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(54) Title: A METHOD FOR ATTACHING AND DETACHING DENTAL CONSTRUCTIONS AND A DEVICE THEREOF

(57) Abstract: The present invention relates to a flexible holding device for connecting a construction to an implant in a ridge of a mouth comprising: (a) a head for holding the construction from the inside of said construction; (b) more than one leg for holding the internal thread of said implant from the inside; and (c) a body, attached to said head and attached to said legs, for attaching said construction to said implant.

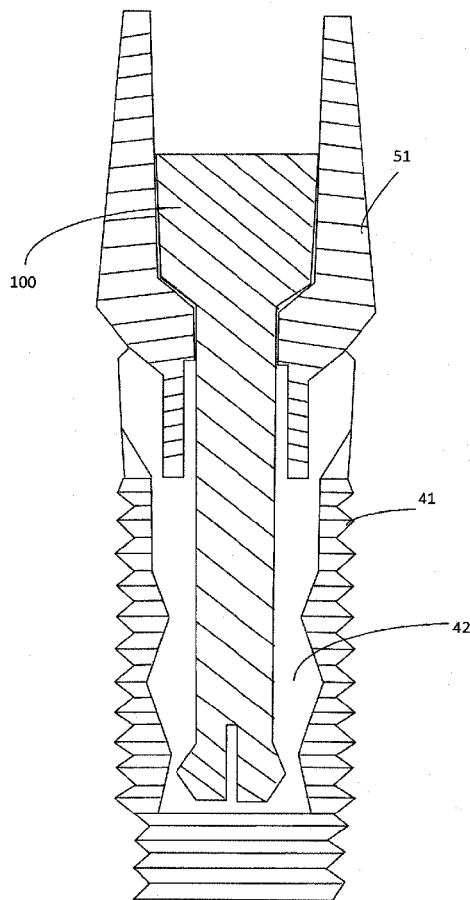


Fig. 6

WO 2013/030839 A1



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A METHOD FOR ATTACHING AND DETACHING DENTAL CONSTRUCTIONS AND A DEVICE THEREOF

Field of the Invention

The present invention relates to the field of dentistry. More particularly, the invention relates to dental restoration systems.

Background of the Invention

The loss of permanent teeth creates the need for a denture, i.e. a dental restoration system, to replace the natural teeth. Conventional dentures rest on implants which are implanted in the gingival tissue of the ridge of the mouth. These dentures, where possible, may also be anchored to existing natural teeth. In cases where all of the teeth have been extracted from either the upper or lower jaw, or both, a full denture can be utilized.

One type of denture, used today, utilizes a prosthetic tooth, which connects to an abutment on a dental implant. After a dental implant is implanted, in the gingival tissue of the ridge, a construction, e.g. an abutment, is attached on top of the implant. The abutment is a metal cylinder that the prosthetic tooth is built onto. There are many types of abutments and they vary in length, width, angle, shape and color. On the abutment a prosthetic tooth is fastened and it should look, and function, just like any other tooth in the mouth.

A patient with a multiple implant restoration goes through the same process and the final prosthetic teeth can vary between multiple single teeth or several teeth connected by a bridge or even a partial fixed denture, based on the planning of the dentist and the needs of the patient.

Another type of denture used today, utilizes a construction such as an overdenture bar. This dental reconstruction system comprises a conventional acrylic overdenture retained by suitable attachments, such as clips, to an implant supported cast bar otherwise known as an overdenture bar, e.g. a Dolder bar. The overdenture bar is attached to the implants, in the patient's ridge, using designated screws.

In any case, after fitting the construction(s) on the implant(s), the dentist is required to take an impression of the ridge, with the attached construction(s). The impression is taken by filling a standard form with a solidifying substance such as polyvinylsiloxane and pressing it inside the mouth of the patient. Once this is completed the dentist will send the impression out to the laboratory for building a model of the mouth. In the laboratory, after receiving the impression, a solidifying material, such as plaster of Paris, is then poured into the impression for creating the model. The model is then separated from the impression. Thus, the model sculpts the patient's alveolar, ridge, implants and the construction. However, since the model is used to create a prosthetic for a patient, the model has to be accurate enough in order to provide that the created prosthetic has a precise fit to the ridge of the patient. An inaccurate prosthetic can cause subsequent inconvenience, or even injuries, to the patient. Finally, the created prosthetic is seated in the mouth of the patient. However, this kind of procedure is time consuming, problematic, and may create inconveniences to the patient.

