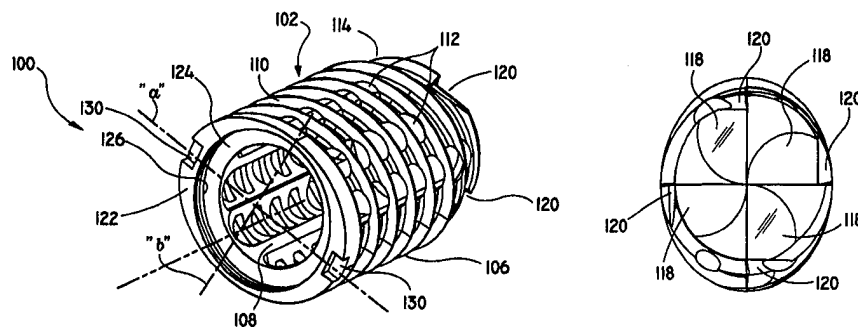




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : A61F 2/44, A61B 17/02 A61F 2/46, A61B 17/16</p>	<p>A3</p>	<p>(11) International Publication Number: WO 98/17208</p> <p>(43) International Publication Date: 30 April 1998 (30.04.98)</p>
<p>(21) International Application Number: PCT/US97/18998</p> <p>(22) International Filing Date: 22 October 1997 (22.10.97)</p> <p>(30) Priority Data: 08/734,911 22 October 1996 (22.10.96) US 08/822,530 24 March 1997 (24.03.97) US</p> <p>(71) Applicant: SURGICAL DYNAMICS, INC. [US/US]; 111 Glover Avenue, Norwalk, CT 06856 (US).</p> <p>(72) Inventor: WINSLOW, Charles, J.; 25 Hilton Court, Walnut Creek, CA 94595 (US).</p> <p>(74) Agents: ANDRES, John, C. et al.; United States Surgical Corporation, 150 Glover Avenue, Norwalk, CT 06856 (US).</p>	<p>(81) Designated States: AU, CA, JP, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p>Published <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></p> <p>(88) Date of publication of the international search report: 17 December 1998 (17.12.98)</p>	

(54) Title: APPARATUS FOR FUSING ADJACENT BONE STRUCTURES



(57) Abstract

An apparatus for facilitating the fusion of adjacent bone structures (V1, V2) includes an implant member (100) configured for insertion within a space defined between adjacent bone structures (V1, V2). The implant member (100) includes an entry end portion (114) and a trailing end portion (122) and defines a longitudinal axis. The implant member (100) includes at least a longitudinal portion (102) having a generally elliptical cross-sectional dimension with a major cross-sectional dimension (a) greater than a minor cross-sectional dimension (b). A system (200) for drilling a bore in adjacent vertebrae (V1, V2) to facilitate the insertion of a fusion implant (100) includes a surgical retractor (202) having a sleeve member (210) with proximal (212) and distal (214) end portions and defining a longitudinal opening and a drill instrument (204) positionable within the longitudinal opening of the surgical retractor (202). The retractor (202) is configured for insertion at least partially into an intervertebral space between adjacent opposed vertebrae (V1, V2) to distract the adjacent vertebrae (V1, V2) to a desired predetermined distracted position. At least one anchoring member may be associated with the surgical retractor (202) to facilitate mounting thereof to the vertebrae (V1, V2). The drill instrument (204) includes an elongate member (220) having a longitudinal passageway and defining at least one distal cutting surface and a drill member (224) disposed within the elongate member (220) and having a distal drill head. The drill member (224) is rotatably movable within the elongate member (220) and is also longitudinally fixed to the elongate member (220) such that advancement of the drill member (224) within the retractor (202) causes corresponding advancement of the elongate member (220) such that the distal cutting surface of the elongate member (220) and the distal drill head of the drill member (224) cooperate to cut a non-circular, e.g., an elliptical-shaped, bore in the adjacent vertebrae (V1, V2). Preferably, the elongate member (220) of the drill instrument (204) includes first and second diametrically opposed distal cutting surfaces. The cutting surfaces may be arcuately-shaped.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon	KR	Republic of Korea	PL	Poland		
CN	China	KZ	Kazakhstan	PT	Portugal		
CU	Cuba	LC	Saint Lucia	RO	Romania		
CZ	Czech Republic	LI	Liechtenstein	RU	Russian Federation		
DE	Germany	LK	Sri Lanka	SD	Sudan		
DK	Denmark	LR	Liberia	SE	Sweden		
EE	Estonia			SG	Singapore		

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 97/18998

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 A61F2/44 A61B17/02 A61F2/46 A61B17/16

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.
Y	EP 0 716 840 A (SURGICAL DYNAMICS) 19 June 1996 see column 9, line 24 - column 14, line 54; figures 17-26 ---	1-20
Y	WO 95 22946 A (FOSTER) 31 August 1995 see page 8, line 8 - line 13 see page 9, line 14 - line 18; claim 13; figures 1C,4C ---	1-20
A	US 5 458 638 A (KUSLICH) 17 October 1995 see column 8, line 39 - line 45; figures 14-25 ---	1,13,20
A	WO 95 32673 A (MICHELSON) 7 December 1995 see the whole document ---	1,13
-/--		

