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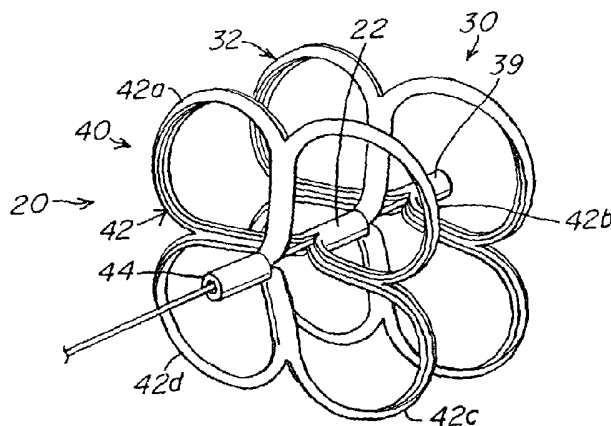
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- (74) Agents: CAVANAUGH, David, L. et al.; Wilmer Cutler Pickering Hale and Dorr LLP, 60 State Street, Boston, MA 02109 (US).
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- Published:  
— with international search report  
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

[Continued on next page]

(54) Title: TUBULAR PATENT FORAMEN OVALE (PFO) CLOSURE DEVICE WITH CATCH SYSTEM



(57) Abstract: The present invention provides a device for occluding an anatomical aperture, such as an atrial septal defect (ASD) or a patent foramen ovale (PFO). The occluder (20) includes two sides connected by a central tube. The occluder is formed from a tube (25), which is cut to produce struts (32) in each side. Upon the application of force, the struts deform into loops. The loops may be of various shapes, sizes, and configurations, and, in at least some embodiments, the loops have rounded peripheries. In some embodiments, at least one of the sides includes a tissue scaffold. The occluder further includes a catch system (131) that maintains its deployed state *in vivo*. When the occluder is deployed *in vivo*, the two sides are disposed on opposite sides of the septal tissue surrounding the aperture and the catch system is deployed so that the occluder exerts a compressive force on the septal tissue and closes the aperture.

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*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.*

INTERNATIONAL SEARCH REPORT

International Application No  
P US2004/022643

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 A61B17/00

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 A61B

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, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 01/49185 A (FREUDENTHAL FRANZ ; PFM PRODUKTE FUER DIE MEDIZIN (DE); SIEGNER GEORG) 12 July 2001 (2001-07-12)	1,2,7, 9-16, 20-23,25
Y	page 13, line 7 - line 21	3-6,8, 17-19
A	page 15, line 3 - line 11 page 17, line 5 - page 18, line 16	24,26
X	----- US 6 261 309 B1 (URBANSKI JEFFREY) 17 July 2001 (2001-07-17)	1-3
Y	column 5, line 46 - line 56; figure 5	3
X	----- US 6 344 048 B1 (CHIN YEM ET AL) 5 February 2002 (2002-02-05)	39-42
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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

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"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

21 February 2005

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INTERNATIONAL SEARCH REPORT

International Application No  
P IS2004/022643

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6 312 446 B1 (BUSCEMI PAUL J ET AL) 6 November 2001 (2001-11-06) column 6, line 54 - column 7, line 20 -----	4-6,8, 17-19
A	US 5 078 736 A (BEHL ROBERT S) 7 January 1992 (1992-01-07) column 6, line 60 - column 7, line 15 -----	1
A	US 6 355 052 B1 (NEUSS MALTE ET AL) 12 March 2002 (2002-03-12) column 7, line 64 - column 8, line 12 -----	41,42

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2004/022643

## 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.: 33-38  
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.:

### 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

An occluder for a defect comprising slits, wherein adjacent slits are offset.

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2. claims: 39-42

An occluder comprising struts formed by slits, whereas said struts are joined by different processes.

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INTERNATIONAL SEARCH REPORT

International Application No  
 F US2004/022643

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