US007429175B2

(12) **United States Patent**
Gittelson

(10) **Patent No.: US 7,429,175 B2**
(45) **Date of Patent: Sep. 30, 2008**

(54) **DENTAL IMPLANT SURGICAL GUIDE**

(76) Inventor: **Glenn L. Gittelson**, 3130 Denton Dr., Merrick, NY (US) 11566

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **11/594,400**

(22) Filed: **Nov. 8, 2006**

(65) **Prior Publication Data**

US 2007/0111156 A1 May 17, 2007

Related U.S. Application Data

(60) Provisional application No. 60/737,789, filed on Nov. 17, 2005.

(51) **Int. Cl.**
A61C 3/00 (2006.01)
A61C 19/04 (2006.01)
A61C 8/00 (2006.01)

(52) **U.S. Cl.** **433/75**; 433/72; 433/173

(58) **Field of Classification Search** 433/72, 433/75, 172–173
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,543,065	A *	9/1985	Bushway	433/221
5,133,660	A	7/1992	Fenick	
5,556,278	A	9/1996	Meitner	
5,636,986	A	6/1997	Pezeshkian	
5,813,858	A	9/1998	Singer	
5,931,675	A	8/1999	Callan	
6,024,567	A	2/2000	Callan	
6,164,969	A	12/2000	Dinkelacker	
6,290,500	B1	9/2001	Morgan et al.	
6,431,867	B1	8/2002	Gittelson et al.	
6,558,162	B1	5/2003	Porter et al.	
6,793,491	B2	9/2004	Klein et al.	
7,086,860	B2	8/2006	Schuman et al.	
2003/0170591	A1	9/2003	Kurer	
2004/0048225	A1	3/2004	Fletcher	
2007/0065771	A1 *	3/2007	Kohani	433/74

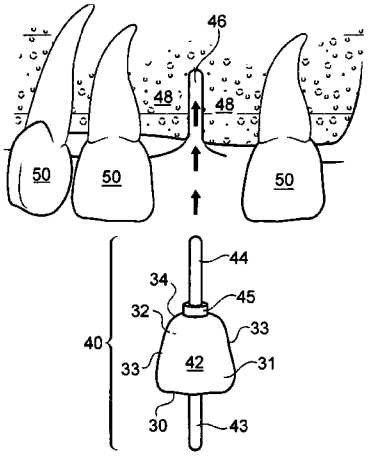
* cited by examiner

Primary Examiner—John J Wilson
Assistant Examiner—Heidi M Bashaw
(74) *Attorney, Agent, or Firm*—Roberts Mardula & Wertheim, LLC

(57) **ABSTRACT**

A prefabricated dental implant surgical guide. The implant surgical guide comprises a tooth shaped contour which simulates a natural tooth and the final prosthesis. The tooth shaped contours can be shaped to match any tooth found in the mouth. The system further comprises apical posts which protrude from the apical aspect of the tooth contour of the surgical guide. These apical posts are capable of marking an initial osteotomy site. The apical posts are further able to be placed in to an initial and developing osteotomy site to verify proper implant location, angulation and rotational position prior to implant placement. Significantly the apical post can be attached to the surgical guide and of a fixed length. The apical post can also be adjustable allowing continuous osteotomy site verification and removable allowing an implant surgical drill to pass thru it thereby allowing continuous osteotomy site development and verification. The system further comprises a coronal post aspect to position the surgical guide. The posts can be removed, the tooth contour aspect of the guide hollowed out and then relined and secured to the abutment aspect of an implant thereby functioning as a provisional crown or crowns. The prefabricated dental implant surgical guide can be used to place single implants or multiple side by side implants in a continuous fashion allowing verification of implant location, angulation and rotational position prior to implant placement leading to a more esthetic, functional and stable prosthesis.

