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(54) Title: DENTAL APPLIANCE WITH CAVITY FOR AN UNERUPTED OR ERUPTING TOOTH

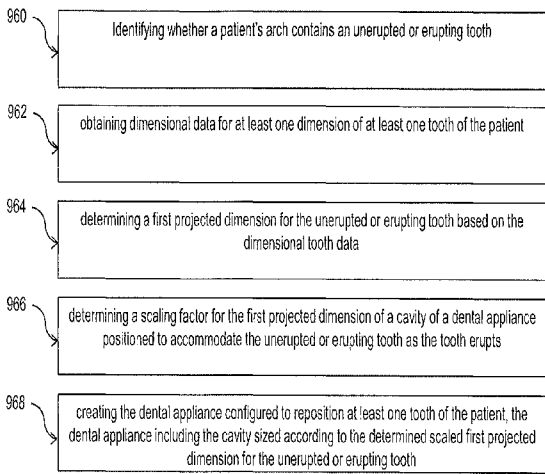


Figure 9

(57) Abstract: A method includes to receive, via a computing device, data representing a plurality of teeth, identify data indicating which of the plurality of teeth are unerupted or erupting, predict at least one characteristic of a tooth of the unerupted or erupting teeth after they have fully erupted using one or more tooth eruption prediction factors, generate new data representing the unerupted or erupting teeth in multiple states of eruption based upon the predicted at least one characteristic of the fully erupted teeth, and generate a series of incremental tooth arrangements with the new data to define a proposed orthodontic treatment based on the new data representing the unerupted or erupting teeth in multiple states of eruption.

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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2015/002134

A. CLASSIFICATION OF SUBJECT MATTER
 INV. A61C7/00 A61C7/08
 ADD.
 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)
 A61C
 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)
 EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|---|-----------------------|
| X A | US 2008/294405 A1 (KITCHING IAN [US] ET AL) 27 November 2008 (2008-11-27) paragraph [0004]; figures 1-7 paragraph [0091] - paragraph [0109] paragraph [0031] - paragraph [0034] paragraph [0050] | 1,4-7 2,3,8-27 |
| X | ----- US 2003/224314 A1 (BERGERSEN EARL O [US]) 4 December 2003 (2003-12-04) paragraph [0002]; figures 1-7D paragraph [0044] - paragraph [0058] paragraph [0058] paragraph [0109] paragraph [0156] - paragraph [0194] | 1-27 |
| X A | ----- US 2008/293003 A1 (MOSS JON F [US] ET AL) 27 November 2008 (2008-11-27) paragraph [0030] - paragraph [0040]; claim 10; figure 1 | 14-27 1-13 |
| | ----- | |

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 | "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 |
| "E" earlier application or patent but published on or after the international filing date | "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 |
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| "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 | "&" document member of the same patent family |

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| Date of the actual completion of the international search 14 November 2016 | Date of mailing of the international search report 23/11/2016 |
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| Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016 | Authorized officer Wirth, Christian |
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2015/002134

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.:
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: 1-7

A non-transitory computing device readable medium having instructions stored thereon that are executable by a processor to cause a computing device to: receive, via a computing device, data representing a plurality of teeth; identify data indicating which of the plurality of teeth are unerupted or erupting; predict at least one characteristic of a tooth of the unerupted or erupting teeth after they have fully erupted using one or more tooth eruption prediction factors; generate new data representing the unerupted or erupting teeth in multiple states of eruption based upon the predicted at least one characteristic of the fully erupted teeth; and generate a series of incremental tooth arrangements with the new data to define a proposed orthodontic treatment based on the new data representing the unerupted or erupting teeth in multiple states of eruption.

2. claims: 8-27

A dental appliance having a cavity for accommodating an unerupted or erupting tooth, comprising: an appliance designed to implement at least a portion of a treatment plan, comprising a shell having a plurality of cavities therein designed to receive teeth of a jaw with at least one of the plurality of cavities being a cavity for accommodating an unerupted or erupting tooth therein, wherein at least one of a size, shape, location, and orientation of at least one of the cavities for accommodating an unerupted or erupting tooth are based upon a prediction of at least one of a size, shape, location, or orientation of the unerupted or erupting tooth and a method of creating the appliance.

INTERNATIONAL SEARCH REPORT

Information on patent family members

| |
|---|
| International application No PCT/IB2015/002134 |
|---|

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|--|------------------|-------------------------|-----------------------------|
| US 2008294405 | A1 | 27-11-2008 | EP 2187834 A1 26-05-2010 |
| | | | US 2008294405 A1 27-11-2008 |
| | | | WO 2009017826 A1 05-02-2009 |
| ----- | | | |
| US 2003224314 | A1 | 04-12-2003 | AU 2003238847 A1 19-12-2003 |
| | | | BR 0311370 A 15-03-2005 |
| | | | CA 2484127 A1 11-12-2003 |
| | | | CN 1655732 A 17-08-2005 |
| | | | EP 1509157 A2 02-03-2005 |
| | | | JP 2005527320 A 15-09-2005 |
| | | | KR 20050004257 A 12-01-2005 |
| | | | MX PA04011380 A 14-02-2005 |
| | | | US 2003224314 A1 04-12-2003 |
| | | | WO 03101330 A2 11-12-2003 |
| | | | YU 103904 A 25-05-2006 |
| ----- | | | |
| US 2008293003 | A1 | 27-11-2008 | CN 101677841 A 24-03-2010 |
| | | | EP 2155103 A1 24-02-2010 |
| | | | JP 5796960 B2 21-10-2015 |
| | | | JP 2010527692 A 19-08-2010 |
| | | | JP 2013039449 A 28-02-2013 |
| | | | JP 2015042318 A 05-03-2015 |
| | | | US 2008293003 A1 27-11-2008 |
| | | | US 2011123941 A1 26-05-2011 |
| | | | US 2015289949 A1 15-10-2015 |
| WO 2008147507 A1 04-12-2008 | | | |
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