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- (71) Applicant: CVDEVICES, LLC [US/US]; 11107 Roselle Street, San Diego, CA 92121 (US).
- (72) Inventor; and
(71) Applicant : CHOI, Hyo, Won [KR/US]; 13963 Ashlake Lane, Fishers, IN 46038 (US).
- (72) Inventor: KASSAB, Ghassan, S.; 11107 Roselle Street, San Diego, CA 92121 (US).
- (74) Agent: REICHEL, Mark, C.; Reichel IP LLP, 212 West 10th Street, Suite D-280, Indianapolis, IN 46202 (US).
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(54) Title: UNITARY BODY SYSTEMS AND DEVICES AND METHODS TO USE THE SAME FOR RETROPERFUSION

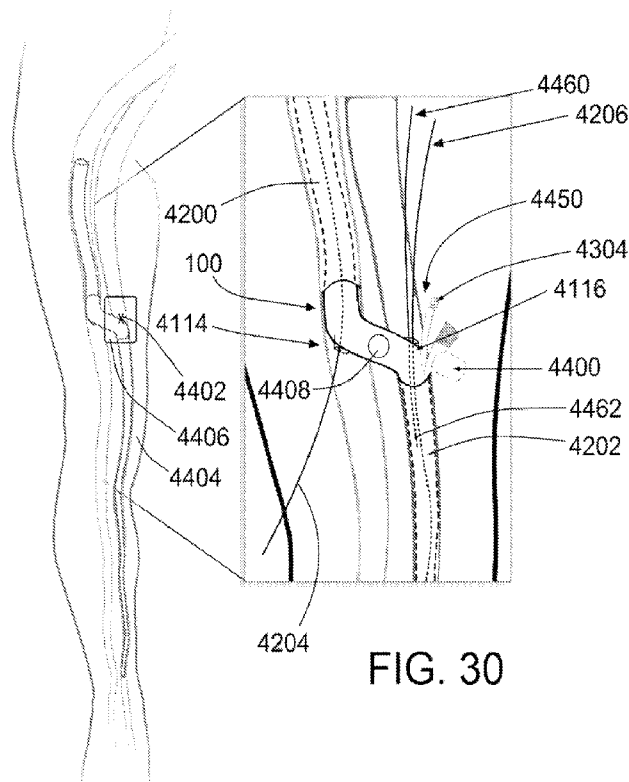


FIG. 30

(57) Abstract: Unitary body systems and devices and methods to use the same for retroperfusion. In an exemplary device embodiment of the present disclosure, the device comprises a unitary body having a wall and a lumen defined therethrough, a first portion terminating at a first end and configured for at least partial placement within a mammalian artery, a first one-way valve positioned at or near an end of the first portion opposite the first end, a second portion terminating at a second end and configured for at least partial placement within a mammalian vein, and a second one-way valve positioned at or near an end of the second portion opposite the second end.



UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

— *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))*

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

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2014/049270

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A61M 1/36 (2015.01)

CPC - A61M 1/3655 (2015.01)

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 1/00, 1/36, 1/38, 39/00, 39/02, 39/08, 39/10, 39/22, 39/24 (2015.01)

CPC - A61M 1/00, 1/36, 1/3621, 1/3653, 1/3655 (2015.01) (Keyword delimited)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC - 604/6.16, 7, 8, 9

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PatBase, Google Patents, Google Scholar, Google.

Search terms used : blood vessel, artery, vein, tube, conduit, shunt, one way valve

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2004/0249334 A1 (CULL) 09 December 2004 (09.12.2004) entire document	1-62, 68-70
A	US 2004/0249335 A1 (FAUL et al) 09 December 2004 (09.12.2004) entire document	1-62, 68-70
A	US 2010/0022940 A1 (THOMPSON) 28 January 2010 (28.01.2010) entire document	1-62, 68-70
A	US 2010/0056978 A1 (MACHAN et al) 04 March 2010 (04.03.2010) entire document	1-62, 68-70
A	US 2011/0196282 A1 (KASSAB) 11 August 2011 (11.08.2011) entire document	1-62, 68-70

☐ 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

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Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
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Authorized officer:

Blaine R. Copenheaver

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2014/049270

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 extra 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 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.:
1-62, 68-70

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/US2014/049270

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees need to be paid.

Group I, claims 1-62, 68-70 are drawn to a perfusion device.

Group II, claim 63 is drawn to a method of implanting.

Group III, claims 64-67 are drawn to a method of positioning comprising a guidewire.

The inventions listed in Groups I, II and III 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, a perfusion device comprising a unitary body, a first portion terminating at a first end, a first one-way valve positioned at or near an end of the first portion opposite the first end, a second portion terminating at a second end, and a second one-way valve positioned at or near an end of the second portion opposite the second end, are not present in Groups II, III; the special technical features of Group II, a method of implanting a retroperfusion device, bending the device so that one or more desired angles and/or bends are present, configuring one or more lengths and/or one or more diameters, and selecting a suitable device, are not present in Groups I, III; and the special technical features of Group III, a method of positioning a perfusion device wherein a first guidewire is positioned through part of a first portion of the device, wherein a second guidewire is positioned through part of a second portion of the device, removing the first guidewire, and removing the second guidewire are not present in Groups I, II.

Groups I-III share the technical feature of a perfusion device having a first portion placed within an artery, and a second portion placed within vein. However, this shared technical feature does not represent a contribution over the prior art. Specifically, US 7,004,925 B2 to Navia et al teaches of a perfusion device (210, Fig. 13; Col. 8, Lns. 12-26) having a first portion placed within an artery (220, Fig. 13; Col. 8, Lns. 16-18 regarding catheter 220 is inserted into the axillary artery 82), and a second portion placed within vein (20, Fig. 13; Col. 8, Lns. 15-16 regarding insertion of cannula 20 into the axillary vein 80).

Since none of the special technical features of the Groups I, II, and III inventions are found in more than one of the inventions, unity is lacking.