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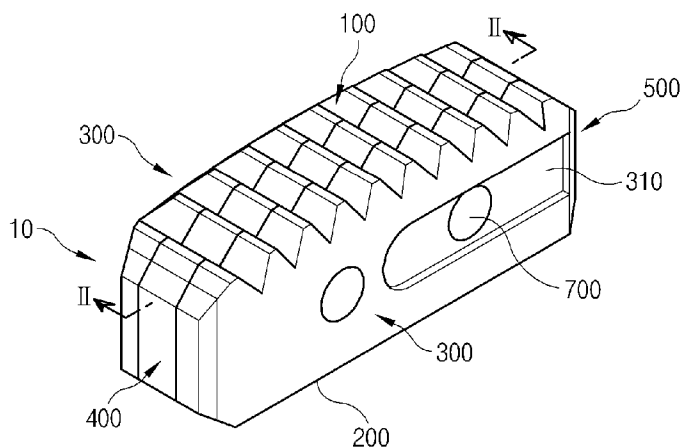
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(54) Title: SPINE INSERT



(57) Abstract: A spine insert which is inserted between vertebrae is provided. The spine insert includes: a top surface contacting with an upper vertebra; a bottom surface formed at an opposite side of the top surface; and both side surfaces connecting the top surface and the bottom surface. The top surface is formed in a curved surface matching with a shape of a lower surface of a vertebra. Accordingly, the spine insert can be easily inserted and more strongly fixed to the spine after the insertion.

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Description

SPINE INSERT

Technical Field

- [1] The present invention relates to a spine insert, and more particularly, to a spine insert capable of easily inserted between vertebrae and having a good biocompatibility.

Background Art

- [2] A spine insert is inserted between vertebrae in a state that the spine cannot be recovered due to a degenerative spinal stenosis, a traffic accident, and the like. As an example, the degenerative spinal stenosis is described as follows.
- [3] As a result of aging of a human body, a degenerative change in a spine occurs, and thus, a space between vertebrae is narrowed. Due to the degenerative progress, a spinous process or a ligamentum flavum compresses a spinal nerve or a nerve process connected to the spinal nerve. This medical condition is called a spinal stenosis.
- [4] As treatment methods for the spinal stenosis, there are a pharmacological treatment, a physical treatment, a surgical treatment, and the like. Among the methods, the surgical treatment is used in a case where other treatment methods cannot be used. It is known that, in a general surgical treatment, bones and organs that compress the nerves are removed, and the spine is fixed by using screws in order to prevent the spine from being unstable. However, in the surgical treatment, since a large number of the bones and organs needs to be removed, general anesthesia is required, and a long surgical time and a long recovery time after the surgery are required. Therefore, there is a problem in that, in many cases, the surgical treatment may not be used for infirm, old persons. In addition, there is a problem in that, due to complications or other reasons, satisfactory effects of the surgery may not be obtained. In addition, there is a problem of high cost of surgery.
- [5] As an approach for solving the problems, a method of inserting a spine insert between the vertebrae is proposed. However, conventional spine inserts have problems that the spine inserts are difficult to practice and are easily ejected. In addition, since the spine insert is made of a metal or a synthetic resin, the spine insert has a problem of damage to a human body for a long time of insertion.
- [6] In order to solve the problems, a method of forming the spine insert by using bones extracted from a human body or an animal has been proposed. However, due to restriction of the material, a desired shape cannot be easily formed. In addition, since the conventional shape is still used, the problems of the difficulty of practicing and the deterioration in stability after the practice are not solved.

Disclosure of Invention

Technical Problem

- [7] In order to solve the aforementioned problems, the present invention provides a spine insert capable of being easily practiced and being not easily ejected after the practice.
- [8] The present invention also provides a spine insert capable of being formed to have a desired shape by using a material having biocompatibility with a human body.

