

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
21 October 2010 (21.10.2010)

PCT

(10) International Publication Number  
WO 2010/120782 A3

(51) International Patent Classification:  
A61F 2/44 (2006.01) A61F 2/46 (2006.01)

(74) Agent: PIETRANGELO, John; Heslin Rothenberg Farley & Mesiti P.C., 5 Columbia Circle, Albany, NY 12203 (US).

(21) International Application Number:  
PCT/US2010/030896

(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, 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, IS, JP, KE, KG, KM, 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, PE, PG, PH, PL, PT, RO, RS, RU, 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.

(22) International Filing Date:  
13 April 2010 (13.04.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
61/168,829 13 April 2009 (13.04.2009) US

(71) Applicant (for all designated States except US): BIOSPINE, LLC [US/US]; 5865 East State Road 14, Columbia City, IN 46725 (US).

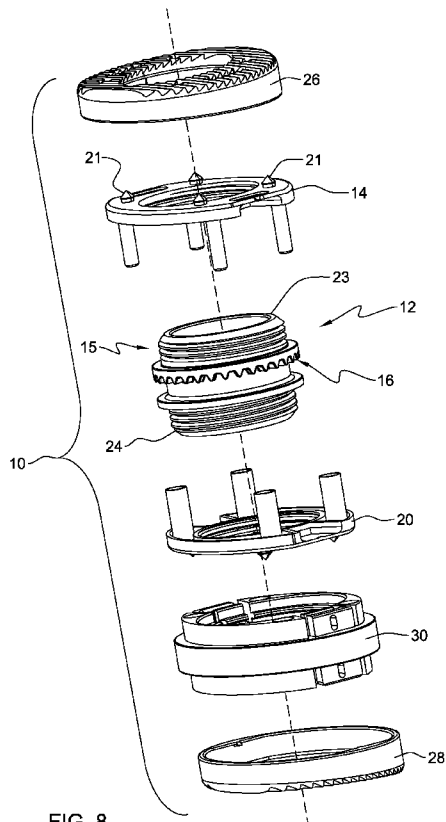
(72) Inventors; and

(75) Inventors/Applicants (for US only): FARRIS, Jeff [US/US]; 1056 Rose Lane, Berne, IN 46711 (US). DANIEL, Refai, M.D. [US/US]; 9303 Holden Lane, Cleveland, OH 44108 (US).

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (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, SE, SI, SK, SM,

[Continued on next page]

(54) Title: VARIABLE HEIGHT INTERVERTEBRAL DEVICES AND METHODS FOR USE



(57) Abstract: Variable height intervertebral devices (10) and method of employing the devices are disclosed. The devices (10) and methods can maintain or re-establishing anatomic spacing along a spine and can ensure avoidance of long-term structural, neurological, vascular, and/or other systemic impairments. The intervertebral device (10) includes a cylindrical body (12) having a first end and a second end opposite the first end; a first disk (14) threaded to the first end of the cylindrical body (12) and a second disk (20) mounted to the second end of the cylindrical body (12); means (16) for rotating the cylindrical body whereby the first disk (14) translates along the cylindrical body to vary the height (18) of the device (10); and a plurality of pins (60) mounted to one disk (14), the plurality of pins (60) slidably engageable with a plurality of sleeves (62) mounted to the other disk (20), the pins and sleeves inhibiting the first disk from rotating when the cylindrical body (12) is rotated.

WO 2010/120782 A3



TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

**Published:**

— with international search report (Art. 21(3))

**(88) Date of publication of the international search report:**

23 December 2010

# INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2010/030896

|  |   |  |   |   |
|--|---|--|---|---|
| <b>A. CLASSIFICATION OF SUBJECT MATTER</b><br>INV. A61F2/44      A61F2/46<br>ADD.  |   |  |   |   |
| According to International Patent Classification (IPC) or to both national classification and IPC  |   |  |   |   |
| <b>B. FIELDS SEARCHED</b>  |   |  |   |   |
| Minimum documentation searched (classification system followed by classification symbols)<br>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 practical, search terms used)<br>EPO-Internal   |   |  |   |   |
| <b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>  |   |  |   |   |
| Category*  | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No.                              |   |   |
| X  | DE 101 27 924 C1 (AESCULAP AG & CO KG [DE]) 19 December 2002 (2002-12-19)   | 1-9  |   |   |
| Y  | figures<br>paragraph [0021] - paragraph [0035]  | 15-19  |   |   |
| X  | US 2006/058877 A1 (GUTLIN MICHAEL [CH] ET AL GUETLIN MICHAEL [CH] ET AL) 16 March 2006 (2006-03-16)   | 1-4,7,8  |   |   |
| A  | figures<br>paragraph [0034] - paragraph [0037]  |  |   |   |
|  | US 6 015 436 A (SCHOENHOEFFER HELMUT [DE]) 18 January 2000 (2000-01-18)   | 1,9,10,<br>15,20                                   |   |   |
|  | figures 1,2,4,8<br>column 4, line 65 - column 4, line 6   |  |   |   |
|  | -/--  |  |   |   |
| <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.  |   |  |   |   |
| * Special categories of cited documents :  |   |  |   |   |
| <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;">                     "A" document defining the general state of the art which is not considered to be of particular relevance<br/>                     "E" earlier document but published on or after the international filing date<br/>                     "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)<br/>                     "O" document referring to an oral disclosure, use, exhibition or other means<br/>                     "P" document published prior to the international filing date but later than the priority date claimed                 </td> <td style="width: 50%; border: none; vertical-align: top;">                     "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<br/>                     "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<br/>                     "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.<br/>                     "&amp;" document member of the same patent family                 </td> </tr> </table> |   |  | "A" document defining the general state of the art which is not considered to be of particular relevance<br>"E" earlier document but published on or after the international filing date<br>"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)<br>"O" document referring to an oral disclosure, use, exhibition or other means<br>"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<br>"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<br>"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.<br>"&" document member of the same patent family |
| "A" document defining the general state of the art which is not considered to be of particular relevance<br>"E" earlier document but published on or after the international filing date<br>"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)<br>"O" document referring to an oral disclosure, use, exhibition or other means<br>"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<br>"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<br>"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.<br>"&" document member of the same patent family |  |   |   |
| Date of the actual completion of the international search  |   | Date of mailing of the international search report |   |   |
| 28 October 2010  |   | 05/11/2010   |   |   |
| Name and mailing address of the ISA/<br>European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040,<br>Fax: (+31-70) 340-3016   |   | Authorized officer<br><br>Stach, Rainer            |   |   |

