

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
25 January 2007 (25.01.2007)

PCT

(10) International Publication Number
WO 2007/011213 A1

(51) International Patent Classification:
A61B 17/70 (2006.01)

(21) International Application Number:
PCT/NL2006/000376

(22) International Filing Date: 19 July 2006 (19.07.2006)

(25) Filing Language: Dutch

(26) Publication Language: English

(30) Priority Data:
1029568 20 July 2005 (20.07.2005) NL

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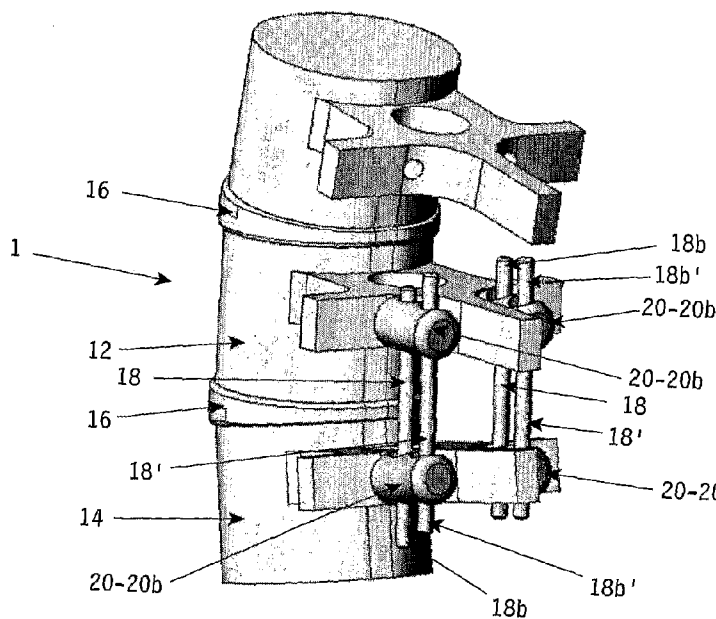
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, 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, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report

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.

(54) Title: MEDICAL DEVICE FOR POSITIONING BONE ELEMENTS



(57) Abstract: A medical device for positioning bone elements, in particular vertebrae (12,14), relative to each other, comprising at least one assembly built up of two or more anchoring elements (20), which can each be implanted in a bone element with a first end thereof, as well as an elongated connecting element, which can be connected to the other ends of the anchoring elements extending from the bone element in question, wherein the connecting element is built up of two straight pins (18,18'), which pins are each connected by their ends to the anchoring elements (20) at spaced-apart positions.

WO 2007/011213 A1

MEDICAL DEVICE FOR POSITIONING BONE ELEMENTS

DESCRIPTION

The invention relates to a medical device for positioning bone elements, in particular vertebrae, relative to each other, comprising at least one assembly built up of two or more anchoring elements, which can each be implanted in a bone element with a first end thereof, as well as an elongated connecting element, which can be connected to the other ends of the anchoring elements extending from the bone element in question.

Such medical devices are generally known, they are used for positioning or fixating adjacent vertebrae whose intervertebral disc is damaged and/or has lost its function relative to each other. Examples of such medical solutions are shown in WO 01/45576 and WO 02/102259. The connecting elements used therein are made of a flexible material and they are implanted on either side of the vertebrae.

These known implant constructions still allow movement of the vertebrae relative to each other, however, to the extent even the affected intervertebral disc is subjected to a load. The flexible connecting element in particular allows movement of the vertebrae in a direction towards each other, which may cause the vertebrae to sag, as a result of which the intervertebral disc and the facet joints are excessively loaded. The latter (sagging of the intervertebral disc) is undesirable in many cases.

The object of the invention is to obviate the above drawbacks of a medical device as referred to in the introductory paragraph and to provide an improved version that makes it possible to position adjacent vertebrae relative to each other in such a manner that movement of the vertebrae towards each other is no longer possible and that thus the intervertebral disc is no longer loaded.

