 (TSUBOUCHI TAKESHI [US]) 10 February 2005 (2005-02-10) paragraphs [0017] - [0027]; figures 2-4 ----- -/--	1

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 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  4 July 2014	Date of mailing of the international search report  08/09/2014
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer  Van Veen, Jennifer

# INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2014/020474

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 530 876 B1 (SPENCE PAUL A [US]) 11 March 2003 (2003-03-11) return conduit 50; paragraph [0023]; figure 5 -----	1-3

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2014/020474

## 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.: 16  
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:

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 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.:

1-3

### 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**

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

## 1. claims: 1-3

A circulatory assist system comprising a cannula assembly, a pump, an outflow cannula, and a generally curvilinear adaptor device.

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## 2. claims: 4-6

A circulatory assist system comprising a cannula assembly with a cannula body with a proximal end, a distal end, and a lumen; a unitary rigid tip, further comprising a pump, and wherein the the lumen of the cannula body further comprises a tapered portion defined as a decrease in inner diameter.

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## 3. claims: 7-9

A circulatory assist system comprising a cannula body, a pump, a unitary rigid tip with a distal portion having first and second (more distal) ends, the second end having a larger diameter than the first end.

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## 4. claims: 10-14

A circulatory assist system comprising a cannula assembly, a pump, and a delivery sheath with a distal end, a proximal end, and a body therebetween, said body comprising a longitudinally disposed tensile element.

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## 5. claim: 15

A delivery system for a cannula assembly including an anchor, comprising a delivery sheath; and a loading device with a proximal end, a distal end, and a lumen therebetween, and a tapered portion in said lumen, changing from a first larger proximal end diameter, to a second smaller distal end diameter.

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**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

Continuation of Box II.1

Claims Nos.: 16

The claim 16 relates to a method comprising the steps of "directing a cannula assembly into the circulatory system of a patient", and ".. implanting a pump ... in a generally lateral direction relative to the patient". Such methods are considered methods of treatment of the human or animal body by therapy. The subject matter of claim 16 was therefore not searched (Article 17(2)(a)(i)/(ii) and Rule 39.1(iv) PCT) and consequently no opinion will be formulated on the subject matter of that claim (Article 34(4)(a)(i) and Rule 67.1(iv) PCT).

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2014/020474

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2005037345	A2	28-04-2005	NONE
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US 2009182188	A1	16-07-2009	CA 2666881 A1 06-03-2008
			EP 2056899 A2 13-05-2009
			EP 2650029 A1 16-10-2013
			ES 2427238 T3 29-10-2013
			HK 1127474 A1 25-04-2014
			JP 2010502304 A 28-01-2010
			US 2009182188 A1 16-07-2009
			WO 2008027869 A2 06-03-2008
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US 2005033107	A1	10-02-2005	NONE
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US 6530876	B1	11-03-2003	AU 5762001 A 07-11-2001
			US 6530876 B1 11-03-2003
			WO 0180927 A2 01-11-2001
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