US 6,488,501 discloses a transfer jig for implant, in a dental surgery, which uses a tubular post and a tubular coping which is attachable and detachable from the post by a snap-fit attachment. The described post has a hexagonal portion for location in a hexagonal socket in an implant and a frusto-conical portion which is a seat for the coping. The coping has a diametrically opposed pair of slots in its end that seats on the post to receive a diametrically opposed pair of pins with a snap-fit, the pins being mounted on the post so that the coping is precisely located relative to the hexagonal portions. The coping also has apertures formed through its tubular wall through which dental

impression material is forced to form structural links when a dental impression is taken. Nevertheless, the described mechanism is complicated and requires a number of specially-designed tight-fitting parts for applying the described method.

It would therefore be desired to propose a system void of the problems discussed above.

Summary of the Invention

It is an object of the present invention to provide a method for creating an accurate impression of the mouth ridge.

It is another object of the present invention to provide a method for creating comfortable and accurate dental restorations.

It is still another object of the present invention to provide a method for attaching and detaching dental constructions for measurements.

It is still another object of the present invention to provide a flexible device, for firmly holding a dental restoration construction in its place, over the implants in the ridge, and for allowing an easy detachment of the construction from the implants in the ridge when detaching the impression.

It is still another object of the present invention to provide a flexible device for firmly holding the dental restoration construction in its place over the implants in the ridge, even if the implants are not parallel to one another.

Other objects and advantages of the invention will become apparent as the description proceeds.

The present invention relates to a method for attaching and detaching a construction to an implant in a ridge of a mouth comprising the steps of: (a) inserting at least one flexible holding device into said construction, where said flexible holding device head is held inside said construction; (b) attaching said construction to said implant by fastening the legs of said holding device into said implant; and (c) detaching said construction by applying a pulling force, in an opposite direction to the implant, on said construction.

Preferably, the detaching is done by applying a pulling force on the form with an impression which engulfs the construction.

In one embodiment, the method is used for connecting and detaching an abutment.

In one embodiment, the method is used for connecting and detaching an overdenture bar. In one embodiment, the method is used for connecting the overdenture bar to a number of implants which are not parallel to one another in the ridge of the mouth.

The present invention also relates to a flexible holding device for connecting a construction to an implant in a ridge of a mouth comprising: (a) a head for holding the construction from the inside of said construction; (b) more than one leg for holding the internal thread of said implant from the inside; and (c) a body, attached to said head and attached to said legs, for attaching said construction to said implant.

Preferably, the device is made of Polyacetal.

Preferably, the device has two legs.

In one embodiment, the device is used instead of a transfer.

Brief Description of the Drawings

Some embodiments of the invention are herein described, by way of example only, with reference to the accompanying drawings. With specific reference now to the drawings in detail, it is stressed that the particulars shown are by way of example and for purposes of illustrative discussion of embodiments of the invention. In this regard, the description and the drawings make apparent to those skilled in the art how embodiments of the invention may be practiced.

In the drawings:

- Fig. 1 is a schematic diagram of the different dental parts of a prior art prosthetic tooth.
- Fig. 2 is a diagram of a mouth of a patient with an abutment secured, in a prior art fashion, in the mouth.
- Fig. 3 is a diagram of an impression taken, in a prior art fashion, in a mouth of a patient.
- Fig. 4 is a schematic diagram of an overdenture bar above the ridge of a mouth, before attaching the overdenture bar to the dental implant analogues, according to a prior art process.
- Fig. 5 is a schematic diagram of a flexible holding device, according to an embodiment of the invention.
- Fig. 6 is a schematic diagram of the flexible holding device attaching a construction to a typical dental implant analogue, according to an embodiment of the invention.