Technical Solution

- [9] According to an aspect of the present invention, there is provided a spine insert inserted between vertebrae, comprising: a top surface contacting with an upper vertebra; a bottom surface formed at an opposite side of the top surface; and both side surfaces connecting the top surface and the bottom surface, wherein the top surface is formed in a curved surface matching with a shape of a lower surface of a vertebra. Accordingly, the spine insert can be easily inserted and more strongly fixed to the spine after the insertion.
- [10] It is preferable that the top surface is provided with a top-surface convex-concave portion having a saw-tooth shape, and the bottom surface is provided with a bottom-surface convex-concave portion having a saw-tooth shape. In addition, it is preferable that the top-surface convex-concave portion and/or the bottom-surface convex-concave portion are provided with forward inclination facets in an insertion direction of the spine insert and backward inclination facets in the opposite direction, and the backward inclination facets are formed to be steeper than the forward inclination facets are. Accordingly, since the spine insert can be easily inserted but not easily ejected, the spine insert can be easily practiced but not easily ejected after the practice.
- [11] It is preferable that distal ends of the top-surface convex-concave portion and/or bottom-surface convex-concave portion are provided with chamfered portions. If the spine insert is made of a material having a strength similar to that of a human bone, a distal end there of may be easily broken. Due to the aforementioned structure, it is possible to prevent the distal end from being broken and to prevent the broken distal end from damaging the human body. Accordingly, it is possible to prevent the convex-concave portion from being easily broken. In addition, since the broken pieces cannot easily occur, it is possible to prevent the broken pieces from damaging other organs.
- [12] It is preferable that the spine insert is formed by combining a plurality of divided parts, and the spine insert is formed by combining the divided parts with a pin penetrating the divided parts. Accordingly, the spine insert having a desired size can be formed by using a material such as an animal bone which cannot be easily obtained in a desired size.
- [13] It is preferable that a through-hole penetrating the top surface and the bottom

surface is formed. Accordingly, since a material for facilitating bonding the spine inset object with the vertebrae is inserted into the through-hole, the spine insert can be more speedily fixed.

Advantageous Effects

- [14] According to the aforementioned aspect of the present invention, many effects including the following effects can be obtained. However, it should be noted that the present invention needs to have all the following effects at the same time.
- [15] Firstly, in the spine insert according to the present invention, since the top surface is formed in a curved surface matching with a shape of a lower surface of a vertebra, the spine insert can be easily inserted and more strongly fixed after the insertion.
- [16] In addition, since the backward inclination facets of the convex-concave portion formed on the top surface and the bottom surface are formed to be steeper than the forward inclination facets, the spine insert can be easily inserted but not easily ejected.
- [17] In addition, since the spine insert can be formed by combining a plurality of separate divided parts, the spine insert having a large size can be formed by using a material similar to a human bone.
- [18] In addition, since the through-hole penetrating the top surface and the bottom surface is formed to receive a material for facilitating bonding the spine inset object with the vertebrae, the spine insert can be more speedily fixed to the vertebrae.

Brief Description of the Drawings

- [19] FIG. 1 is a perspective view illustrating a spine insert according to a first embodiment of the present invention.
- [20] FIG. 2 is a cross-sectional view taken along line II-II of FIG. 1.
- [21] FIG. 3 is a plan view as seen from an upper surface side of FIG. 1.
- [22] FIG. 4 is an exploded perspective view illustrating the spine insert of FIG. 1.
- [23] FIG. 5 is a perspective view illustrating a spine insert according to a second embodiment of the present invention.

Mode for the Invention

- [24] Hereinafter, embodiments of the present invention will be described in detail with reference to the accompanying drawings.
- [25] For clarifying the present invention, description of well-known functions and constructions will be omitted.
- [26] FIG. 1 is a perspective view illustrating a spine insert according to a first embodiment of the present invention.
- [27] The spine insert according to the first embodiment includes a top surface 100 contacting with an upper vertebra, a bottom surface 200 formed at an opposite side of the top surface 100, both side surfaces 300 connecting the top surface 100 and the

bottom surface 200, a front surface 400 formed in a forward direction of insertion, and a rear surface 500 formed at an opposite side of the front surface 400.

[28] The top surface 100 is provided with a top-surface convex-concave portion 110 having a saw-tooth shape, and the bottom surface 200 is provided with a bottom-surface convex-concave portion 210 having a saw-tooth shape. In the top-surface convex-concave portion 110 and the bottom-surface convex-concave portion 210, forward inclination facets 111 and 211 are formed in an insertion direction, that is, in a direction toward the front surface 400, and backward inclination facets 112 and 212 are formed in a direction toward the rear surface 500. Preferably, the backward inclination facets 112 and 212 are formed to be steeper than the forward inclination facets 111 and 212 are. That is, as shown in FIG. 2, the forward inclination facets 111 and 211 are formed to have an angle of 45 degrees, and the backward inclination facets 112 and 212 are formed to have an angle of more than 45 degrees. Therefore, the spine insert can be easily inserted by using the forward inclination facets during the insertion operation. In addition, after the insertion, the spine insert cannot be easily ejected by using the backward inclination facets 112 and 212.