According to the invention, the connecting element is to that end built up of two straight pins, which pins are each connected to the anchoring element at spaced-apart positions with their ends. In this way a radical fixation of the adjacent vertebrae relative to each other is obtained, and further loads on the intervertebral disc are prevented by preventing the vertebrae from sagging (or moving) in a direction towards each other.

A further constant position of the adjacent vertebrae relative to each other is achieved in particular if, according to a specific embodiment, the two straight pins extend parallel to each other.

More in particular, the two straight pins lie in a plane posterior to the spine, as a result of which the implantation of the device into a patient's back can be

carried out with a minimum burden for the patient.

A further immobilisation of the vertebrae and reduction of the load on the intervertebral disc can be realised in that in one embodiment at least one of said pins is rigid in longitudinal direction.

More specifically, both pins are rigid in longitudinal direction, this in order to enhance the immobilisation of the vertebrae and the reduction of the load on the intervertebral disc.

On the other hand, a slight movement in one direction can be allowed if according to the invention the other pin is flexible in longitudinal direction.

In a preferred embodiment, the points of attachment of the two rigid pins are spaced the same distance apart, whilst in another functional embodiment the points of attachment of the two rigid pins are not spaced the same distance apart.

The invention will not be explained in more detail with reference to a drawing, in which:

Figures 1a-1b show two embodiment is of a medical device according to the prior art; and

Figure 2 shows an embodiment of a medical device according to the invention.

For a better understanding of the invention, like parts will be indicated by identical numerals in the description below.

Figures 1a and 1b show two embodiments of a prior art medical device for positioning bone elements, in particular vertebrae, relative to each other.

In figure 1a, two vertebrae are schematically indicated at 12 and 14, which vertebrae are separated by an intervertebral disc 16. In the situation in which the intervertebral disc 16 is damaged or otherwise affected it may be desirable to position the vertebrae 12 and 14 positioned thereabove and therebelow, respectively, relative to each other, to which end use is made in figure 1a of a medical device that is built up at least of an assembly comprising two anchoring elements 20, which can be placed in the vertebrae 12 and 14 with their distal ends 20a and 20b, respectively. A connecting element 18 may be provided between the two adjacent anchoring elements 20 at the other ends 20c-20d of the anchoring elements 20, which connecting element can be attached with its ends 18b to the two other ends 20c-20d of the anchoring elements 20 that extend from the bone elements.

Although the aim of the prior art embodiment as shown in figure 1a is to effect an adequate positioning or fixation of the two vertebrae 12-14 relative to each other, in order to reduce the load on the intervertebral disc 16, which is affected in many cases, the construction that is shown in figure 1a is often not

satisfactory. This is caused by the use of a flexible or springing central part of 18a of the connecting element 18, which allows bending, turning or twisting movements of the spine and consequently of the two vertebrae 12-14 with respect to each other. This leads to an increased load on the intervertebral disc and the facet joints, which is unpleasant for the patient.

The above degrees of freedom of movement make it possible for the vertebrae to move towards each other ("sag"), thus increasing the load on the intervertebral disc 16, which may be a painful experience for the patient in question.

A similar prior art embodiment is shown in figure 1b, which likewise employs connecting elements 18-18', which are similarly connected to anchoring elements 20, which are likewise placed in a vertebra 12, 14 with their first end 20b. In this embodiment, too, flexible connecting elements 18-18' are used, so that a turning or twisting movement of the back is possible at all times, as a result of which the vertebrae 12-14 move relative to each other, in particular towards each other, and the intervertebral disc 16 can accordingly be loaded or compressed.

Upon extension of the wearer's back, the restraining function of the rear connecting element 18' in figure 1b is lost. This, too, causes the load on the intervertebral disc and the facet joints to increase, with the attendant unpleasant side-effects for the patient.

This known embodiment does not provide such a position or orientation of the vertebrae 12-14 disposed on either side of the affected intervertebral disc 16, either. In this case, too, the intervertebral disc 16 is still subjected to loads, with only adverse consequences for the patient.