12 Claims, 19 Drawing Sheets



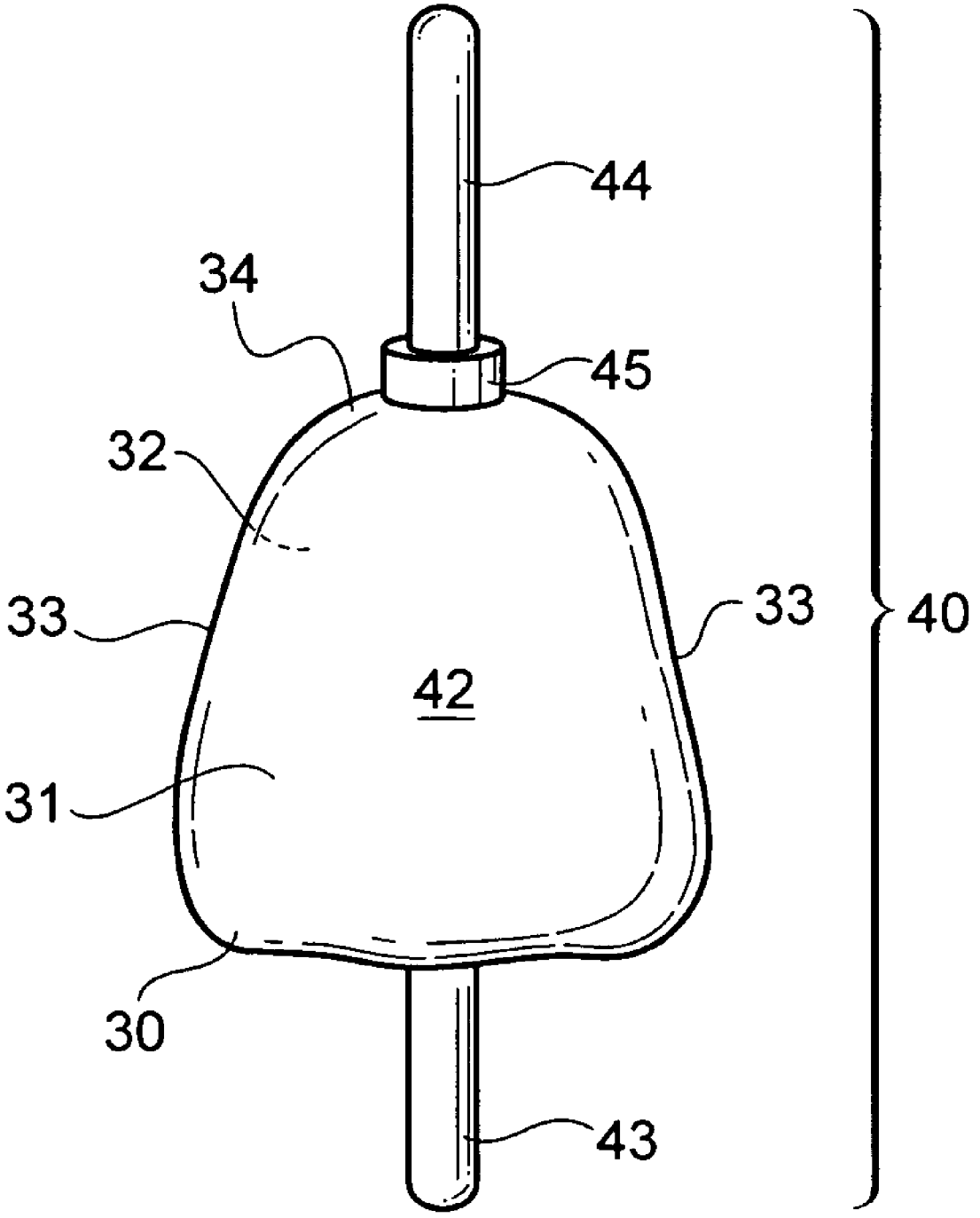


Figure 1a

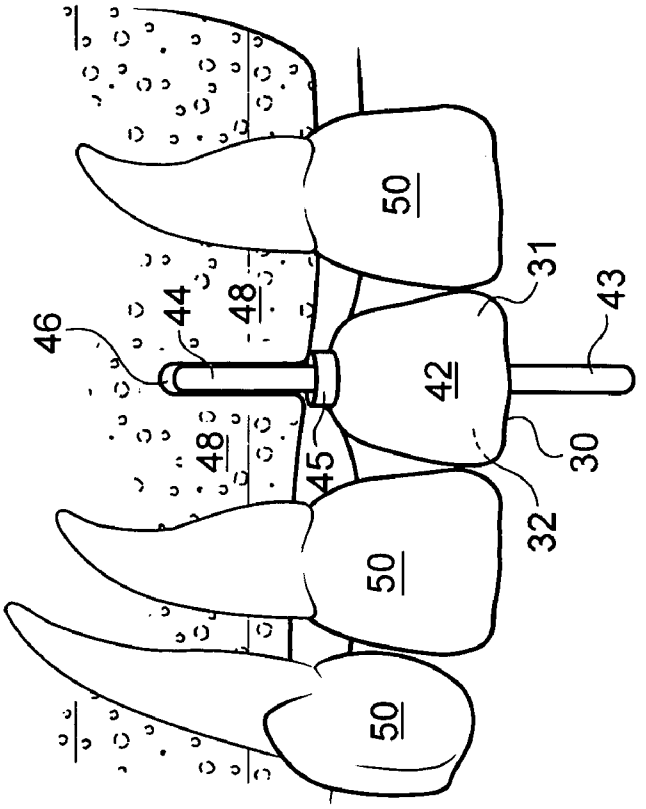


Figure 1c

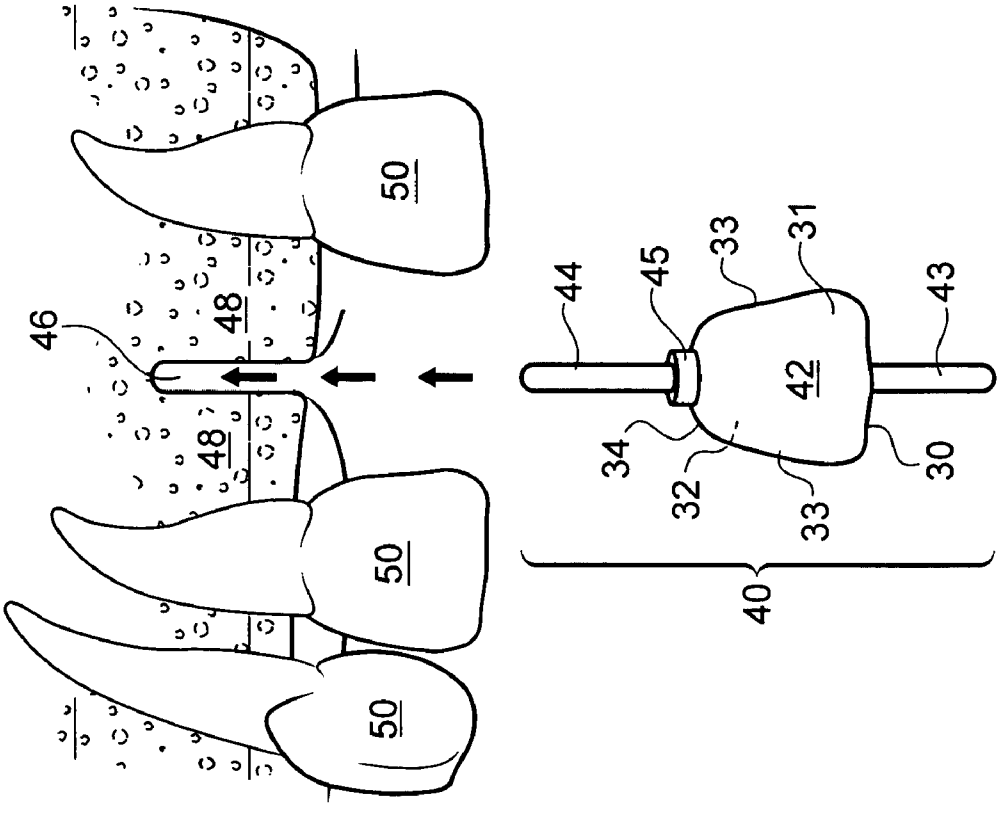


Figure 1b

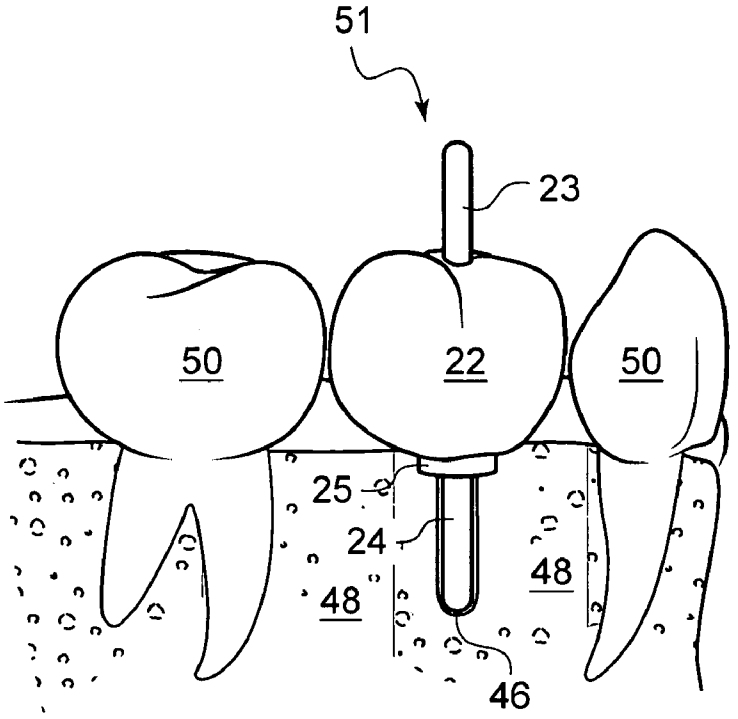


Figure 2a

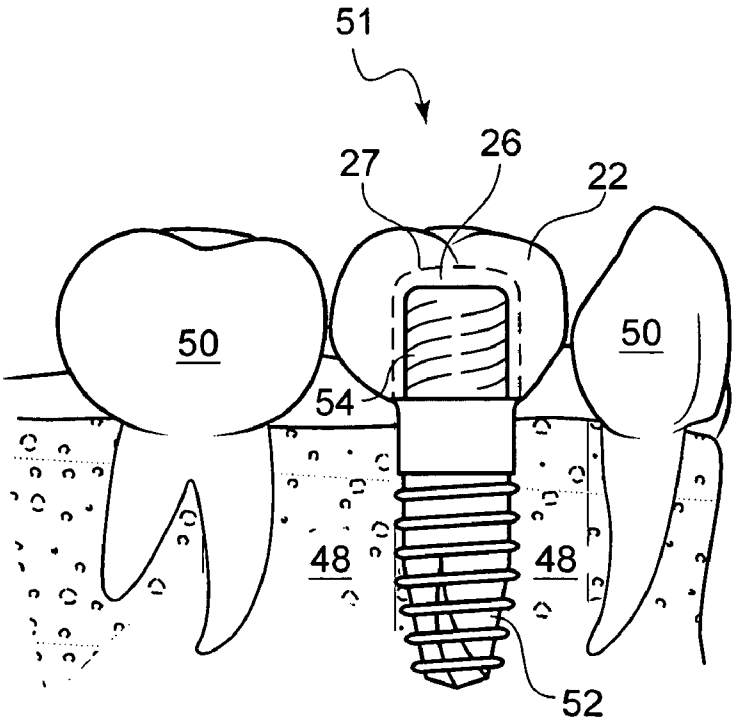


Figure 2b

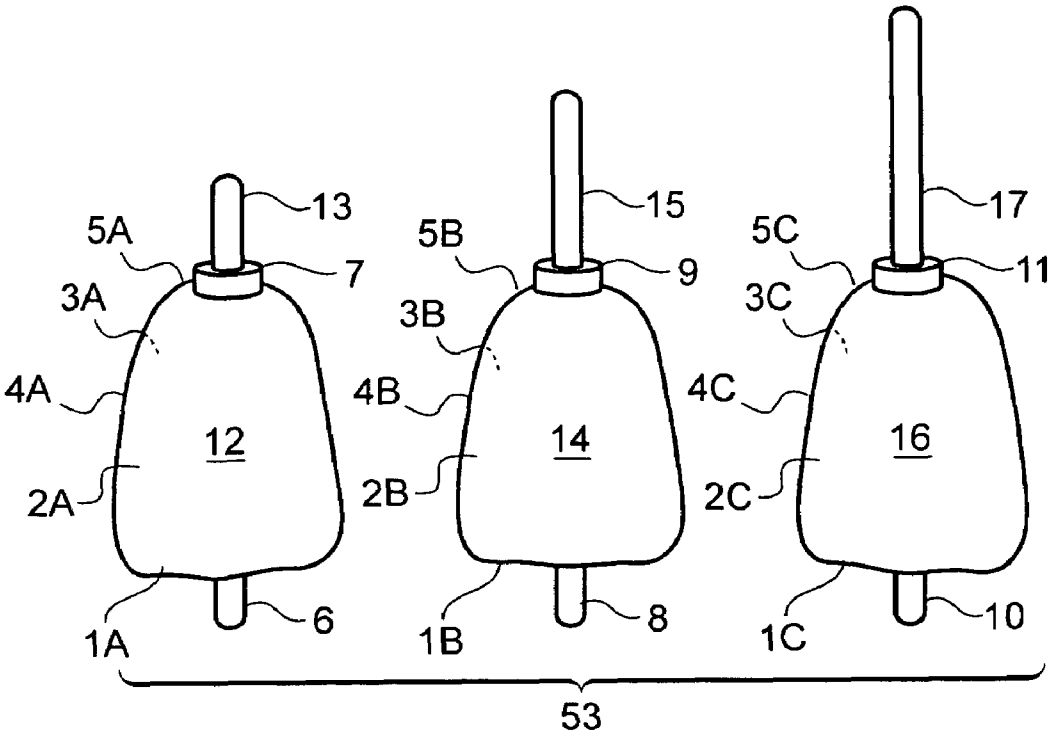


Figure 3a

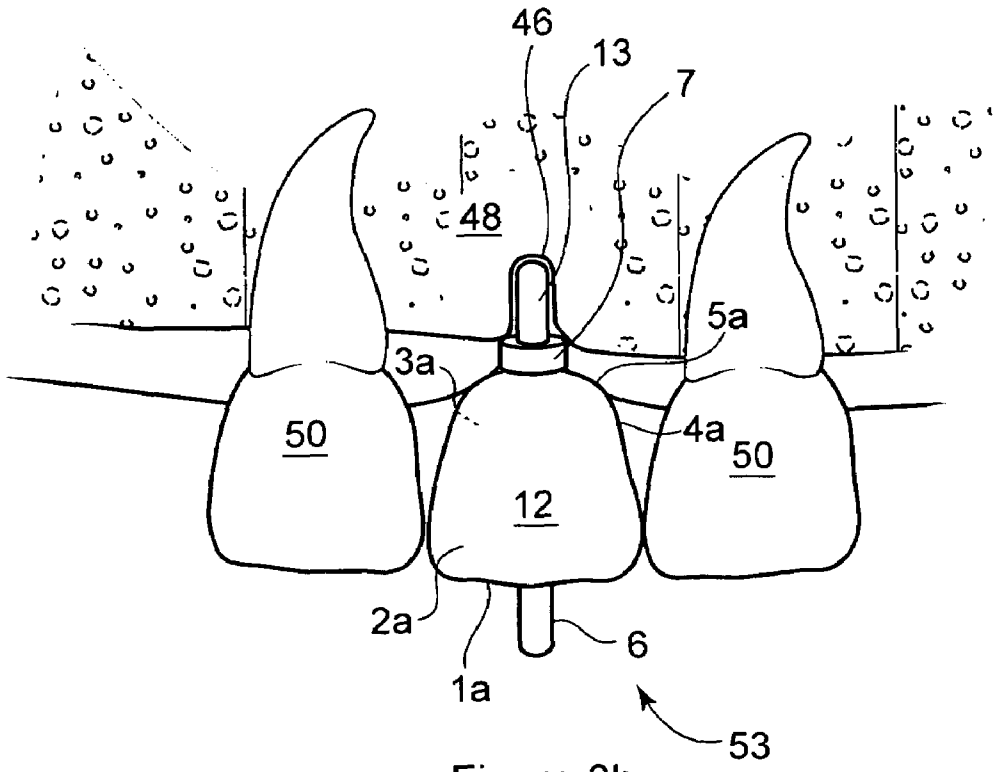


Figure 3b

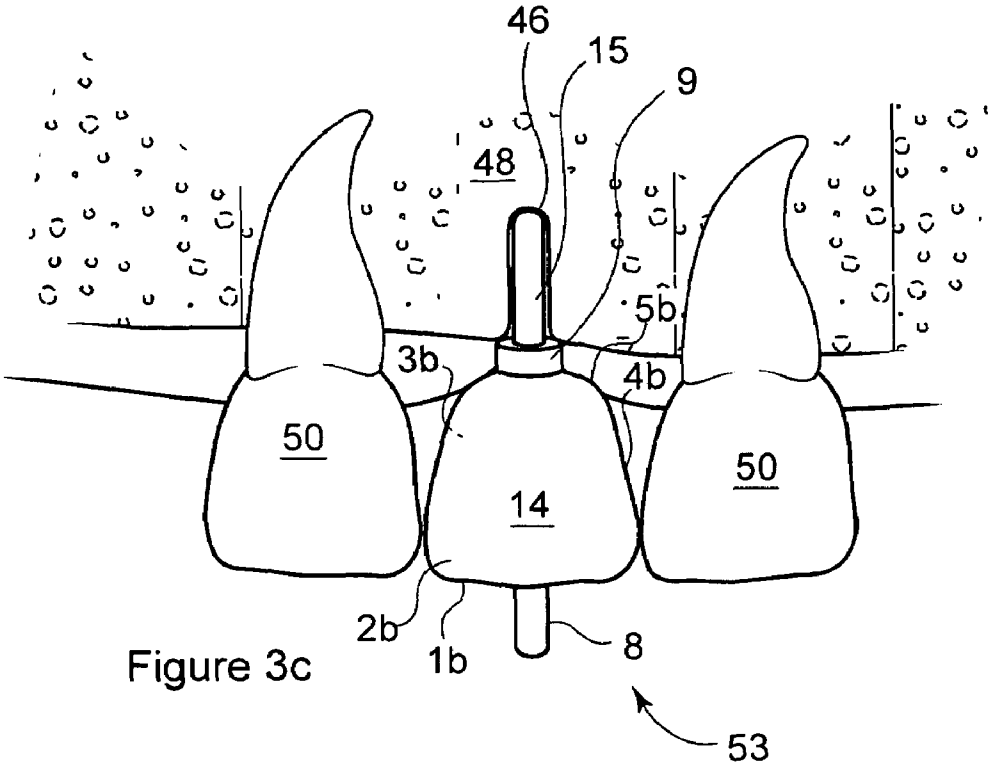


Figure 3c

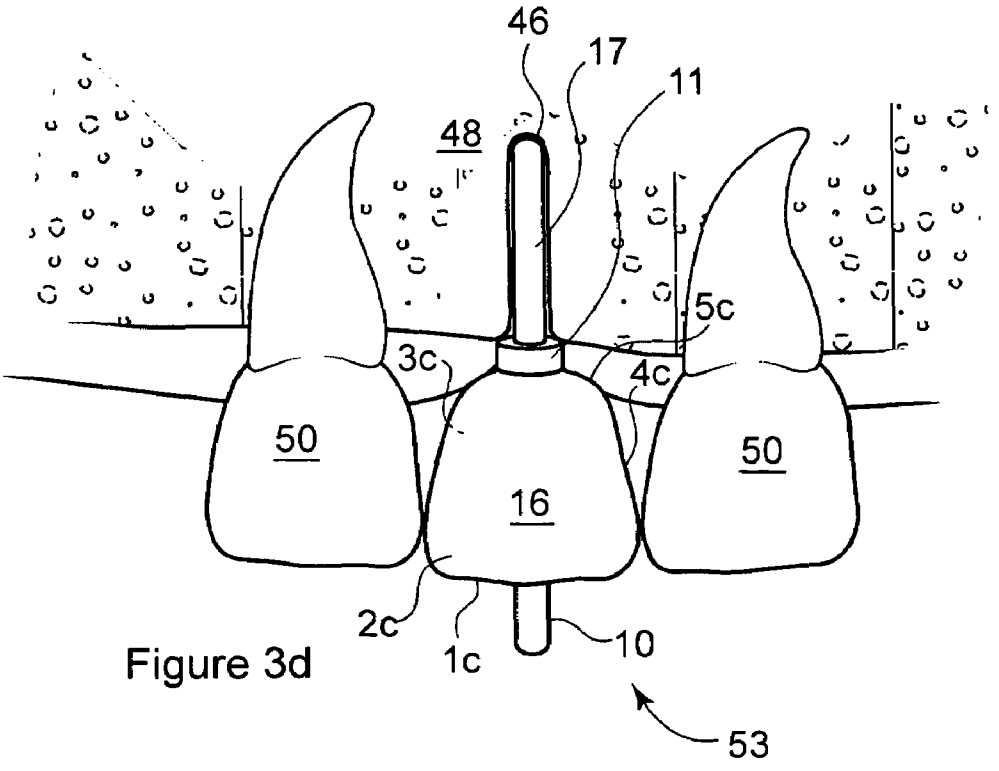


Figure 3d

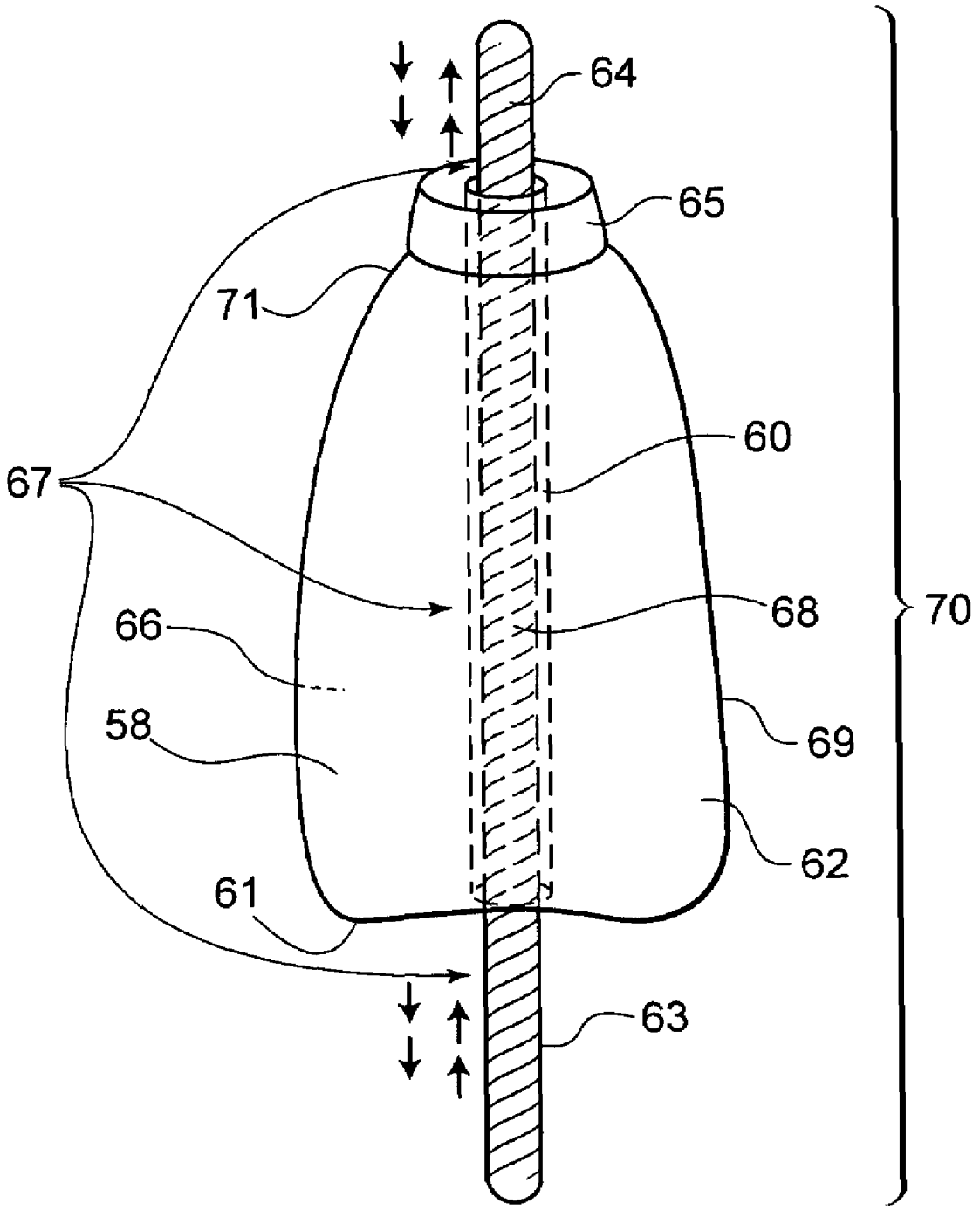


Figure 4a

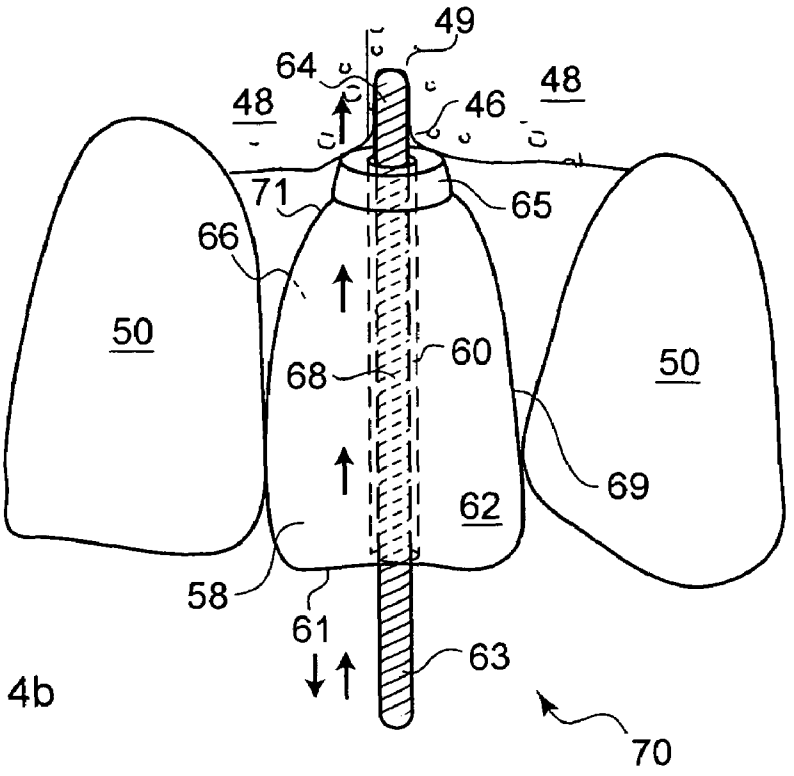


Figure 4b

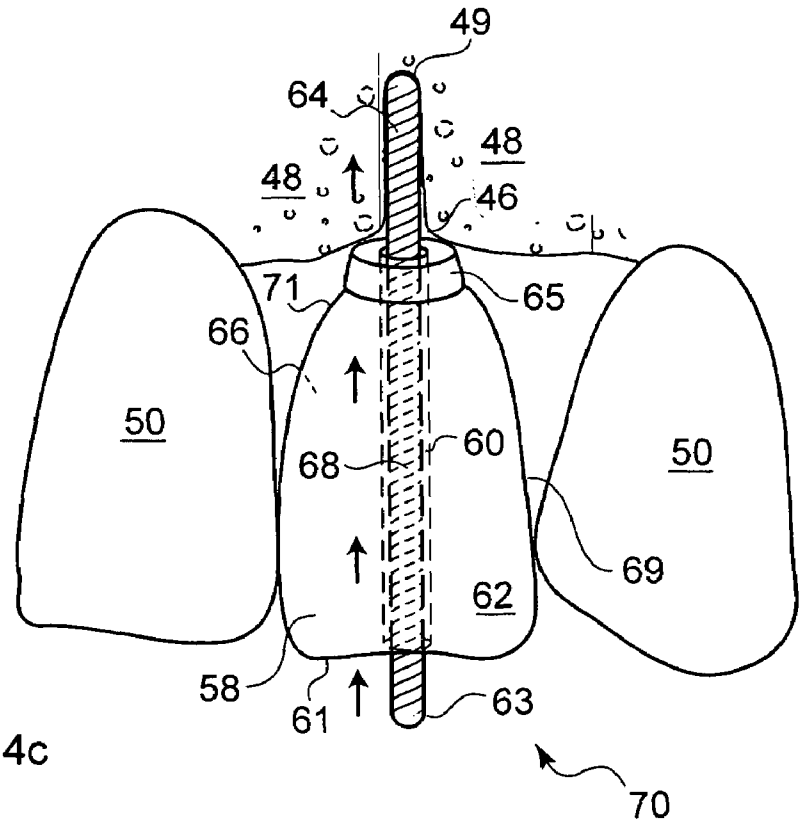


Figure 4c

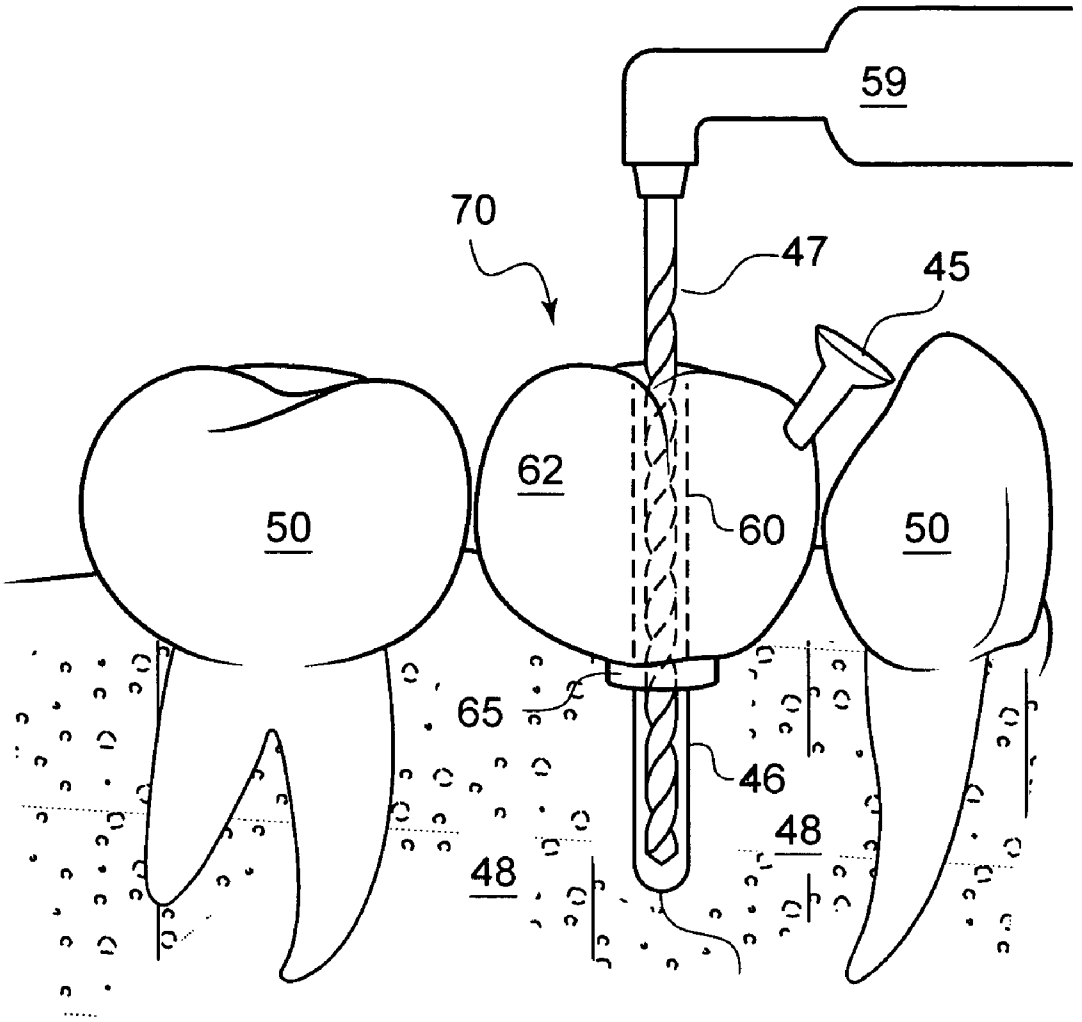


Figure 4d

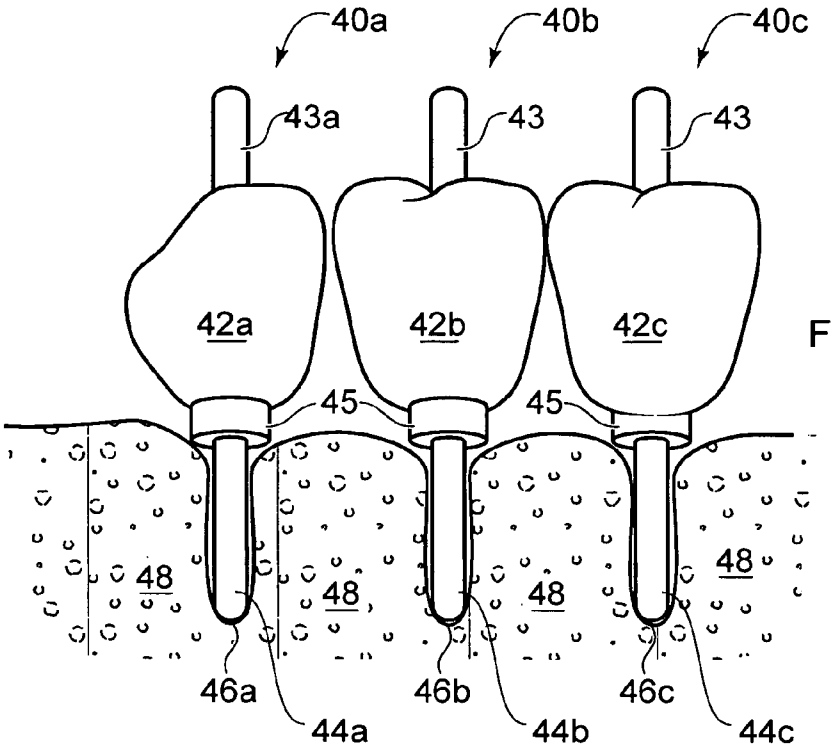


Figure 5

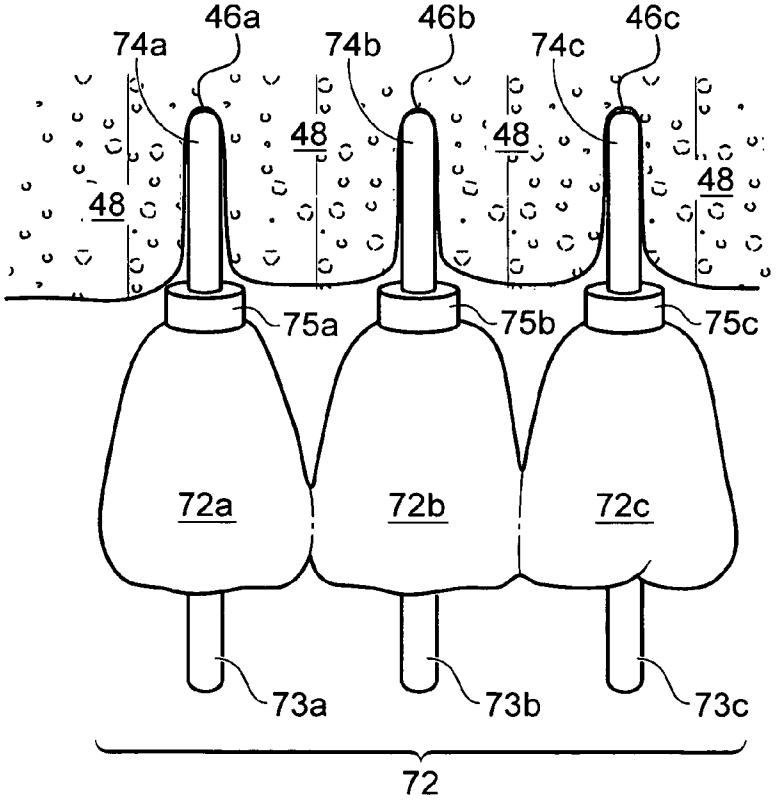


Figure 6

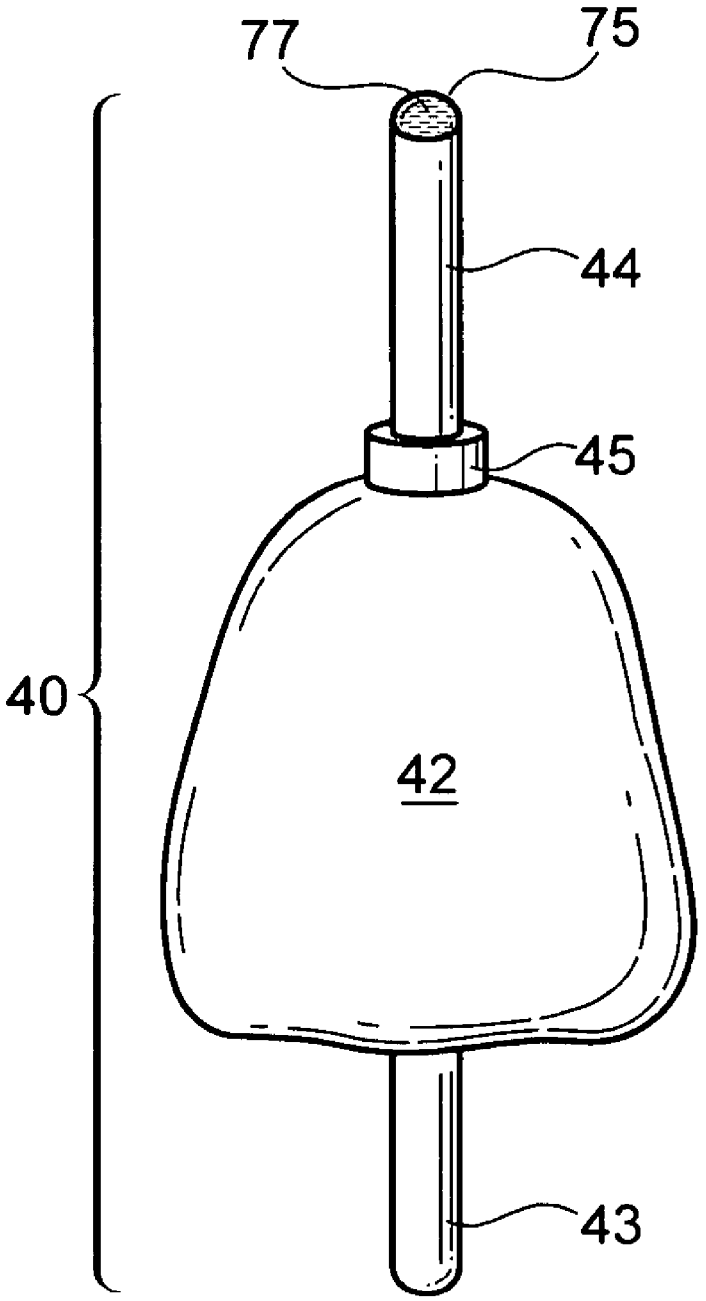


Figure 7a

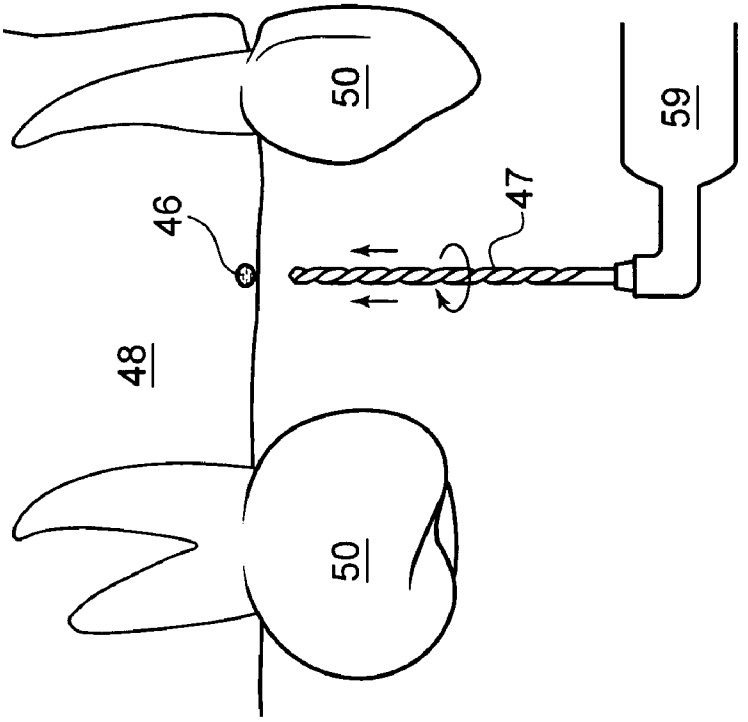


Figure 7c

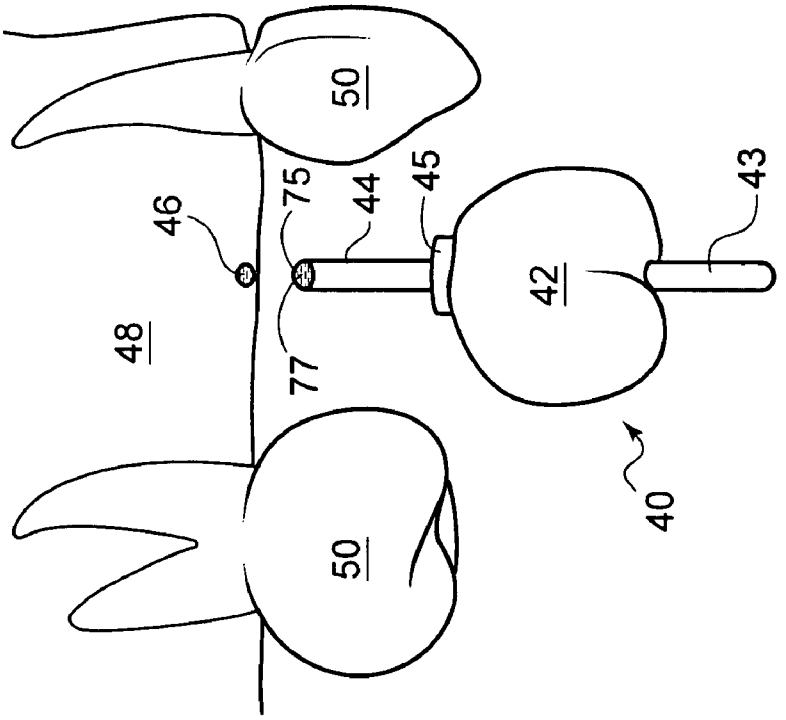


Figure 7b

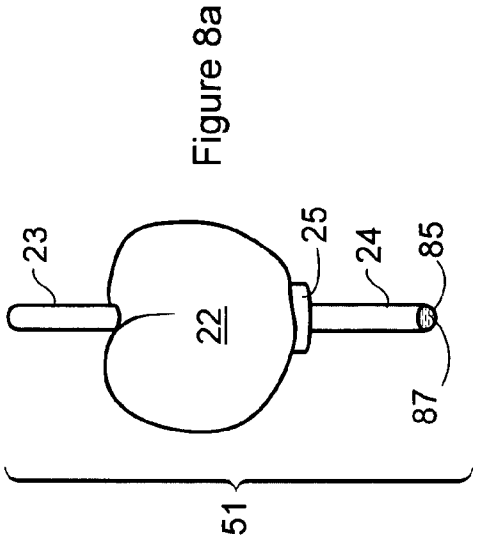


Figure 8a

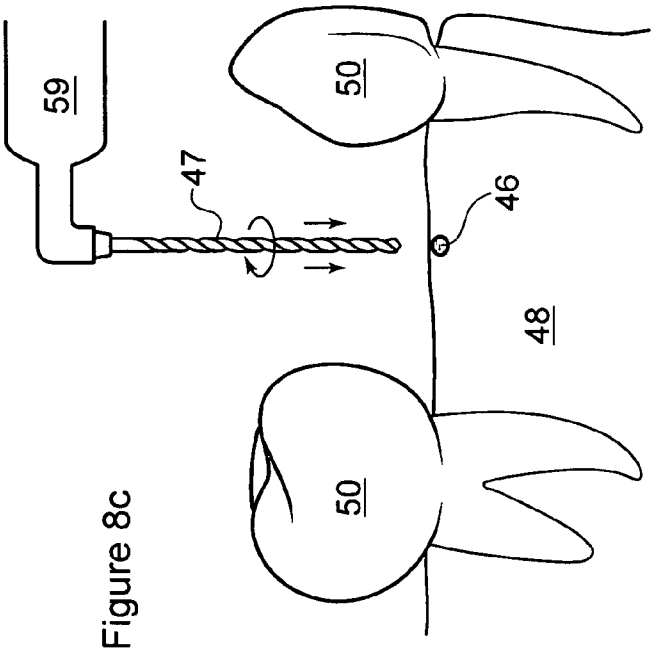


Figure 8c

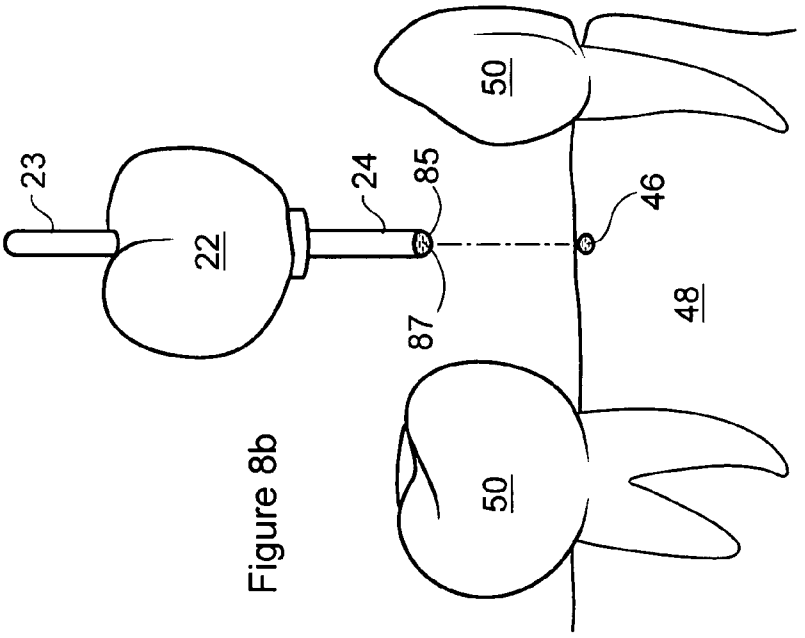


Figure 8b

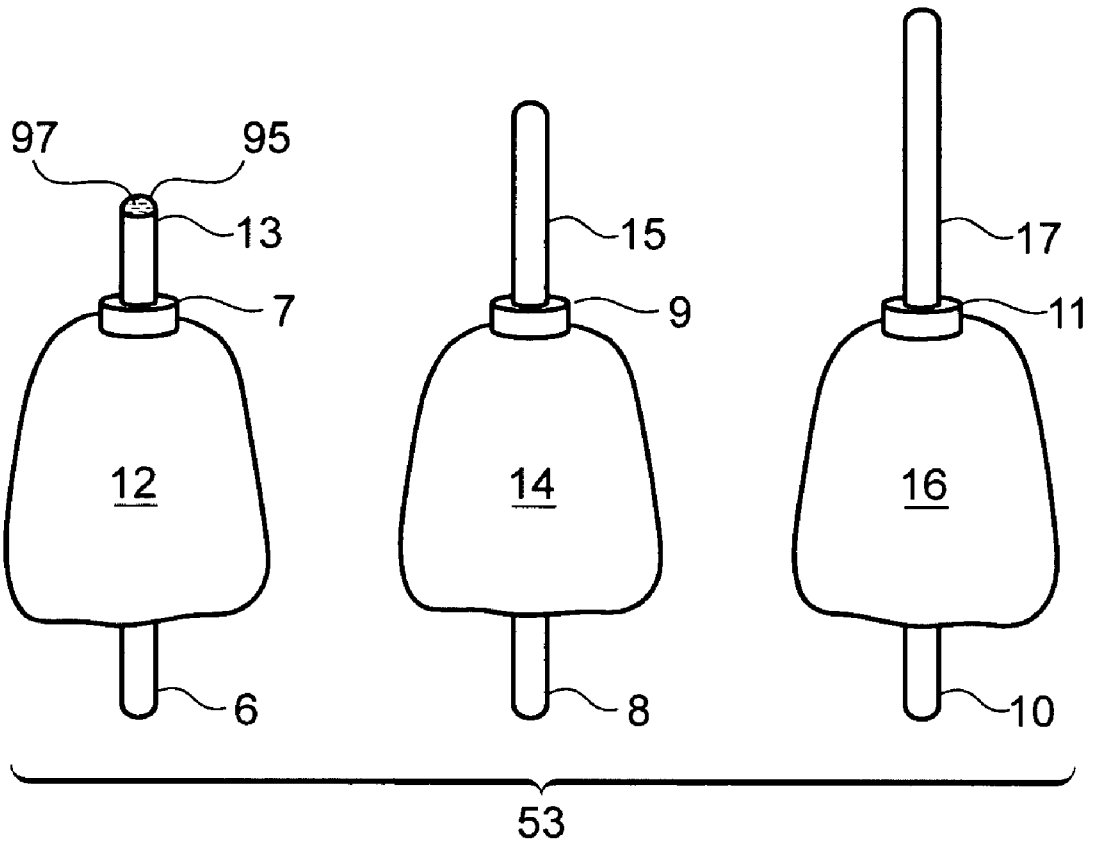


Figure 9a

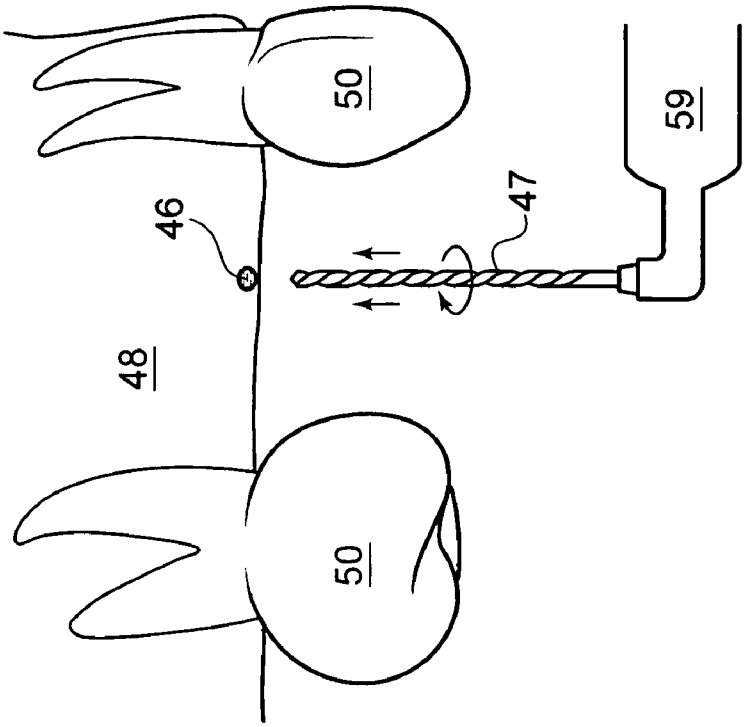


Figure 9c

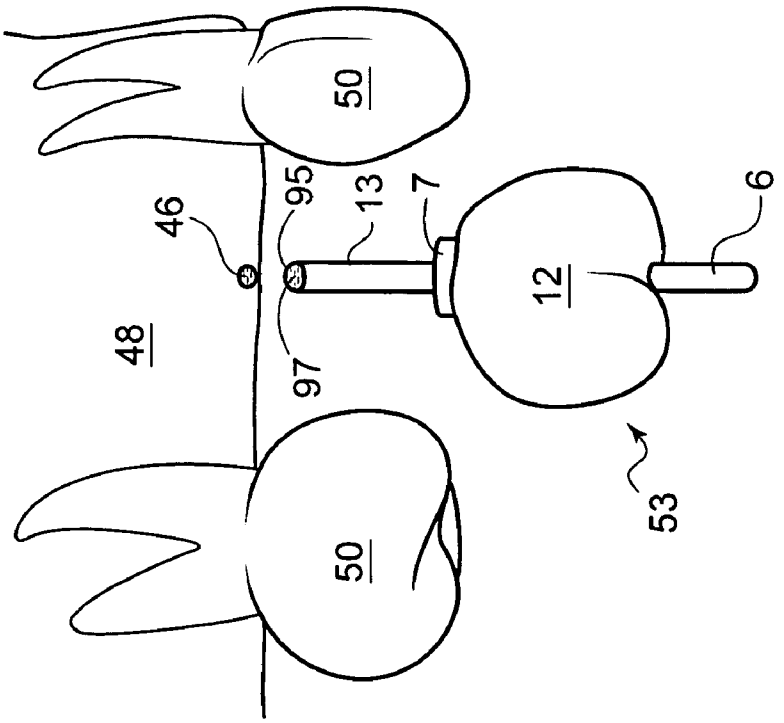


Figure 9b

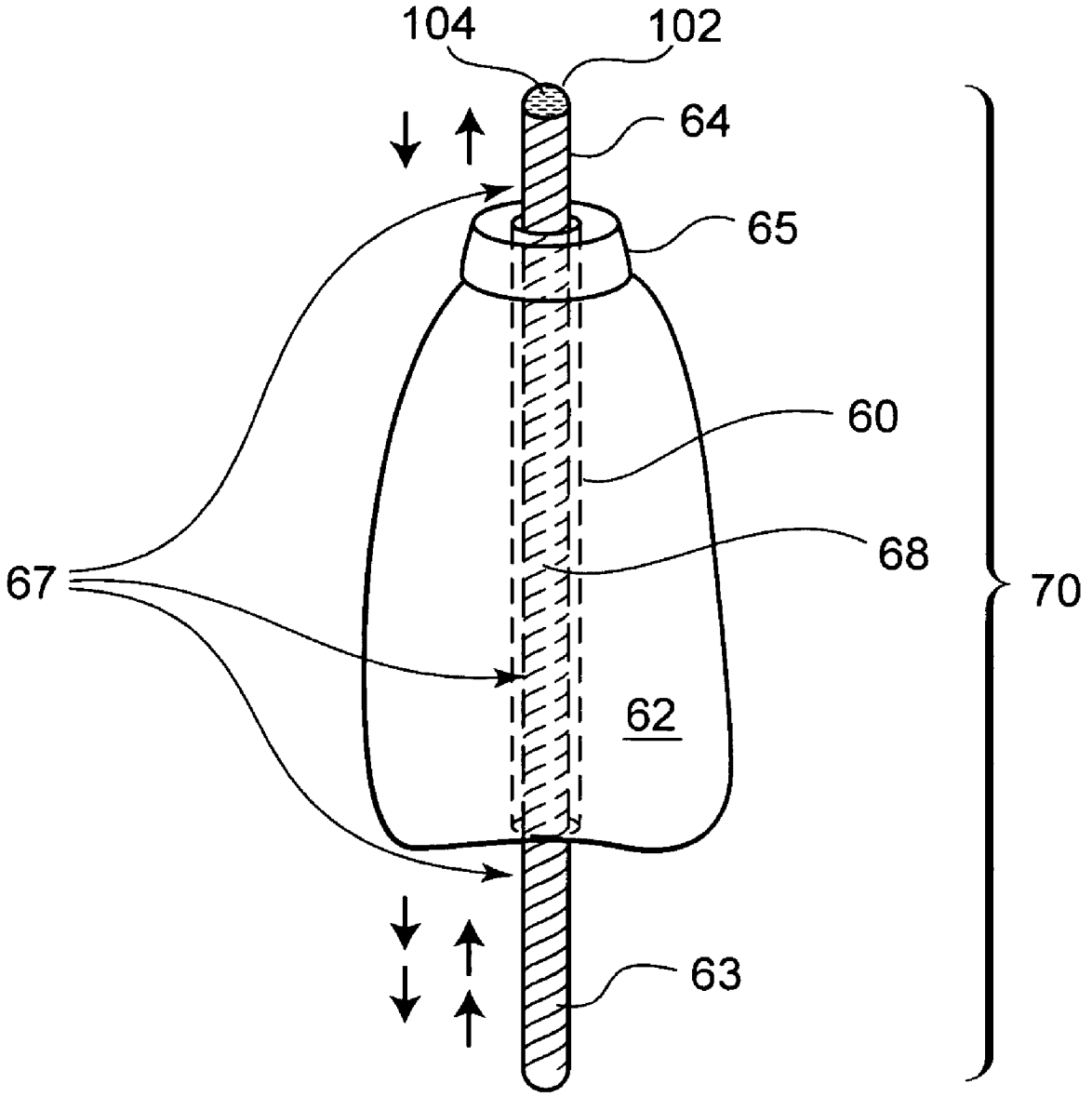


Figure 10a

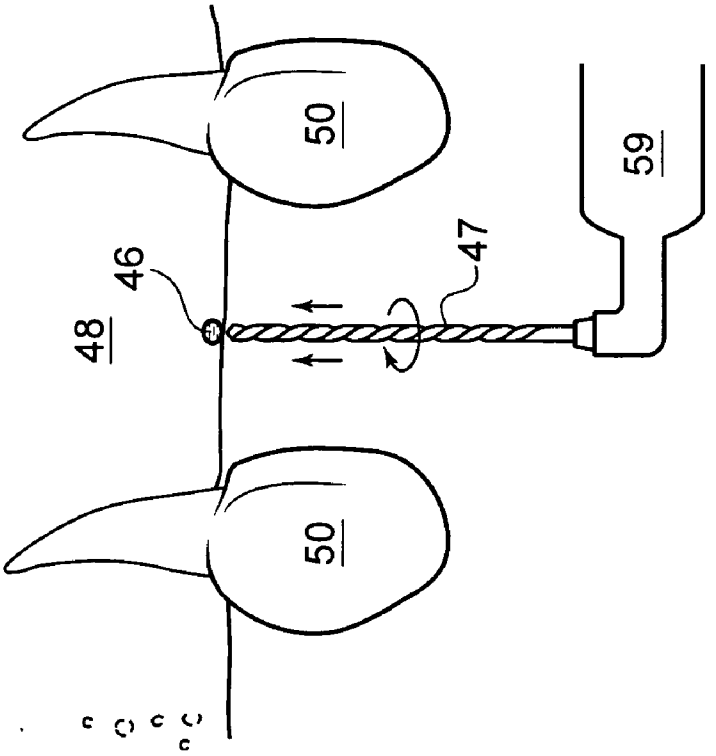


Figure 10c

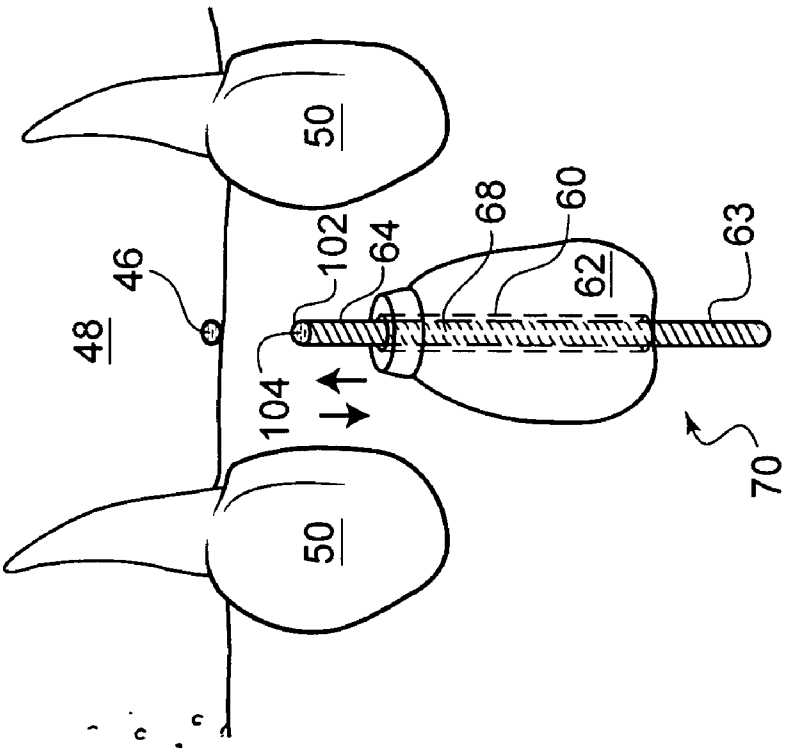


Figure 10b