Detailed Description of Preferred Embodiments

The term "ridge" refers to the alveolar ridge which comprises gingival tissue and contains the sockets, i.e. alveoli, of the teeth.

The terms "implant analogue(s)" and "implant(s)" are used throughout the description intermittingly and are meant to include any device which is inserted into the ridge for supporting a denture.

The terms "bar" "cast bar", "denture bar", "overdenture bar", "Perci bar", and "Dolder bar" are used throughout the description intermittingly and are meant to include any bar which supports the prosthetic overdenture.

The term "construction(s)" is meant to include any dental device which can be attached to the implant, such as, an abutment, a bridge, or an overdenture bar.

The term "denture(s)" is meant to include any prosthetic device for replacing the natural teeth, such as a prosthetic tooth or a prosthetic overdenture.

Fig. 1 is a schematic diagram of the different dental parts of a prior art prosthetic tooth. At first a dental implant 41 is implanted in the gingival tissue of the ridge 44. Then, an abutment 31 is fastened to the implant 41 using a prior art screw 200. After the abutment 31 has been attached and fastened to the implant 41, the dentist is required to take an impression of the ridge and the attached abutment 31, for casting a model of the ridge with its attached abutment 31. Since the model is used afterwards to create the prosthetic tooth 30, the model needs to be as accurate as possible. Any inaccuracy in the model may result in an inaccuracy of the prosthetic tooth which in turn may cause inconvenience to the patient. In some of the cases, due to the inaccuracies, the dentist may be required to amend and smooth the tooth in the mouth of the patient, after attaching the prosthetic tooth, a feat which is not easy to the dentist and inconvenient to the patient.

Fig. 2 is a diagram of a mouth of a patient with an abutment secured, in a prior art fashion, in the mouth. The abutment 31, as describe in relations to fig. 1, is secured, using a screw, prior to taking an impression. The abutment 31, of the prior art, is designed to be

taller than the other teeth of the mouth in order to allow the dentist to unfasten the screw of the abutment 31 and pull the abutment 31.

Fig. 3 is a diagram of an impression taken, in a prior art fashion, in a mouth of a patient. In the prior art process, a hole is cut in the standard form 33 in order to equip the abutment 31. The abutment 31, as described in relations to Fig. 1 and 2, sticks out from the ridge and therefore the standard form 33 is first cut in order to take the impression with the abutment 31. The cut is made in the corresponding place of abutment 31 and then the form 33 is filled with the solidifying material such as such as a combination of Zhermack's Hydrorise silicon and Hydroise putty. This cut form 33, with its solidifying material, is then pressed onto the ridge of the patient and held in place until it solidifies. After which the dentist first unscrews the abutment 31 and then lifts the form and sends it the lab for casting a model of the ridge.

Fig. 4 is a schematic diagram of an overdenture bar above the ridge of a mouth, before attaching the overdenture bar to the dental implant analogues, according to a prior art process. The overdenture bar 20 comprises poles, such as pole 21, connected between them by interconnecting bars, such as bar 22. The overdenture bar 20 may have any number of poles, and interconnecting bars, according to the needs of the patient and his ridge. In this embodiment the ridge 44 has four implants, such as implant 41, for supporting the overdenture bar 20, which has four poles. The poles of the overdenture bar 20 are attached to the implants by screws such as screw 200. The top part of the screw 200 which is inside the pole 21 is depicted in silhouette. In the prior art process, after attaching the overdenture bar with screws to the implants of the ridge an impression is taken.

However, since the construction is fastened by screws to the implants, any impression of the ridge and the construction is distorted by the construction. For example when the impression material, which may be any solidifying material such as a combination of Zhermack's Hydrorise silicon and Hydroise putty, is first poured on the ridge and the

construction, the material flows around the construction, and in the spaces between the construction and the ridge, and solidifies. This however makes the task, of removing the impression intact and undamaged, time consuming and fairly difficult, since the construction is fastened with screws to the abutments of the implants in the ridge. In many cases it is almost impossible to detach the impression from the mouth of the patient without it being ripped or torn, due to the fact that the construction is secured to the ridge of the mouth and due to the fact that there is a space between the construction and the ridge and due to the fact that the impression material has solidified. In many cases the ripped and distorted impression hinders the ability to create an accurate model of the mouth of the patient which in turn may prevent the lab from creating a fitting prosthetic, whether the prosthetic is a prosthetic tooth or a prosthetic overdenture, or any other kind of construction.