Figure 2 shows an embodiment of the medical device according to the invention which employs two connecting elements 18-18' that are essentially rigid in longitudinal direction. Preferably, two assemblies, each consisting of two connecting elements 18-18' (four in total), are used for thus realising a proper orientation or fixation or positioning of the two vertebrae 12-14 relative to each other. As a result, the load on the intervertebral disc 16 is relieved in its entirety, thus enabling the intervertebral disc 16 to recover or preventing the intervertebral disc 16 from being further affected and making it possible to prepare the patient for, for example, an operation to replace the intervertebral disc 16 by an implant, for example.

To immobilise the two vertebrae 12-14 relative to each other and relative to the intervertebral disc 16, the two straight anchoring elements or pins 18-18' are provided in such a manner that they extend parallel to each other. More specifically, said straight anchoring elements 18-18' lie in a plane posterior to the spine 1. This makes it possible to carry out the surgical treatment, i.e. the implantation or removal of the medical device according to the invention, from the

back side of the patient, thereby minimising the burden for the patient.

More specifically, one anchoring element, even more specifically both anchoring elements 18-18' are rigid in longitudinal direction. This makes it possible to realise a complete immobilisation of the two vertebrae 12-14, so that said vertebrae will function as one hinged bone element, as it were, and the load on the intervertebral disc 16 present therebetween is fully relieved and the intervertebral disc 16 will no longer be affected by any displacements or movements of the two vertebrae 12-14 relative to each other (and in particular towards each other).

A slight movement of the back (without the intervertebral disc 16 being loaded thereby) may be rendered possible by making at least one of the pins 18-18' flexible in longitudinal direction. Depending on the position at which the medical device is implanted in the patient's back, the points of attachment between the connecting elements 18-18' and the anchoring elements 20 may or may not be spaced an even distance apart.

In contrast to the flexible prior art implants (as shown in figure 1b), the rear connecting element 18' also restricts the extent of movement of the spine upon extension of the back. Thus the load on the intervertebral disc and the facet joints is reduced in that the vertebrae 12-14 can no longer move towards each other. The patient's comfort is absolutely improved in this way.

CLAIMS

1. A medical device for positioning bone elements, in particular vertebrae, relative to each other, comprising at least one assembly built up of two or more anchoring elements, which can each be implanted in a bone element with a first end thereof, as well as an elongated connecting element, which can be connected to the other ends of the anchoring elements extending from the bone element in question, **characterised in that** the connecting element is to that end built up of two straight pins, which pins are each connected to the anchoring element at spaced-apart positions with their ends.
2. A medical device according to claim 1, **characterised in that** the two straight pins extend parallel to each other.
3. A medical device according to claim 2, **characterised in that** the two straight pins lie in a plane posterior to the spine.
4. A medical device according to any one of the claims 1-3, **characterised in that** at least one of said pins is rigid in longitudinal direction.
5. A medical device according to claim 4, **characterised in that** both pins are rigid in longitudinal direction.
6. A medical device according to claim 4, **characterised in that** the other pin is flexible in longitudinal direction.
7. A medical device according to any one of the claims 1-6, **characterised in that** the points of attachment of the two rigid pins are spaced the same distance apart.
8. A medical device according to any one of the claims 1-6, **characterised in that** the points of attachment of the two rigid pins are not spaced the same distance apart.