[29] Distal ends of the top-surface convex-concave portion 110 and the bottom-surface convex-concave portion 210 are provided with chamfered portions 113 and 213. If the spine insert is made of a material having a strength similar to that of a human bone, a distal end there of may be easily broken. Due to the aforementioned structure, it is possible to prevent the distal end from being broken and to prevent the broken distal end from damaging the human body.

[30] The top surface is formed in a curved surface matching with a shape of a lower surface of a vertebra. That is, the top surface 100 is formed along the curved line 130 shown in FIG. 2. Preferably, the curved line 130 is the same as a curved line of the lower surface of the vertebrae which the spine insert is inserted between. Accordingly, the spine insert can be easily inserted. In addition, since the entire top-surface convex-concave portion of the top surface contact with the lower surface of the vertebrae, the spine insert can be more strongly fixed after the insertion.

[31] The side surfaces 300 are provided with recessed clamp grooves 310, so that the spine insert can be easily clamped with a clasper.

[32] FIG. 3 is a plan view as seen from an upper surface side of FIG. 1.

[33] As shown in FIG. 3, corners 150 between the rear surface 500 and the side surfaces 300 are provided with chamfered portions. If the corner 150 is formed to protrude, distal ends thereof may stimulate or damage the human body during the practice. Due to the aforementioned structure, the stimulating or the damaging can be prevented. Alternatively, the corners 150 may be formed to have a curved surface.

[34] FIG. 4 is an exploded perspective view of FIG. 1.

- [35] As shown in FIG. 4, the spine insert is formed by combining a plurality of divided parts 11 to 13. The spine insert is divided into three parts in parallel to both side surfaces 30. In a case where the spine insert is formed by extracting an animal bone similar to a human bone instead of a synthetic material or a metallic material, a one body having a desired size cannot be easily extracted. Therefore, the extracted animal bones are divided into a plurality of parts, and then, the divided parts are combined, so that the spine insert having a larger size than the original materials one can be obtained. Each of the divided parts is provided with a pin-insert hole 600 that penetrates the divided part. A pin is inserted into the pin-insert holes 600, so that the divided parts 11, 12, and 13 can be combined to form one spine insert 10. Preferably, the pin 700 is formed to have a diameter so that the pin is inserted into the pin-insert hole 600 by interference fit. In addition, preferably, the divided parts 11, 12, and 13 are made of the same material.
- [36] As described above, in the spine insert according to the first embodiment of the present invention, since the top surface 100 is formed in a curved surface matching with a shape of a lower surface of a vertebra, the spine insert can be easily inserted and more strongly fixed after the insertion.
- [37] In addition, since the backward inclination facets 112 and 212 are formed to be steeper than the forward inclination facets 111 and 212, the spine insert can be easily inserted but not easily ejected.
- [38] In addition, since the spine insert can be formed by combining a plurality of separate divided parts, the spine insert having a large size can be formed by using a material similar to a human bone.
- [39] FIG. 5 is a perspective view illustrating a structure of a spine insert according to a second embodiment of the present invention.
- [40] The spine insert according to the second embodiment is used for the neck and the spine. The shape of spine insert according to the second embodiment is slightly different from that of the spine inert object according to the first embodiment. However, the spine insert according to the second embodiment is the same as the spine insert according to the first embodiment except for a through-hole 1800 formed at a central portion to penetrate a top surface 110 and a bottom surface 1200, a dividing direction parallel to the top surface, a pin 1700 inserted in up/down direction. Before the insertion into the spine, a material for facilitating bonding the spine inset object with the vertebrae is inserted into the through-hole 1800. Since such a material is well known, detailed description thereof is omitted. In addition, the material does not relate to the scope of the present invention.
- [41] Accordingly, since the spine insert can be speedily fixed between the vertebrae, a patient can be recovered in a shorter time after the practice.

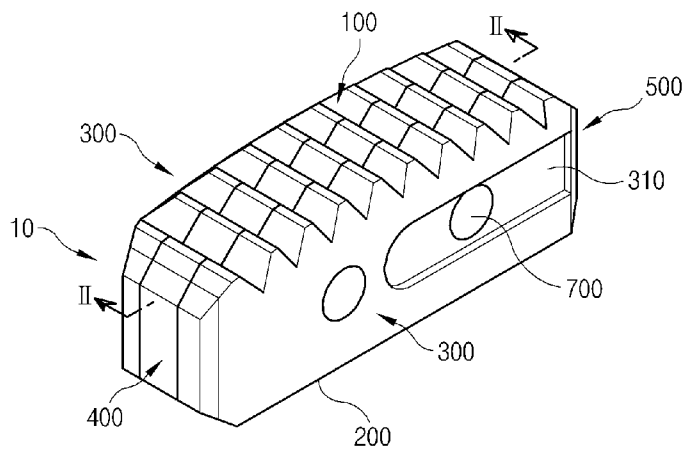
[42] While the present invention has been particularly shown and described with reference to exemplary embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present invention as defined by the following claims.