Therefore, a device is proposed which can hold the construction in place when pouring the impression material, over the construction and ridge, and can easily detach from the ridge, when the impression solidifies, thus allowing the impression to keep engulfing the construction when lifted. Thus the impression, which includes the construction, may be used for casting the model of the ridge of the patient, after which the construction may be extracted from the impression and fastened to the model, effectively creating a more accurate model of the ridge and the construction of the patient. These flexible devices are designed to be used instead of the screws used for attaching the construction to the implants.

The described device may also spare the use of a transfer since it may be used as a transfer, even in cases where the implants are not implemented in the ridge in parallel.

Fig. 5 is a schematic diagram of a flexible holding device, according to an embodiment of the invention. The device 100 is designed as a flexible holding device having a head 11, a body 12, and two extended legs 13. The body 12 is designed to be slimmer than the head 11, in other words, the body 12 is designed to have a shorter circumference than the head

11. A typical dental construction is designed with a tunnel running through its axis, where the end of the tunnel is slightly slimmer in order to hold the head of the screw. The device 100 is designed to fit in a construction, instead of the designated screw. Thus the device 100 may be inserted into the construction, legs 13 first – head 11 last, and pushed to the limit, i.e. until the head 11 gets stuck close to the end of the construction, above the lower opening, and the legs 13 dangle out. The legs 13, which are designed for insertion and gripping, can then be inserted into the inside of an implant, where the legs 13 can grip the internal thread of the implant from within, due to the legs 13 elastic repelling force which repels the legs from one another. Typically, the construction can be attached to the implant by applying force on the top of the head 11 of device 100, which is in the tunnel of the construction, to force the legs 13 into the implant and gripping it from within, while the lower opening of the tunnel of the construction is on, or substantially close, to the implant.

Likewise the construction may be detached by pulling the construction from the ridge, thus forcing the legs 13 of device 100 to surrender their grip on the inner thread of the implant. The holding device 100 may be composed of Polyacetal or any other flexible and rigid material such as Toarplast POM.

In one embodiment, the wider part of legs 13, as described in relations to Fig 5, is designed as having an angle which sticks out of the device. In another embodiment the legs 13 may have their wider part rounded. Other embodiments are possible as well as long as the legs are designed to grip the internal thread of the implant from within.

In one of the embodiments, the device 100, as described in relations to Fig. 5, has more than two legs. There may be any number of legs to device 100 as long as they are designed to grip the internal thread of the implant from within.

In one embodiment the device 100, as described in relations to Fig. 5, is 10mm long, where the head 11 may be 2mm long, the body 12 may be 7mm long, and the legs 13

wider part may be 1mm long. In this embodiment the head 11 may have a diameter of 2mm, the body 12 may have a diameter of 1mm, and the legs 13 wider part may have a diameter of 2mm, when they are not pressed together. In one embodiment the legs 13 may be 2mm long. Other embodiments and other measurements are possible as well.

Fig. 6 is a schematic diagram of the flexible holding device attaching a construction to a typical dental implant analogue, according to an embodiment of the invention. The device 100, as described in relations to Fig. 5, is inserted in the construction 51 and into the implant 41. The head of device 100 secures the construction 51, and the legs, of device 100, grip the internal thread 42 of the implant 41 from within. Thus the construction 51 is held by device 100 to the implants 41. However, if an upper pulling force is applied to the construction 51, the legs of device 100 will surrender their grip and the construction 51 can be easily detached from the implant 41.

Due to the features of the described flexible holding device, it may be used for holding the constructions over implants where the implants are not parallel. Meaning, that even in cases where a number of implants are implanted in the ridge of the patient at different angles, the construction(s) may be held by a number of the described flexible devices, e.g. one for each implant, to the implants, and pulled away when necessary.