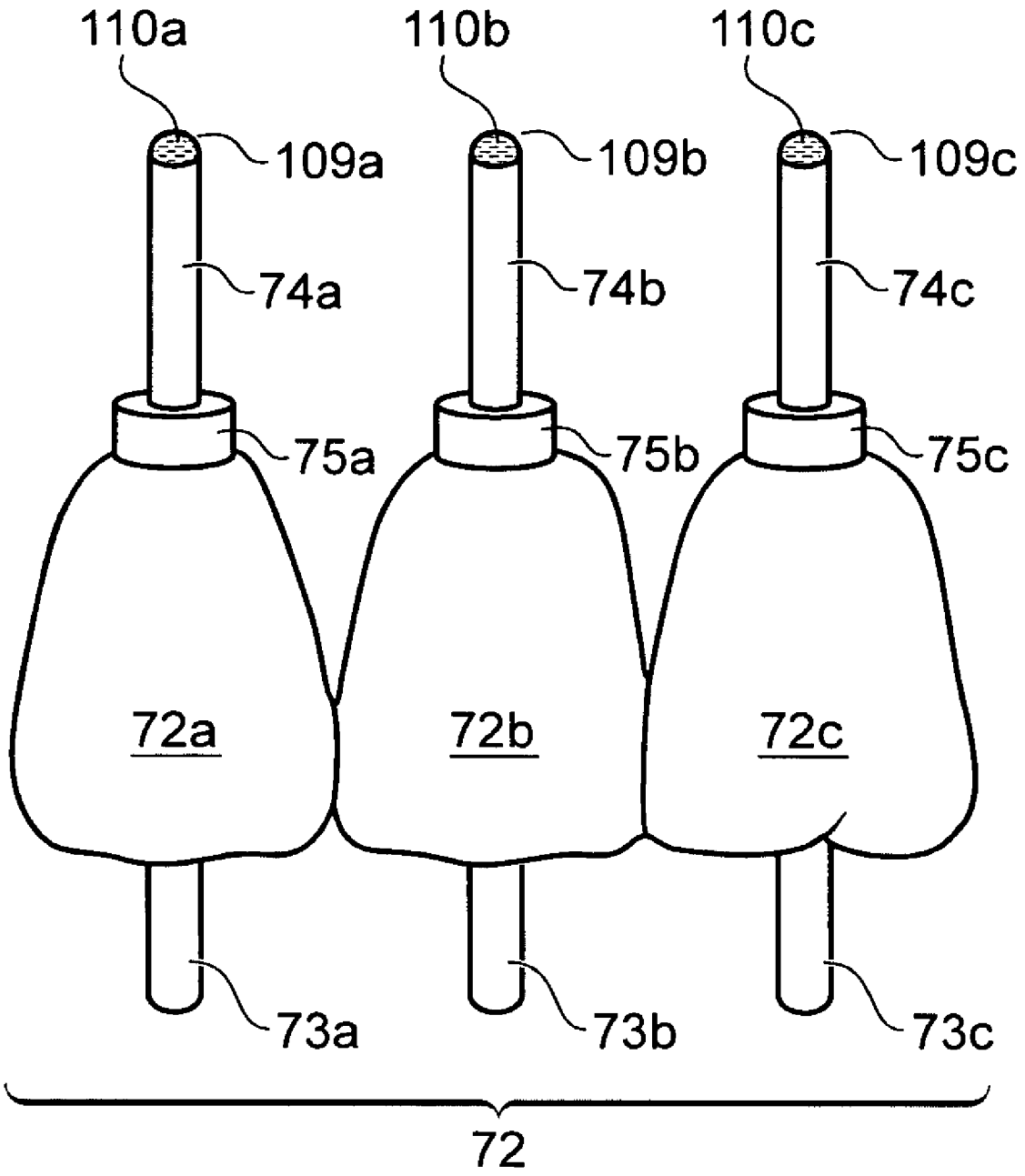

110a
110b
110c
109a
109b
109c
74a
74b
74c
75a
75b
75c
72a
72b
72c
73a
73b
73c
72

Figure 11a

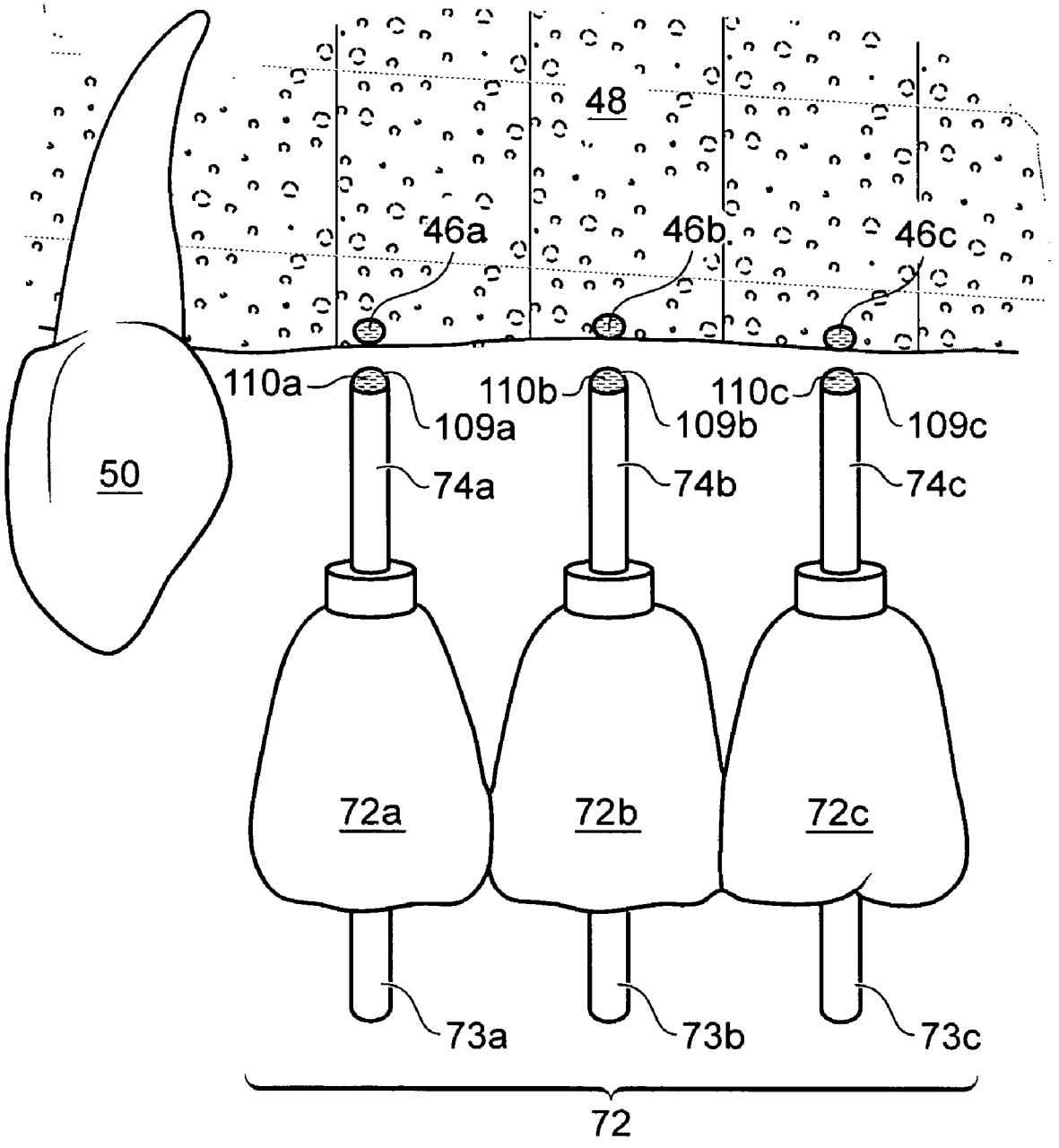

48
46a
46b
46c
110a
110b
110c
109a
109b
109c
50
74a
74b
74c
72a
72b
72c
73a
73b
73c
72

Figure 11b

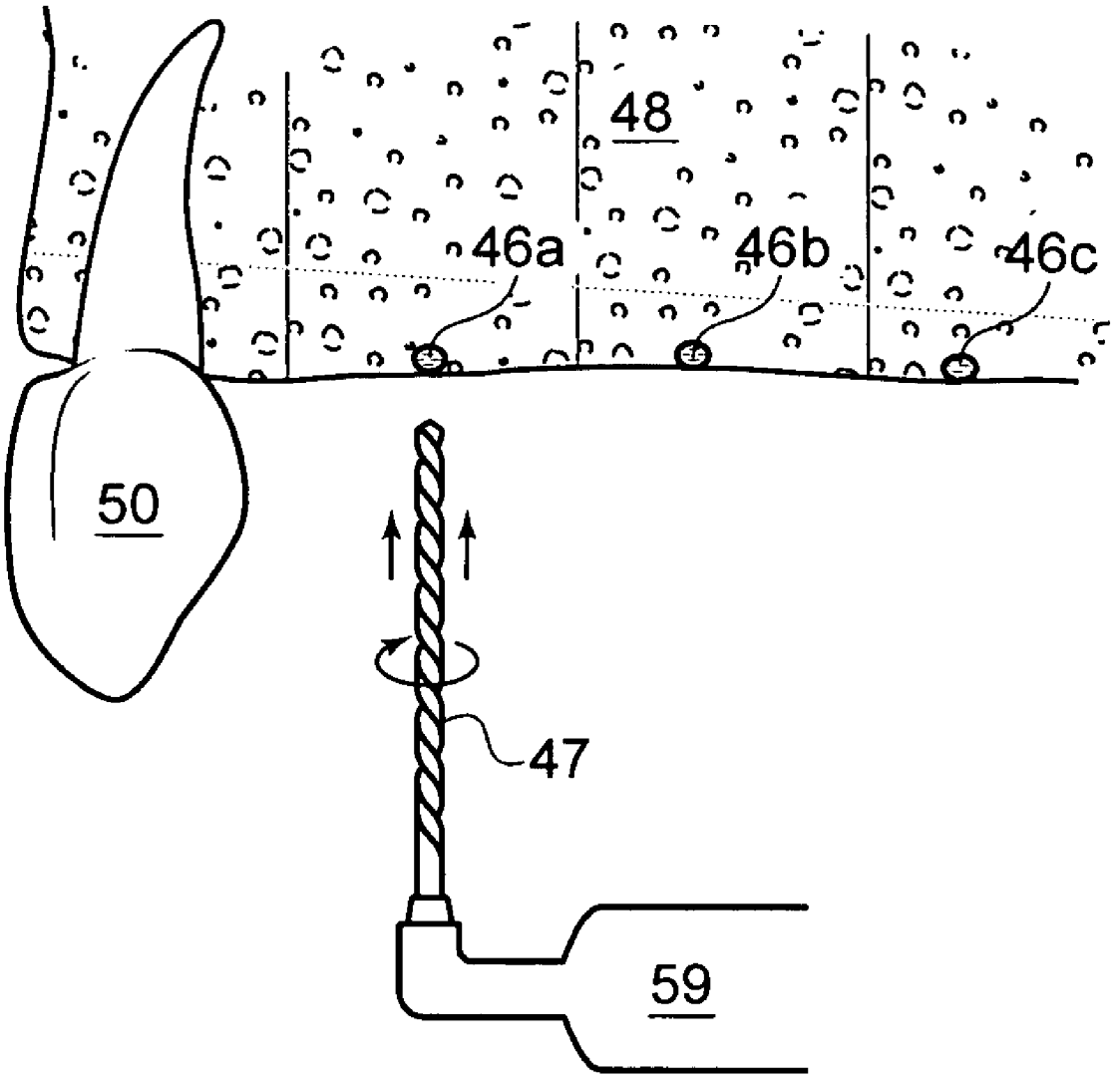


Figure 11c

DENTAL IMPLANT SURGICAL GUIDE

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims priority under 35 U.S.C. §119(e) from provisional application No. 60/737,789 filed Nov. 17, 2005. The Ser. No. 60/737,789 application is incorporated by reference herein, in its entirety, for all purposes.

BACKGROUND

This application relates generally to oral implant surgery. More particularly the present invention relates to a surgical guide to be used during dental implant surgery which is used to effect correct placement of a dental implant.

In the healthy non-diseased mouth with natural teeth present, there exists a biologic relationship between the root of a tooth, the crown of a tooth, the bone surrounding the root and the gingiva (soft tissue) surrounding the bone, root and crown of a tooth. In nature, the shape and contour that the gingiva or soft tissue assumes and follows is dictated by the underlying presence and shape of bone. The bone contours around a natural tooth are actually scalloped, with the bone more apical on the facial and lingual aspects of the tooth and more coronal in the inter-proximal area (between the teeth). In a healthy mouth, this