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2010/030896

| 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 5 458 641 A (RAMIREZ JIMENEZ JUAN J [MX]) 17 October 1995 (1995-10-17)   | 15-19                 |
| A  | figures<br>column 3, line 62 - column 5, line 20  | 1,2,7                 |
| A  | US 2004/172129 A1 (SCHAFER BERND [CH] ET AL SCHAEFER BERND [CH] ET AL) 2 September 2004 (2004-09-02)<br>figures<br>paragraphs [0036] - [0043] | 1-4,7                 |

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2010/030896

## 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.: 11-14  
because they relate to subject matter not required to be searched by this Authority, namely:  
**Claims 11-14 relate to subject-matter considered by this Authority to be covered by the provisions of Rule 39.1(iv) / 67.1(iv) PCT.**
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.:

### 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: 1-10

A variable height intervertebral device (10) comprising:  
a cylindrical body (12) having a first end and a second end opposite the first end;  
a first disk (14) threaded to the first end of the cylindrical body and a second disk (20) mounted to the second end of the cylindrical body;  
means (16) for rotating the cylindrical body (12) whereby the first disk (14) translates along the cylindrical body to vary a height (18) of the device; and  
a plurality of pins (60) mounted to one of the first disk and the second disk, the plurality of pins slidably engageable with a plurality of sleeves (62) mounted to the other of the first disk and the second disk, the pins and sleeves inhibiting the first disk from rotating when the means (16) for rotating rotates the cylindrical body (12), the device further comprising,  
means for limiting translation of at least the first disk (14)  
a housing (30) surrounding the cylindrical body (12) and a vertebra engagement member (26) mounted to the first disk (14),  
wherein the means for limiting translation comprises a projection (122) on the vertebra engagement member positioned to engage a recess (120) in the housing.

---

## 2. claims: 15-20

A variable height intervertebral device (10) comprising:  
a hollow cylindrical body (12) having a threaded first end (23) and a threaded second end (24) opposite the threaded first end;  
a first disk (14) internally threaded to the first end of the cylindrical body and a second disk (20) internally threaded to the second end of the cylindrical body;  
a first end cap (26) mounted to the first disk and a second end cap (28) mounted to the second disk;  
means for rotating (26) the cylindrical body (12) whereby the first disk axially translates along the cylindrical body and impels the first end cap into engagement with a first vertebra and the second end cap into engagement with a second vertebra;  
and  
a plurality of pins (60) mounted to one of the first disk and the second disk slidably engageable with a plurality of sleeves (62) mounted to other of the first disk and the second disk, the plurality of pins and the plurality of sleeves inhibiting the first disk from rotating when the means for rotating rotates the cylindrical body.

---

# INTERNATIONAL SEARCH REPORT

Information on patent family members

|   |
|---|
| International application No<br>PCT/US2010/030896 |
|---|

| Patent document cited in search report | Publication date | Patent family member(s)  | Publication date   |
|--|------------------|--|--|
| DE 10127924                            | C1               | DE 20109599 U1   | 23-08-2001   |
| US 2006058877                          | A1               | AR 041951 A1<br>AU 2002347178 A1<br>CA 2508666 A1<br>WO 2004052245 A1  | 01-06-2005<br>30-06-2004<br>24-06-2004<br>24-06-2004   |
| US 6015436                             | A                | AT 214578 T<br>WO 9747258 A1<br>DE 19622827 A1<br>EP 0848603 A1<br>ES 2171947 T3<br>JP 11510720 T<br>JP 3826405 B2 | 15-04-2002<br>18-12-1997<br>11-12-1997<br>24-06-1998<br>16-09-2002<br>21-09-1999<br>27-09-2006 |
| US 5458641                             | A                | NONE   |  |
| US 2004172129                          | A1               | AT 305280 T<br>CA 2455339 A1<br>DE 10210214 A1<br>WO 03073964 A1<br>EP 1361840 A1                                  | 15-10-2005<br>12-09-2003<br>25-09-2003<br>12-09-2003<br>19-11-2003                             |