The device of the present invention is beneficial to the dental surgeon who performs the implant surgery, the dental laboratory which creates the dentures, and the patient who receives the denture. The dental surgeon can make an impression much easier since the construction is removed from the ridge along with the impression. With a securely attached construction, difficulty always is encountered with the impression material becoming lodged between the construction and the sutured gingival tissue. Since the construction is removed with the impression, no such difficulties are encountered taking the impression. Next, the dental laboratory can fashion a denture which is much tighter fitting since the construction is present in the laboratory during the denture manufacturing operation. This results in a better fit of the denture for the patient. Installation of the

construction, for usage, is accomplished easily by attaching the construction extracted from the impression into the implants in the ridge, prior to the patient being finally fitted with the custom-manufactured denture prosthetic.

While some embodiments of the invention have been described by way of illustration, it will be apparent that the invention can be carried into practice with many modifications, variations and adaptations, and with the use of numerous equivalents or alternative solutions that are within the scope of persons skilled in the art, without departing from the invention or exceeding the scope of claims.

Claims

1. A flexible holding device for connecting a construction to an implant in a ridge of a mouth comprising:
 - a. a head for holding the construction from the inside of said construction;
 - b. more than one leg for holding the internal thread of said implant from the inside; and
 - c. a body, attached to said head and attached to said legs, for attaching said construction to said implant.
2. A device according to claim 1, where the device is made of Polyacetal.
3. A device according to claim 1, where the device has two legs.
4. A device according to claim 1, where the device is used for connecting an abutment.
5. A device according to claim 1, where the device is used for connecting an overdenture bar.
6. A device according to claim 5, where the device is used for connecting the overdenture bar to a number of implants which are not parallel to one another in the ridge of the mouth.
7. A device according to claim 1, where the device is used instead of a transfer.
8. A method for attaching and detaching a construction to an implant in a ridge of a mouth comprising the steps of:
 - a. inserting at least one flexible holding device into said construction, where said flexible holding device head is held inside said construction;
 - b. attaching said construction to said implant by fastening the legs of said holding device into said implant; and
 - c. detaching said construction by applying a pulling force, in an opposite direction to the implant, on said construction.
9. A method according to claim 8, where the detaching is done by applying a pulling force on the form with an impression which engulfs the construction.

10. A method according to claim 8, where the method is used for connecting and detaching an abutment.
11. A method according to claim 8, where the method is used for connecting and detaching an overdenture bar.
12. A method according to claim 11, where the method is used for connecting the overdenture bar to a number of implants which are not parallel to one another in the ridge of the mouth.

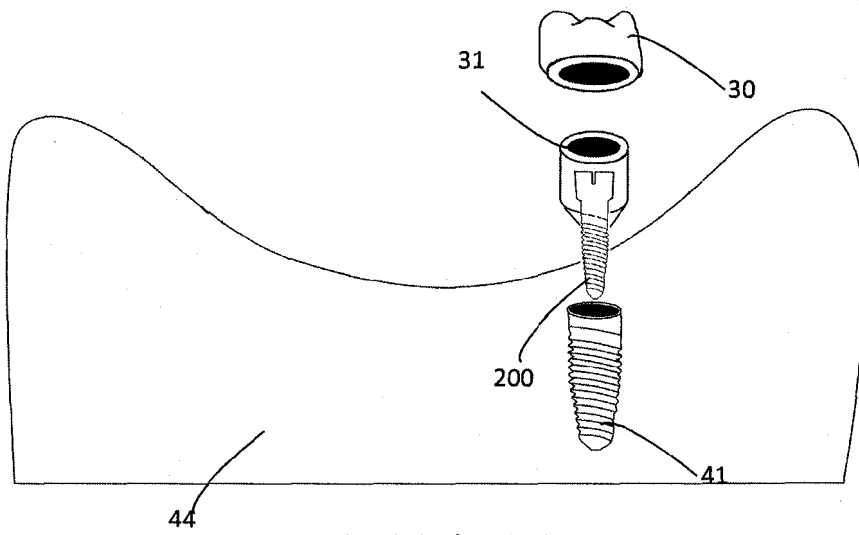


Fig. 1 (Prior Art)