Claims

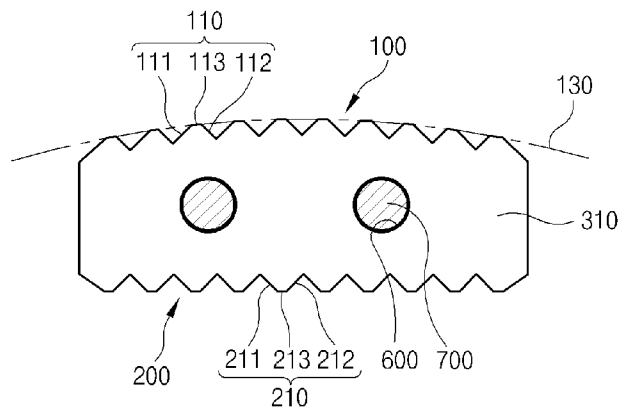
- [1] A spine insert inserted between vertebrae, comprising:
a top surface contacting with an upper vertebra;
a bottom surface formed at an opposite side of the top surface; and
both side surfaces connecting the top surface and the bottom surface,
wherein the top surface is formed in a curved surface matching with a shape of a lower surface of a vertebra.
- [2] A spine insert inserted between vertebrae, comprising:
wherein a distal end of a top-surface convex-concave portion having a saw-tooth shape of the top surface is provided with a chamfered portion, and
wherein a distal end of a bottom-surface convex-concave portion having a saw-tooth shape of the bottom surface is provided with a chamfered portion.
- [3] The spine insert according to claim 1,
wherein the top surface is provided with a top-surface convex-concave portion having a saw-tooth shape, and
wherein the bottom surface is provided with a bottom-surface convex-concave portion having a saw-tooth shape.
- [4] The spine insert according to claim 2,
wherein the top-surface convex-concave portion and/or the bottom-surface convex-concave portion are provided with forward inclination facets in an insertion direction of the spine insert and backward inclination facets in the opposite direction, and
wherein the backward inclination facets are formed to be steeper than the forward inclination facets are.
- [5] The spine insert according to claim 1 or 2, wherein the spine insert is formed by combining a plurality of divided parts.
- [6] The spine insert according to claim 5, wherein the spine insert is divided parallel to the both side surfaces.
- [7] The spine insert according to claim 5, wherein the spine insert is formed by combining the divided parts with a pin penetrating the divided parts.
- [8] The spine insert according to claim 7, wherein the spine insert and the pin are made of a bone of an animal.
- [9] The spine insert according to claim 1, wherein a through-hole penetrating the top surface and the bottom surface is formed.
- [10] A spine insert inserted between vertebrae, comprising:
a top surface contacting with an upper vertebra;
a bottom surface formed at an opposite side of the top surface; and

both side surfaces connecting the top surface and the bottom surface,
wherein the top surface is provided with a top-surface convex-concave portion
having a saw-tooth shape,
wherein the bottom surface is provided with a bottom-surface convex-concave
portion having a saw-tooth shape, and
wherein distal ends of the top-surface convex-concave portion and/or the bottom-
surface convex-concave portion are provided with chamfered portions.

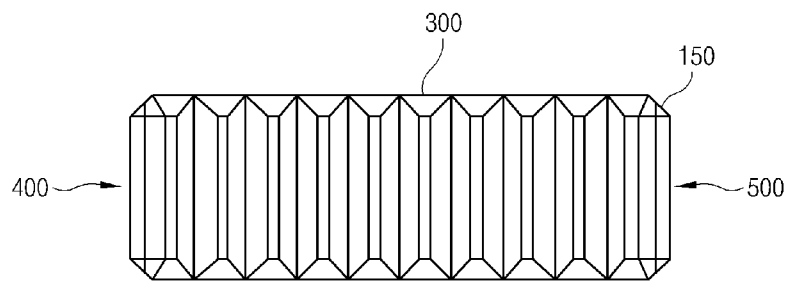
[Fig. 1]