scalloping effect is dictated by the cemento-enamel junction (CEJ) of the tooth which itself is also scalloped. It is this scalloping of the bony architecture which lends itself to the formation and maintenance of proper gingival contours including the inter-dental papilla (the small triangular flesh portion adjacent the gum line and located between the teeth).

However, despite best efforts of a person, or because of lack of proper dental care, it may become necessary to replace teeth completely. In these cases, dental implant procedures have proven to be an effective method of restoring both form and function in patients having missing teeth. Implants provide a structure upon which a prosthetic tooth or teeth can be attached and secured in an otherwise edentulous (non-tooth) area. In contrast to using dentures or other tooth born fixed or removable dental bridge systems, implants have the advantage of maintaining bone and not being subject to decay.

Bone support is necessary for proper placement, securement and maintenance of a dental implant. Proper bone support around an implant is also necessary for the development and maintenance of healthy gingival contours, including papilla. Bone growth around an implant follows the shape of the bone-integrating part of the implant. A primary concern in implant dentistry is the precise placement of an implant in its proper location, with appropriate and accurate angulation and rotational position at the time of implant placement surgery. Even the slightest error in implant placement can result in significant complications and or compromises in the stability of the implant, the maintenance of bone, the contours of the gingival tissues, placement of the final prosthesis, stability of the final prosthesis and the overall appearance of the patient's mouth.

Accordingly, it is desirable to provide a prefabricated dental implant surgical guide which ensures the proper placement of a dental implant or implants and its corresponding prosthesis (crown or crowns). One exemplary embodiment of the present invention allows it to be converted from a surgical guide to a dental provisional crown which can then be used to help maintain the hard (bone) and soft (gingival) tissue architecture of the mouth during the healing phase of treatment,

with the end result being a final prosthesis that is stable, functional, natural looking and aesthetically pleasing in the patient's mouth.

For such applications, the prefabricated dental implant surgical guide of the present invention may be configured as a surgical guide with a tooth-shaped contour (also referred to as a "tooth contour") with a post affixed to its apical end, or with a post as an integral part of the entire guide. This embodiment of a dental implant surgical guide is placed into an initial osteotomy site (a surgical procedure in which bone is cut or prepared for the placement of a dental implant) at the time of dental implant placement surgery, but prior to final implant body placement, to ensure and or to correct proper location, angulation, and rotational position of an implant body prior to it's placement.

