



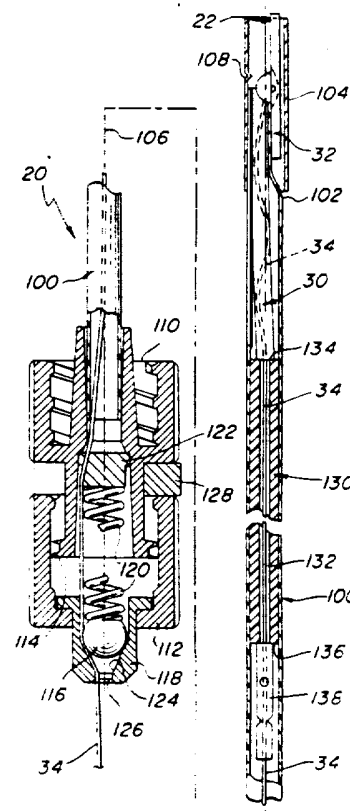
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification <sup>5</sup> : <b>A61B 17/00</b></p>	<p>A3</p>	<p>(11) International Publication Number: <b>WO 93/08746</b> (43) International Publication Date: 13 May 1993 (13.05.93)</p>
<p>(21) International Application Number: PCT/US92/09572 (22) International Filing Date: 6 November 1992 (06.11.92) (30) Priority data: 789,704 8 November 1991 (08.11.91) US 846,322 5 March 1992 (05.03.92) US (71) Applicant: KENSEY NASH CORPORATION [US/US]; Marsh Creek Corporate Center, 55 East Uwchlan Avenue, Suite 204, Exton, PA 19341 (US). (72) Inventors: KENSEY, Kenneth ; 8 Hickory Lane, Chester Springs, PA 19425 (US). NASH, John ; 145 Oak Street, Downingtown, PA 19335 (US). EVANS, Douglas ; 1011 Penn Circle, Apt. D605R, King of Prussia, PA 19406 (US).</p>		<p>(74) Agent: FAIGUS, Martin, L.; Caesar, Rivise, Bernstein, Cohen &amp; Pokotilow, Ltd., 12th Floor, Seven Penn Center, 1635 Market Street, Philadelphia, PA 19103-2212 (US). (81) Designated States: AU, BB, BG, BR, CA, FI, HU, JP, KP, KR, LK, MG, MW, NO, RO, RU, SD, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, SN, TD, TG). <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 5 August 1993 (05.08.93)</p>

## (54) Title: HEMOSTATIC PUNCTURE CLOSURE SYSTEM AND METHOD OF USE

## (57) Abstract

A system and closure (22) for determining the position of a blood vessel (26) via a percutaneous puncture (24) and for sealing the percutaneous puncture in the blood vessel. The system includes an introducer sheath (28, 28') and associated positioning device (200, 300, 400, 600), a hemostatic puncture closure (22), and a deployment instrument (20). The positioning device (200, 300, 400, 600) enables the introducer sheath (28) to be positioned at a desired position within the vessel (26). The deployment instrument (20) includes a tubular carrier (100) storing the closure (22). The carrier (100) has a distally located free end (104) to be extended via an introducer (28, 28') through the puncture (24) and its associated tract (24A). The closure (22) comprises a radiopaque rigid anchor (32, 32'), a compressed collagen plug (30), and a thin filament (34) connecting the two in a pulley-like arrangement. The carrier (100) ejects the anchor (32, 32') through the introducer (28, 28') and puncture (24) and then draws it against the free end of the introducer. The instrument (20) and introducer (28, 28') are then withdrawn together to pull the anchor against the tissue contiguous with the puncture inside the artery. Further withdrawal draws the plug (30) out of the carrier (100) into the puncture tract (24A), whereupon the plug (30) moves with respect to the anchor (32, 32') into engagement with the outside of artery wall to seal the puncture or incision (24). A tensioning device (116, 118, 120, 122) limits the force applied to the filament (34). The carrier (100) also includes a tamper (130) which is used to mechanically deform the plug (30) within the tract (24A). Once positioned hemostasis occurs rapidly, thereby locking the closure (22) in place.



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**INTERNATIONAL SEARCH REPORT**

International Application No

PCT/US 92/09572

**I. CLASSIFICATION OF SUBJECT MATTER** (if several classification symbols apply, indicate all)<sup>6</sup>  
 According to International Patent Classification (IPC) or to both National Classification and IPC  
 Int.Cl. 5 A61B17/00

**II. FIELDS SEARCHED**

Minimum Documentation Searched <sup>7</sup>	
Classification System	Classification Symbols
Int.Cl. 5	A61B ; A61M

Documentation Searched other than Minimum Documentation  
 to the Extent that such Documents are Included in the Fields Searched<sup>8</sup>

**III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup>**

Category <sup>10</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X	US,A,5 021 059 (KENSEY ET AL.) 4 June 1991 cited in the application	1,71-79, 20,83,85
Y	see claim 1; figures 1,2,4-7,12	3-15, 21-24, 27-30, 31,33, 35-37, 44,46,49
Y	see column 9, line 68 - column 10, line 29 see column 11, line 25 - line 39 ---	52-66, 80-82
Y	EP,A,0 401 525 (BRAUN) 12 December 1990	3-15
X	see column 3, line 44 - column 4, line 7; figure 2 ---	15-18

<sup>10</sup> 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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- "I" 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
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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
- "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

**IV. CERTIFICATION**

Date of the Actual Completion of the International Search <p align="center">24 JUNE 1993</p>	Date of Mailing of this International Search Report <p align="center">0 6. 07. 93</p>
International Searching Authority <p align="center">EUROPEAN PATENT OFFICE</p>	Signature of Authorized Officer <p align="center">MOERS R.</p>

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	US,A,4 317 445 (ROBINSON) 2 March 1982 see abstract; figure 2 ---	4,8-12, 16-18
A	EP,A,0 139 091 (ABBOTT) 2 May 1985 see abstract; figures 2,5,7 ---	10
Y	EP,A,0 013 693 (PAL DI DONA ALESSANDRO) 6 August 1980 see abstract; figures 1,2 ---	21-24
A	EP,A,0 324 641 (BAXTER) 19 July 1989 see column 5, line 34 - line 44; figures 2-4 ---	20,21
X	WO,A,9 014 796 (MUIJS V.D. MOER) 13 December 1990 see page 5, line 3 - line 33; figure 7 ---	19
Y		31,33, 35-37, 44,46, 49, 52-66, 80-82
A	WO,A,8 911 301 (KENSEY) 16 November 1989  see page 11, line 16 - line 17; figures 6,8 ---	19,31, 35,52, 80-82
Y	FR,A,2 641 692 (NIPPON ZEON) 20 July 1990 see claims 7,8; figure 26 -----	27-30

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 92/09572

**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.:  
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 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:

For information see PCT/ISA/206 sent on 07.04.93.

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.

ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.

US 9209572  
SA 67230

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.  
The members are as contained in the European Patent Office EDP file on  
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		EP-A- 0527923	24-02-93
		WO-A- 9116858	14-11-91
EP-A-0401525	12-12-90	DE-C- 3918431	26-07-90
		US-A- 5135525	04-08-92
US-A-4317445	02-03-82	None	
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