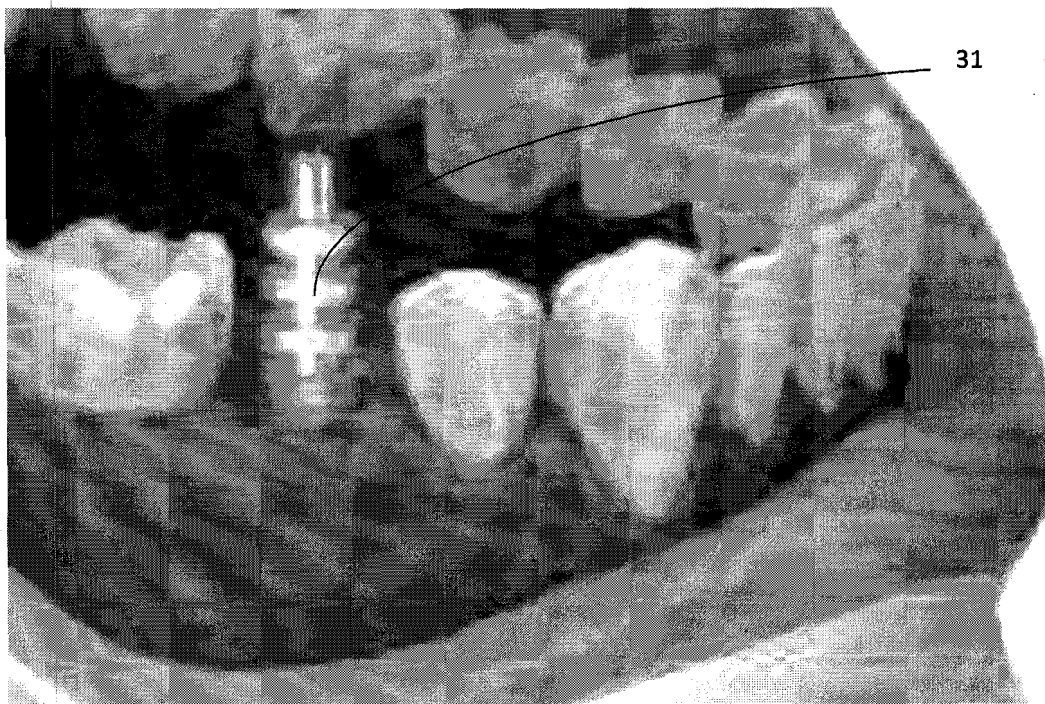


Fig 2 (Prior Art)