The present invention in various embodiments is a prefabricated dental implant placement surgical guide which, in one exemplary embodiment, has a post affixed to the apical end of an anatomically correct tooth form. This tooth form can be made to represent any tooth in the mouth in order to have accurate implant placement regarding the tooth to be replaced.

At the time of initial osteotomy site preparation, a small hole is prepared into the jaw bone using conventional dental implant surgical drills. The apical post of the surgical implant guide is inserted into the osteotomy site allowing verification of proper implant placement in location, angulation, and rotational position prior to implant body placement. This is accomplished by viewing the surgical guide in place, then comparing the tooth-contoured part of the surgical guide with some facial and/or intra-oral guideline such as the adjacent teeth, gingiva, shape of the arch and lips etc. This allows for proper implant location and ultimately placement to be verified or corrected prior to implant body placement lending to a more stable, functional and esthetic prosthetic outcome. The apical post of the surgical guide can repeatedly be inserted into the osteotomy site, as the site is further developed and deepened to continuously verify proper position and location of the implant body prior to its placement. This process of trying in the surgical guide with further osteotomy site preparation is repeated until the appropriate final depth of the osteotomy site is achieved. Thus the process of the present invention provides for a verified correct position, location and angulation of the osteotomy site, all prior to final implant body placement. If improper alignment is detected during this verification process, the osteotomy site location, angulation and position can be corrected with minimal damage to the bone.

In another embodiment of the present invention, the prefabricated dental implant surgical guide can be converted into a provisional crown, a plurality of crowns, or a bridge. This is accomplished by removing the finger grip and apical post, or guide post, hollowing out the tooth contour aspect of the guide, and relining the tooth contour aspect of the surgical guide, then reversibly fastening via screw or cement, the tooth contour aspect of the surgical guide to the abutment of an implant body.

In yet another embodiment, the surgical guide comprises a set of anatomically correct tooth forms each having an apical post and finger grip. The apical posts are graduated in length thus constituting a set of surgical guides that are sequentially used as an osteotomy site is created and deepened. In this way the surgical guide set can sequentially provide guidance that the osteotomy site is being correctly prepared.

