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- (81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, 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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(54) Title: PROSTHETIC HEART VALVE DEVICES, PROSTHETIC MITRAL VALVES AND ASSOCIATED SYSTEMS AND METHODS

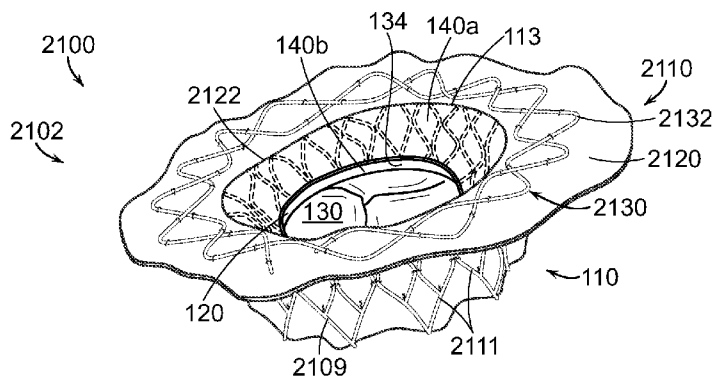


FIG. 86B

(57) Abstract: Prosthetic heart valve devices for percutaneous replacement of native heart valves and associated systems and method are disclosed herein. A prosthetic heart valve device configured in accordance with a particular embodiment of the present technology can include an anchoring member having an upstream portion configured to engage with tissue on or near the annulus of the native heart valve and to deform in a non-circular shape to conform to the tissue. The device can also include a mechanically isolated valve support coupled to the anchoring member and configured to support a prosthetic valve. The device can further include an atrial extension member extending radially outward from the upstream portion of the anchoring member and which is deformable without substantially deforming the anchoring member. In some embodiments, the upstream portion of the anchoring member and the extension member may be deformed while the valve support remains sufficiently stable.





GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, 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).

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INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
INV. A61F2/2418
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)
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 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 2012/177942 A2 (GIFFORD HANSON III [US]; FANN JAMES L [US]; MORRISS JOHN [US]; DEEM MA) 27 December 2012 (2012-12-27) cited in the application paragraphs [0241], [0242]; figures 5A9,5A11	1-30
X	WO 2013/021374 A2 (MITRALTECH LTD [IL]; GROSS YOSSI [IL]; HACOHEH GIL [IL]; MILLER ERAN []) 14 February 2013 (2013-02-14) page 25, line 3 - page 26, line 17; figures 8A,8B	1-30

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 10 September 2014	Date of mailing of the international search report 02/03/2015
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 Chevalot, Nicolas

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/029549

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>WO 2012/035279 A1 (CT HOSPITALIER REGIONAL UNIVERSITAIRE D AMIENS [FR]; CARMi DORON [FR];) 22 March 2012 (2012-03-22) page 6, line 10 - page 9, line 27; figures 1,3</p> <p style="text-align: center;">-----</p>	1-30
X,P	<p>WO 2013/175468 A2 (TEL HASHOMER MEDICAL RES INFRA [IL]) 28 November 2013 (2013-11-28)</p> <p>page 27, line 9 - page 30, line 26; figures 1-3D,29A,29B</p> <p style="text-align: center;">-----</p>	1-12, 16-19, 21-26, 28,30

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2014/029549

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.: 58-70, 89-92
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 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 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.:
1-30

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: 1-30

A prosthetic heart valve device for treating a native heart valve having a native annulus and native leaflets, comprising: a valve support having an upstream region and a downstream region relative to blood flow direction through a native heart valve of a human heart, the upstream region being configured to support a prosthetic valve, the prosthetic valve having a plurality of leaflets and having an undeformed shape in which the leaflets coapt sufficiently to prevent backflow through the prosthetic valve; an anchoring member arranged around the valve support and including an outwardly-facing fixation portion having an engagement surface configured to engage tissue at an implant site proximate the native annulus, the fixation portion having a first cross-sectional shape in an unbiased condition and being deformable into a second cross-sectional shape to adapt to a shape of the tissue at the implant site in a deployed state; and a connection structure interconnecting the fixation portion to the valve support, the fixation portion extending from the connection structure at a transition zone, and the transition zone being configured to be positioned at a subannular location below the native annulus and to allow the fixation portion to deflect angularly relative to the connection structure; wherein the tissue fixation portion of the anchoring member is mechanically isolated from the upstream region of the valve support such that the upstream region of the valve support maintains the undeformed shape if the anchoring member has deformed into the second cross-sectional shape (claim 1), further comprising a plurality of barbs extending in an upstream direction from the fixation surface (claim 2).

2. claims: 31-57, 71-88

A prosthetic heart valve device comprising: an anchoring member having a tubular fixation frame with an inlet end and an outlet end; a tubular valve support having a first portion coupled to the anchoring member and a second portion mechanically isolated from the anchoring member such that the inlet end of the anchoring member is radially deformable without substantially deforming the second portion; a valve coupled to the valve support and having at least one leaflet movable from a closed position in which blood flow is blocked through the valve support and an open position in which blood flow is allowed through the valve support in a downstream direction; and an extension member coupled to the fixation frame and extending radially outward therefrom, at least a deformable portion of the extension member being mechanically isolated from the anchoring member such that

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

the deformable portion of the extension member is radially deformable without substantially deforming the anchoring member (claim 31).

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/US2014/029549

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2012177942 A2	27-12-2012	AU 2012272855 A1 CA 2840084 A1 CN 103997990 A EP 2723273 A2 JP 2014522678 A US 2013310928 A1 WO 2012177942 A2	16-01-2014 27-12-2012 20-08-2014 30-04-2014 08-09-2014 21-11-2013 27-12-2012

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