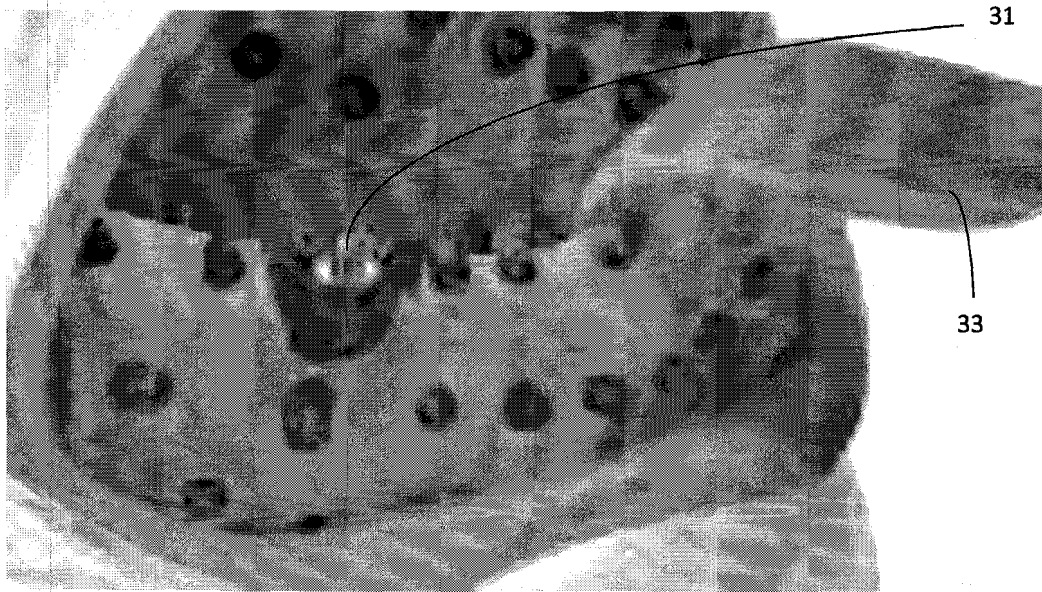


Fig. 3 (Prior Art)

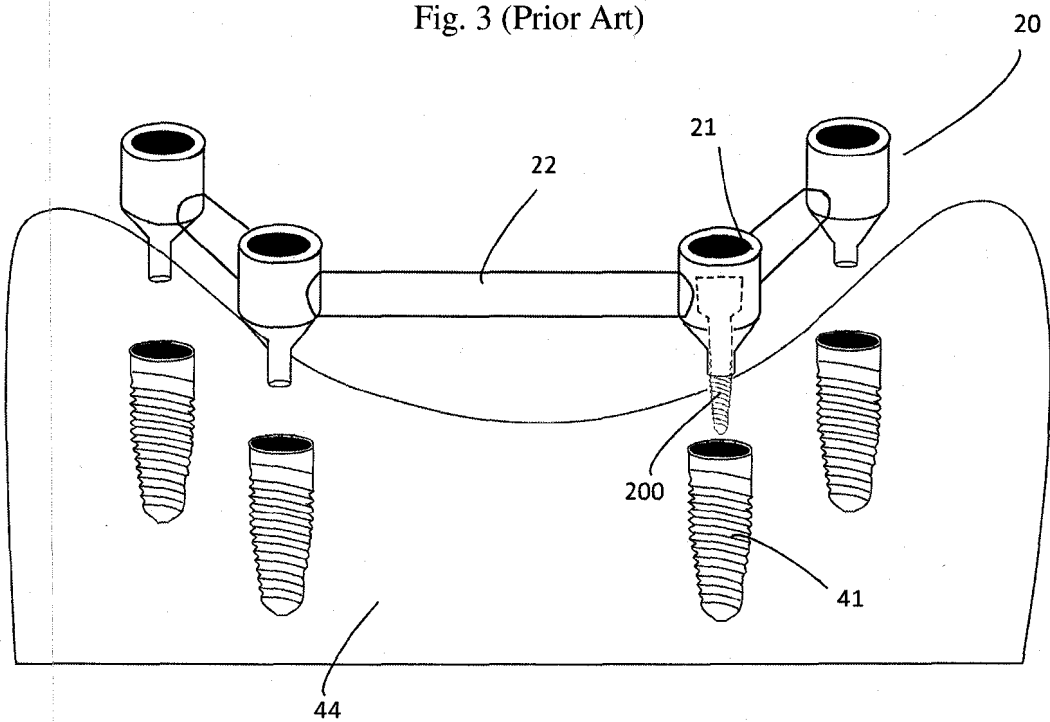


Fig. 4 (Prior Art)