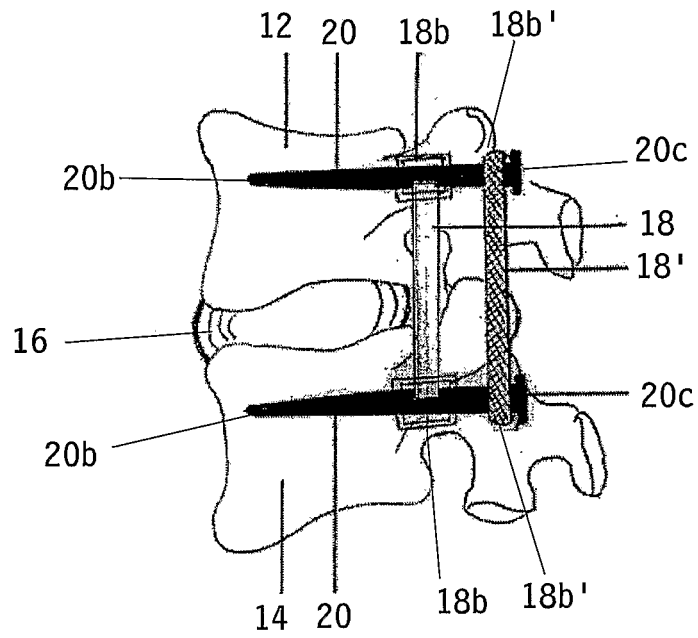


Fig. 1b

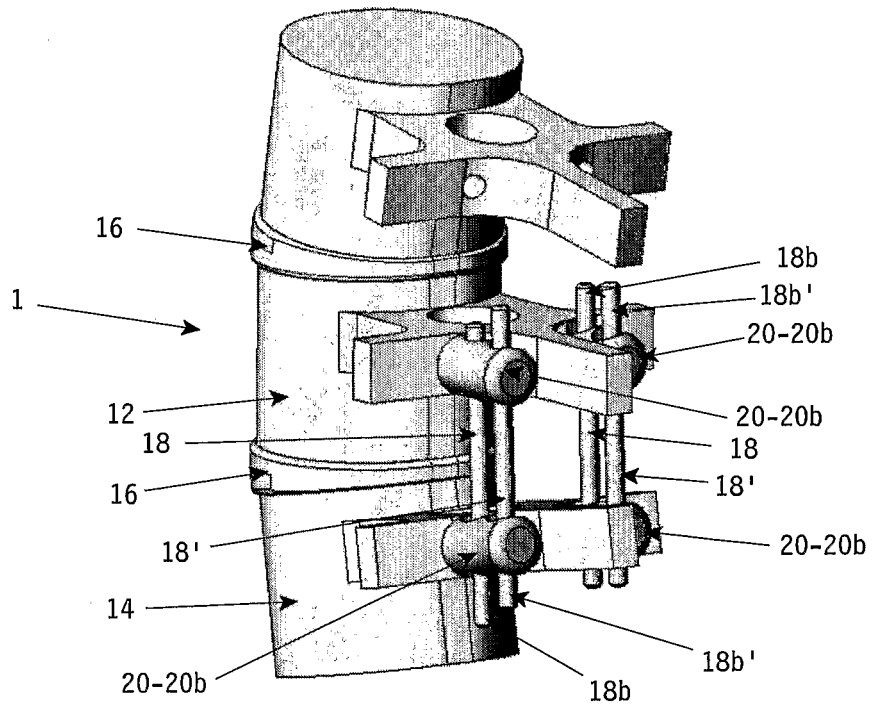


Fig. 2

INTERNATIONAL SEARCH REPORT

International application No
PCT/NL2006/000376

A. CLASSIFICATION OF SUBJECT MATTER INV. A61B17/70		
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) 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		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2004/052217 A (SDGI HOLDINGS) 24 June 2004 (2004-06-24) page 6, line 27 - page 7, line 5 page 7, line 18 - page 8, line 3 page 11, line 9 - line 27 page 13, line 6 page 13, line 23 - line 27 figures 1,4,9	1-7
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X	DE 101 24 994 A (GRADL H.-G.) 12 December 2002 (2002-12-12) paragraphs [0031], [0038], [0039]; figure 1	1,2,4,5, 7
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<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 : "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 28 September 2006		Date of mailing of the international search report 06/10/2006 *
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 Nice, Philip

INTERNATIONAL SEARCH REPORT

International application No
PCT/NL2006/000376

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Information on patent family members

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