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

² 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
- "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

23 October 1998

Date of mailing of the international search report

30.10.98

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Klein, C

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 97/18998

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 96 27339 A (ADVANCED MICROBOTICS CORPORATION) 12 September 1996 see page 9, line 17 - line 19; figures ---	7,8,10, 15
X	WO 96 27345 A (MICHELSON) 12 September 1996	29,43
A	see the whole document ---	36,51
A	WO 96 27321 A (MICHELSON) 12 September 1996 see the whole document ---	29,36, 43,51
A	EP 0 077 159 A (ATKINS) 20 April 1983 see the whole document ---	29,36, 43,51
A	WO 95 35180 A (STARK) 28 December 1995 see the whole document ---	29,36, 43,51
A	US 5 062 845 A (KUSLICH) 5 November 1991 see the whole document ---	29,36
P,X	EP 0 796 593 A (SURGICAL DYNAMICS) 24 September 1997 cited in the application see the whole document ---	29,36, 43,51
A	US 5 026 373 A (RAY) 25 June 1991 cited in the application ---	
A	US 5 489 307 A (KUSLICH) 6 February 1996 cited in the application ---	
A	US 5 015 247 A (MICHELSON) 14 May 1991 cited in the application -----	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 97/18998

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.: 21-28, 38-42
because they relate to subject matter not required to be searched by this Authority, namely:
Rule 39.1(iv) PCT - Methods 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:

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: 1-20

An apparatus for facilitating the fusion of adjacent bone structures.

2. Claims: 29-37, 43-53

A system for drilling a bore in adjacent vertebrae comprising a surgical retractor and a surgical drill instrument.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 97/18998

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 716840	A	19-06-1996	
		AU 3505395 A	29-03-1996
		AU 4035395 A	20-06-1996
		CA 2164922 A	12-06-1997
		CA 2199637 A	21-03-1996
		EP 0781113 A	02-07-1997
		JP 8215225 A	27-08-1996
		WO 9608205 A	21-03-1996
		AU 696997 B	24-09-1998
		JP 10508766 T	02-09-1998

WO 9522946	A	31-08-1995	
		AU 1968095 A	11-09-1995

US 5458638	A	17-10-1995	
		US 5489308 A	06-02-1996
		CA 2015507 A	06-01-1991

WO 9532673	A	07-12-1995	
		AU 2643895 A	21-12-1995
		CA 2191345 A	07-12-1995
		JP 10505248 T	26-05-1998

WO 9627339	A	12-09-1996	
		AU 5188196 A	23-09-1996

WO 9627345	A	12-09-1996	
		AU 5025896 A	23-09-1996
		CA 2213819 A	12-09-1996
		DE 29623246 U	02-01-1998
		EP 0812167 A	17-12-1997
		US 5797909 A	25-08-1998

WO 9627321	A	12-09-1996	
		US 5772661 A	30-06-1998
		AU 5025996 A	23-09-1996
		CA 2213827 A	12-09-1996
		DE 29623247 U	19-02-1998
		EP 0814718 A	07-01-1998

EP 77159	A	20-04-1983	
		JP 58078653 A	12-05-1983

WO 9535180	A	28-12-1995	
		AU 2944495 A	15-01-1996

US 5062845	A	05-11-1991	
		US 5015255 A	14-05-1991
		CA 2007210 A,C	10-11-1990
		US 5445639 A	29-08-1995

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 97/18998

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5062845 A		CA 2007209 A	10-11-1990
EP 796593 A	24-09-1997	AU 1629597 A CA 2199462 A JP 10000200 A	18-09-1997 14-09-1997 06-01-1998
US 5026373 A	25-06-1991	US 4961740 A AU 648047 B AU 6534790 A CA 1306913 A CA 2072992 A EP 0369603 A EP 0498816 A JP 2149271 A JP 2551670 B JP 5501507 T KR 9709551 B WO 9106261 A DE 68928675 D	09-10-1990 14-04-1994 31-05-1991 01-09-1992 07-05-1991 23-05-1990 19-08-1992 07-06-1990 06-11-1996 25-03-1993 14-06-1997 16-05-1991 25-06-1998
US 5489307 A	06-02-1996	US 5720748 A US 5700291 A AU 695006 B AU 2877297 A AU 683243 B AU 6089394 A CA 2155422 A EP 0683651 A JP 8506501 T WO 9417759 A	24-02-1998 23-12-1997 06-08-1998 02-10-1997 06-11-1997 29-08-1994 18-08-1994 29-11-1995 16-07-1996 18-08-1994
US 5015247 A	14-05-1991	AT 169811 T AU 3838789 A CA 1332999 A DE 68928790 D EP 0419564 A EP 0712607 A US 5484437 A WO 8912431 A US 5593409 A	15-09-1998 12-01-1990 15-11-1994 24-09-1998 03-04-1991 22-05-1996 16-01-1996 28-12-1989 14-01-1997

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 97/18998

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5015247 A		US 5772661 A	30-06-1998
		US 5785710 A	28-07-1998
		US 5505732 A	09-04-1996
		US 5797909 A	25-08-1998
		US 5741253 A	21-04-1998