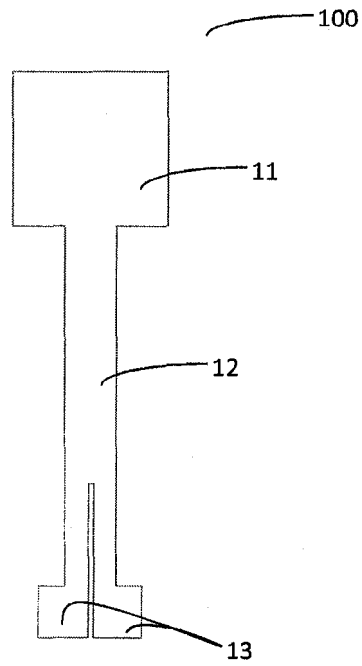


Fig. 5

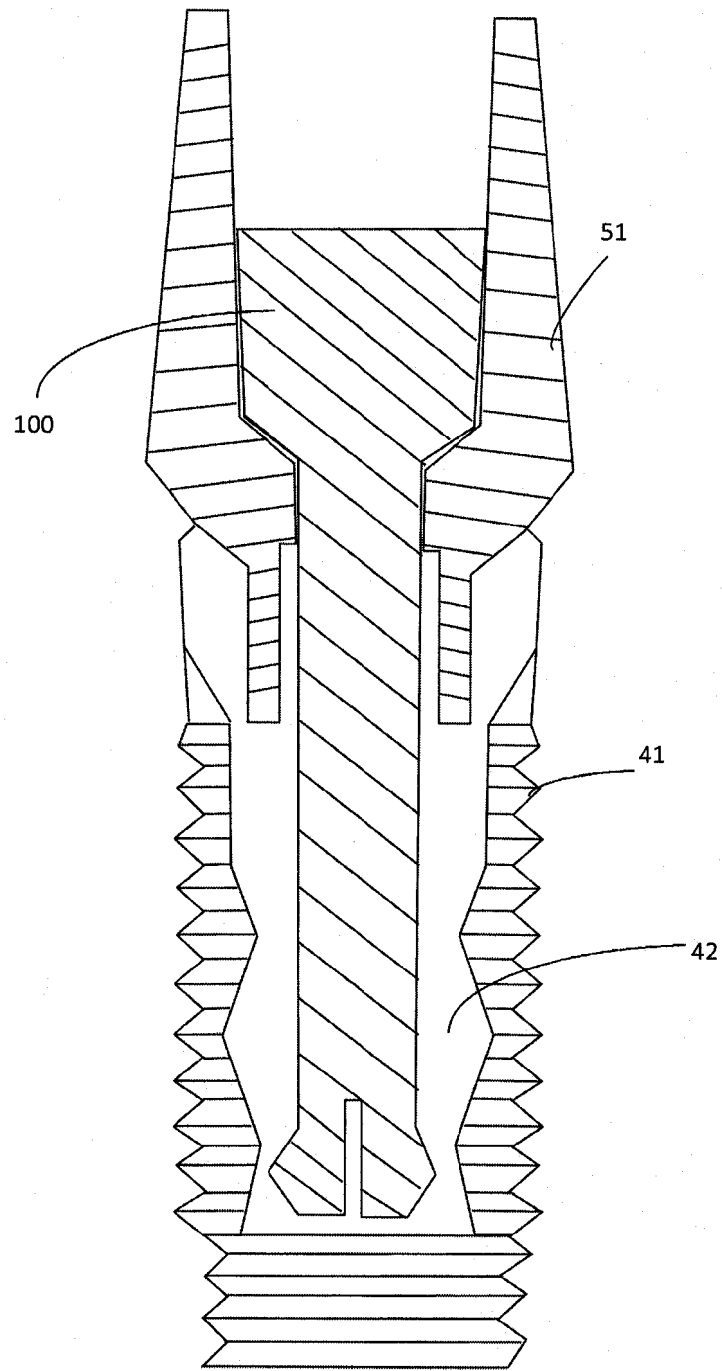


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
INV. A61C8/00
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	WO 2011/036268 A2 (DENTALPOINT AG [CH]; BOLLETER PHILIP [CH]; CHIUSOLO NICOLA [CH]) 31 March 2011 (2011-03-31) figure 16(b) page 16, line 5 - page 18, line 22 -----	1-8, 10-12
X	EP 0 685 209 A1 (TOBOSO RAMON JES S [ES]) 6 December 1995 (1995-12-06) figures 1,10 column 6, line 16 - column 9, line 19 -----	1-12

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
"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)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 13 December 2012	Date of mailing of the international search report 21/12/2012
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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 Fortune, Bruce
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/IL2012/050339

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2011036268 A2	31-03-2011	CH 701860 A1	31-03-2011
		EP 2480161 A2	01-08-2012
		WO 2011036268 A2	31-03-2011

EP 0685209 A1	06-12-1995	EP 0685209 A1	06-12-1995
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