



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : A61F 2/06, A61B 17/00, 17/11, 17/34	A3	(11) International Publication Number: WO 99/38454 (43) International Publication Date: 5 August 1999 (05.08.99)
(21) International Application Number: PCT/US98/26845 (22) International Filing Date: 18 December 1998 (18.12.98) (30) Priority Data: 09/016,721 30 January 1998 (30.01.98) US (71) Applicant: VASCULAR SCIENCE INC. [US/US]; Suite 202, 701 Decatur Avenue North, Minneapolis, MN 55427 (US). (72) Inventors: BERG, Todd, A.; 1517 Broken Oak Court, Lino Lakes, MN 55038 (US). PETERSON, Alex, A.; 17650 82nd Way North, Maple Grove, MN 55311 (US). WAHLBERG, Mark, D.; 999 Grand Avenue #5, St. Paul, MN 55105 (US). ST. GERMAIN, Jon, P.; 18896 146th Street, Elk River, MN 55330 (US). (74) Agents: JACKSON, Robert, R. et al.; Fish & Neave, 1251 Avenue of the Americas, New York, NY 10020 (US).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, 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, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims</i> <i>and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 7 October 1999 (07.10.99)
(54) Title: MEDICAL GRAFT CONNECTOR OR PLUG STRUCTURES, AND METHODS OF MAKING AND INSTALLING SAME		
(57) Abstract <p>A medical graft connector or plug is made, for example, by cutting end portions of a tube of highly elastic material axially at numerous locations spaced circumferentially around the tube to produce a plurality of fingers which extend axially from each end of an uncut medial portion of the tube. The fingers are deflected radially outwardly from the medial portion and set in that condition. For a graft connector, the medial portion is coaxially connected to an end portion of a tubular graft. The connector is then installed through an aperture in the side wall of a patient's tubular body conduit, for example, by using a delivery tube in which the fingers are elastically deflected back to approximately their initial positions. When the delivery conduit is withdrawn from the connector, the fingers spring out to engage the inner and outer surfaces of the body conduit wall. For a plug, the medial portion is occluded and then the structure is installed through the aperture to be plugged in a manner similar to installation of the connector.</p> <div data-bbox="678 1243 1372 1601" data-label="Image"> </div>		

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 98/26845

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 A61F2/06 A61B17/00 A61B17/34 A61B17/11

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 6 A61F 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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 98 02099 A (HEARTPORT INC) 22 January 1998 (1998-01-22)	1-12,14, 16,17, 19,25, 26,59, 69,74
A	page 25, line 3 - page 27, line 3; figures page 76, line 3 - line 7 page 106, line 20 - page 107, line 29 page 112, line 20 - line 36	15,29, 30, 65-67, 70,75,76
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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
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- "O" document referring to an oral disclosure, use, exhibition or other means
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- "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 May 1999

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 98/26845

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 5 234 447 A (KASTER ROBERT L ET AL) 10 August 1993 (1993-08-10)	1,3-6, 11,12, 14,16, 17,25, 26,29,30
A	column 2, line 51 - column 3, line 29; figures column 5, line 65 - column 6, line 14	27,59, 69,74-76
X	--- WO 98 03118 A (SOLEM JAN OTTO) 29 January 1998 (1998-01-29) page 4, line 25 - line 36; figures 2-6	1,3,4, 14,29,30
A	---	6,16
X	WO 97 27898 A (MACHOLD TIMOTHY R ;TRANSVASCULAR INC (US); ROTH ALEX T (US); WHITT) 7 August 1997 (1997-08-07)	1,2, 5-10,14, 16,18, 59,64,69
A	page 24, line 28 - page 26, line 11; figures 3-10 page 36, line 1 - line 21	29,30, 34,36,37
X	--- US 5 122 156 A (GRANGER RICHARD N ET AL) 16 June 1992 (1992-06-16)	1,3,4, 11,12, 14,16, 27,29, 34,36,37
A	column 5, line 66 - column 6, line 21; figures	59,66, 67,69,75
X	--- DE 195 42 733 A (MANDLIER MATHIAS) 24 July 1997 (1997-07-24)	1,3,4,6, 12,16, 18,26
	figures -----	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 98/26845

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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.: 61-63, 77, 79-82, 86, 89, 100
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 II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

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.:
1-39, 59-60, 64-76, 78

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

1. Claims: 1-39,59-60,64-76,78

A connector to connect a tubular graft conduit to a side wall of a tubular body conduit having a medial tubular portion, a plurality of resilient fingers integral and extending from the medial portion

2. Claims: 40-58,83-85,87,88,90-99,101

A plug for use in plugging an aperture through a body structure having a medial tubular portion, a plurality of resilient fingers integral and extending from the medial portion and a plugging structure occluding the tubular portion

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 98/26845

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9802099 A	22-01-1998	US 5797933 A AU 3883897 A EP 0928161 A	25-08-1998 09-02-1998 14-07-1999
US 5234447 A	10-08-1993	WO 9504503 A AU 4803593 A EP 0713373 A US 5403333 A US 5366462 A	16-02-1995 28-02-1995 29-05-1995 04-04-1995 22-11-1994
WO 9803118 A	29-01-1998	SE 509389 C AU 3790497 A EP 0914063 A SE 9602849 A	18-01-1999 10-02-1998 12-05-1999 25-01-1998
WO 9727898 A	07-08-1997	US 5830222 A AU 1847197 A AU 1847297 A AU 1847397 A AU 7431696 A CA 2234361 A CA 2244066 A CA 2244079 A CA 2244080 A CN 1216929 A CN 1216930 A EP 0910298 A EP 0879068 A EP 0932426 A WO 9713463 A WO 9727897 A WO 9727893 A AU 1275997 A WO 9816161 A	03-11-1998 22-08-1997 22-08-1997 22-08-1997 30-04-1997 17-04-1997 07-08-1997 07-08-1997 07-08-1997 19-05-1999 19-05-1999 28-04-1999 25-11-1998 04-08-1999 17-04-1997 07-08-1997 07-08-1997 11-05-1998 23-04-1998
US 5122156 A	16-06-1992	NONE	
DE 19542733 A	24-07-1997	NONE	