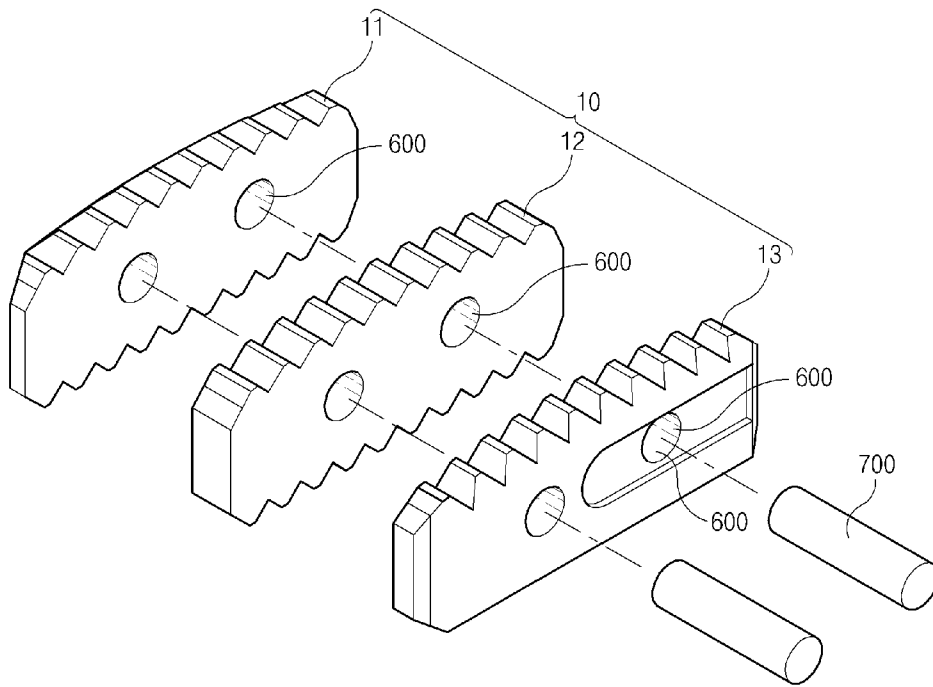
[Fig. 2]



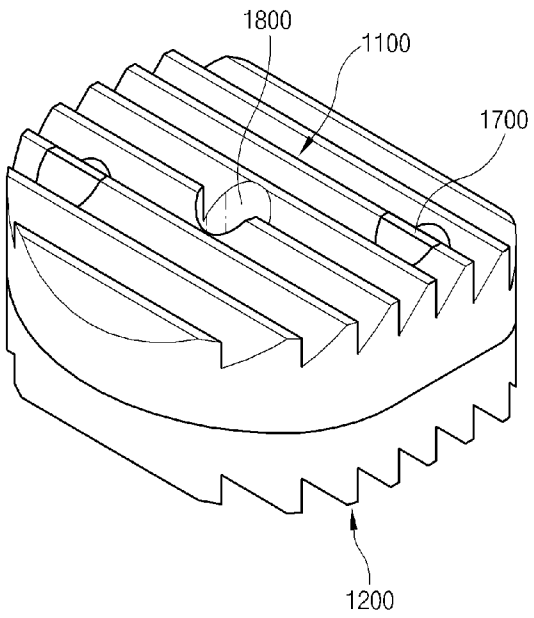
[Fig. 3]



[Fig. 4]



[Fig. 5]



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.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.: 2, 4-8
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:

Claim 2 does not meet the requirements of PCT article 6 in that the matter for which protection is sought is not clearly defined. The term "wherein" doesn't fit to the claim 2 because the claim 2 is an independent claim and does not define the compositions of the spine insert. As claims 4-8 contain the constituents of claim 2, the subject matter of claim 4-8 is also unclear.
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:

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 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.

A. CLASSIFICATION OF SUBJECT MATTER*A61F 2/44(2006.01)i*

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 8 A61F 2/44

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 practicable, search terms used)

eKIPASS, Delphion Research Intellectual Property Network database
"spine", "insert", "saw-tooth"**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2004/0133279 A1(KRUGGER D.J. et al) 08 July 2004 See the abstract, figures 3 and 18, page 3, claims	1,3,9,10
A	US 6,500,206 B1(BRYAN, D.W. et al.) 31 December 2002 See the whole document.	1,3,9,10
A	KR 10-2004-22602 A(HANS NIOMED. COR) 16 March 2004 See pages 3-4, figures 5 and 6	1,3,9,10
A	US 6,200,347 B1(ANDERSON, B.G. et al.) 13 March 2001 See the whole document.	1,3,9,10

 Further documents are listed in the continuation of Box C. 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 application or patent 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 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 APRIL 2008 (28.04.2008)

Date of mailing of the international search report

28 APRIL 2008 (28.04.2008)

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Authorized officer

Sohn, Younghee

Telephone No. 82-42-481-5975



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2008/000014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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