In yet another exemplary embodiment, the prefabricated dental implant surgical guide comprises an anatomically correct tooth form having a bore through the tooth form into

which an adjustable and removable post is placed or threaded. The apical end of the post protrudes through the tooth form and can be lengthened by pushing or screwing the post through the bore. In this way the apical end is lengthened and can be placed into the gradually deepening osteotomy site to insure that the site is correctly prepared. The post can also be removed and an osteotomy drill passed thru the bore to allow for further preparation of the osteotomy site with the guide in place. In another embodiment of the present invention, a bottom face of the apical end of the movable post comprises a marking agent. In this embodiment, the surgical guide is placed in a desired position on the jaw bone at a proposed osteotomy site. Once the correct position of the surgical guide is established, the movable post is pressed downward to engage the bottom face of the apical end with the jaw bone thereby marking the location of the osteotomy site.

In still another exemplary embodiment, the prefabricated dental implant surgical guide comprises a number of anatomically correct tooth forms as a unitary surgical guide. In this case, for example and without limitation, a number of tooth forms can be connected and tried into a series of side by side osteotomy sites as a unit. This allows multiple dental implants to be placed side by side with verification of proper location, angulation, and rotational position.

Thus various embodiments improve the dental implant placement process and allow for proper placement of a dental implant subsequent to osteotomy site preparation. Embodiments act as a prefabricated surgical guide and improve the placement of a dental implant. Embodiments further allow sequential placement of individual prefabricated implant surgical guides to develop sequential osteotomy sites for subsequent multiple side by side implant placement during dental implant placement surgery. Additional embodiments use unitary multi-tooth prefabricated implant surgical guides during dental implant placement surgery where more than one tooth is to be replaced with a dental implant. Other embodiments use a prefabricated dental implant surgical guide having adjustable apical posts for use with deepening osteotomy sites.

These and other embodiments will be come apparent to those skilled in the art upon review of the detailed description that follows.

DESCRIPTION OF THE FIGURES

FIGS. **1***a*, **1***b*, and **1***c* illustrate a prefabricated dental implant surgical guide configured as a tooth with a static post.

FIGS. **2***a* and **2***b* illustrate another embodiment of a prefabricated dental implant surgical guide converted to and also used as an interim crown with posts that are removable.

FIGS. **3***a*, **3***b*, **3***c* and **3***d* illustrate a prefabricated dental implant surgical guide as a series of tooth shapes having graduated post lengths.

FIGS. **4***a*, **4***b* and **4***c* and **4***d* illustrate another embodiment as a prefabricated dental implant surgical guide having a central bore with an adjustable, removable post.

FIG. **5** illustrates an embodiment, as illustrated in FIGS. **1***a-c*, **2***a-b*, **3***a-d* and **4***a-d* being used in a multiple side by side format.

FIG. **6** illustrates another embodiment as a one piece multiple unit surgical guide.

FIG. **7***a-c* illustrates an embodiment for the purpose of marking and identifying an osteotomy site.

FIG. **8***a-c* illustrates another embodiment for the purpose of marking and identifying an osteotomy site.

FIG. **9***a-c* illustrates another embodiment for the purpose of marking and identifying an osteotomy site.

FIG. **10***a-c* illustrates another embodiment for the purpose of marking and identifying an osteotomy site.

FIG. **11***a-c* illustrates another embodiment for the purpose of marking and identifying an osteotomy site.

DETAILED DESCRIPTION

As noted above, the present invention comprises a method and apparatus for insuring correct placement of dental implants during the surgical placement process. Referring now to FIGS. **1***a*, **1***b*, and **1***c*, the prefabricated dental implant surgical guide configured as a surgical guide with a tooth-shaped contour with a post affixed to its apical end is illustrated. The guide can be made of metal, plastic, acrylic, porcelain or some other material known to those of skill in the dental arts. Such materials will be collectively referred to herein as "dental material." This exemplary embodiment is placed into an initial osteotomy site at the time of implant placement surgery, prior to implant body placement to ensure and or to correct the proper location, angulation, and rotational position of the implant body.

FIGS. **1***a*, **1***b*, and **1***c* illustrate the dental implant aid in an exemplary alternative embodiment. As illustrated in FIG. **1***a*, the dental implant aid, generally referred to as **40** in this figure, is configured as a one piece surgical guide with a tooth-shaped contour **42**. The tooth-shaped contour **42** is further defined by its anatomical components, i.e. the incisal edge (for an anterior tooth) or occlusal table (for a posterior tooth) **30**, facial contour **31**, lingual contour **32**, interproximal aspect **33** and apical aspect **34**. Affixed to the apical end of tooth-shaped contour **42** is collar **45** which has apical post **44** extending above it. Affixed to the coronal end of tooth-shaped contour **42** is a protruding post which acts as finger grip **43**. Thus the surgical guide **40** can be held in the mouth and the tooth-shaped contour **42** of guide **40** can be seen clearly by the surgeon during the course of surgery with out the surgeon's fingers obscuring the view.

This tooth-shaped contour **42** can be represented by any tooth shape found in the mouth (central incisors, lateral incisors, cuspids, premolars, and molars of both the upper and lower jaws) and can therefore be used as a surgical guide to verify implant body placement with respect to any tooth and its corresponding position in the mouth prior to implant placement. For example, FIG. **1***b* represents a jaw bone **48** to which an osteotomy site **46** (a surgical procedure in which bone is cut or prepared for the placement of an implant) has been prepared in jaw bone **48**. As illustrated in FIGS. **1***b* and **1***c*, by holding finger grip **43**, the apical post **44** of implant surgical guide **40** is placed into the osteotomy site **46** so that collar **45** of implant surgical **40** rests against jaw bone **48** at the opening of osteotomy site **46**. This is done at the time of implant placement surgery, but prior to implant body placement.

By using existing intra-oral guidelines as a reference (i.e. adjacent teeth **50**, lips, shape of the arch as but several examples), the tooth contour **42** and its corresponding anatomic components of implant surgical guide **40** with apical post **44** in osteotomy site **46**, can be used to verify and/or correct the proper location, angulation, and rotational position of any implant body and it's corresponding system prior to it's insertion. This is accomplished by comparing the location, angulation, and position of the tooth shape-contour **42** and its corresponding anatomic components of the implant surgical guide **40** with some facial and/or intra-oral guideline or reference such as the adjacent teeth, gingiva, shape of the arch and lips, face etc., while apical post **44** of implant surgical guide **40** is engaged in osteotomy site **46**.

Verification of osteotomy site position, angulation, location, subsequent proper implant location and placement and proper prosthesis location, requires the tooth contour aspect **42** of implant surgical guide **40** be in proper alignment with the facial and or intra-oral guide lines or references previously noted. This alignment is verified by comparing the position of the anatomic components of tooth contour **42**, for example, the incisal edge (for an anterior tooth) or occlusal table (for a posterior tooth) **30**, facial contour **31**, lingual contour **32**, interproximal aspect **33** and apical aspect **34** of tooth contour **42** of the surgical guide **40** while engaged in the mouth with facial and or intra -oral references previously noted.

If the alignment of the anatomic components of tooth contour **42** of surgical guide **40** are in harmony with and are symmetrical to the facial and or intra-oral references previously noted, osteotomy site location, position and angulation are verified, and osteotomy site and subsequent implant placement can be completed.

If there is disharmony and/or an asymmetrical position of the anatomic components of tooth contour **42** of the implant surgical guide **40** is noted with respect to the facial and or intra-oral references previously noted, a correction as to position and location can be made and verified prior to final implant placement.

It will be apparent to those skilled in the art that, not only can different tooth shapes be represented, but also different sizes of tooth contour **42** of the prefabricated dental implant surgical guide **40** can be used to conform to the size teeth and arch form of the dental implant patient.

Referring now to FIGS. **2***a* and **2***b*, another alternate embodiment generally referred to as **51** is illustrated. In this embodiment, the prefabricated implant surgical guide is made of a dental material so that once implant placement has been verified and the implant body has been placed, either at the time of surgery or at a later date subsequent to healing, the surgical guide can be converted to a provisional crown as illustrated in FIGS. **2***a* and **2***b*.

Referring again to FIG. **2***a*, apical post **24** of implant guide **51** having a collar **25** is placed into osteotomy site **46** of jaw bone **48** to verify proper implant location and angulation prior to implant body placement as previously described in FIGS. **1***a-c*.

Referring now to FIG. **2***b*, implant body **52** is shown having been placed into jaw bone **48**. At the time of surgery or subsequent to surgical healing, the finger grip **23** and apical post **24** of implant surgical guide **51** are removed via a cutting procedure known in the art. The tooth contour **22** of implant surgical guide **51** is then hollowed out so that a concavity **26** is formed on the internal aspect **27** of tooth contour **22** of implant guide **51**. At the time of surgery or subsequent to surgical healing utilizing either a 2-stage, 2-piece implant system, a one-stage, 2-piece implant system or a one piece, one-stage implant system, the concavity **26** of internal aspect **27** of tooth contour **22** of implant guide **51** is relined with a dental provisional material, known to those in the art (for example and without limitation, acrylic) to the abutment aspect **54** of implant body **52** to create a custom fitting, retentive provisional crown which can then be either cemented into place with some provisional dental cement (for example and without limitation zinc oxide-eugenol)) or screw retained.

Referring now to FIGS. **3***a*, **3***b*, **3***c* and **3***d*, another embodiment of the prefabricated implant surgical guide, herein referred to as **53** having separate graduated apical post lengths is illustrated. In this embodiment, implant guide **53** exists in a multiple set format with apical posts **13**, **15**, and **17**, connected to tooth contours **12**, **14**, and **16** respectively via collars **7**, **9**, and **11** respectively. Tooth contours **12**, **14** and **16** are further defined by their anatomical components, that is, the incisal edge (for an anterior tooth) or occlusal table (for a posterior tooth) **1***a*, **1***b* and **1***c* respectively, facial contours **2***a*, **2***b* and **2***c* respectively, lingual contours **3***a*, **3***b*, and **3***c* respectively, interproximal aspects **4***a*, **4***b* and **4***c* respectively and apical aspects **5***a*, **5***b* and **5***c* respectively.

The tooth-shaped contours **12**, **14** and **16** can be represented in the form of any tooth shape found in the mouth (central incisors, lateral incisors, cuspids, premolars, and molars of both the upper and lower jaws) and can therefore be used as a surgical guide to verify implant body placement with respect to any tooth and its corresponding position in the mouth prior to implant placement.

Apical posts **13**, **15**, and **17** increase in length to be used as described in FIGS. **3***a*, **3***b*, **3***c* and **3***d*. Finger grips **6**, **8**, and **10**, respectively allow for manipulation of the surgical guide during the surgical implant placement procedure.

Referring now to FIG. **3***b*, the use of the embodiment of FIG. **3***a* is illustrated. An initial oseotomy site **46** of minimum depth is prepared into jaw bone **48**. By placing implant guide **53** with the shortest apical post **13** first into initial osteotomy site **46**, an initial and preliminary evaluation as to proper implant position, location and angulation can be done. At this time, verification and or correction to the initial osteotomy site **46** can be done with minimal trauma to jaw bone **48**. This is accomplished by comparing the location, angulation and position of the tooth shape-contour **12** of the surgical guide **53** with some facial and/or intra-oral guideline or reference such as the adjacent teeth, gingiva, shape of the arch and lips, face etc. with apical post **13** of surgical guide **53** engaged in osteotomy site **46**.

To verify osteotomy site position, angulation, location, subsequent proper implant location, angulation and placement and ultimately proper prosthesis location, requires the tooth contour aspect **12** of implant surgical guide **53** be in proper alignment with the facial and or intra-oral guide lines or references previously stated. This alignment is verified by comparing the anatomic components of tooth contour **12**, that being the incisal edge or occlusal table **1***a*, facial contour **2***a*, lingual contour **3***a*, interproximal aspect **4***a* and apical aspect **5***a* of tooth contour **12** of surgical guide **53** while engaged in the mouth with facial and or intra-oral references previously noted.

If the alignment of the anatomic components of tooth contour aspect **12** of surgical guide **53** are in harmony with and are symmetrical to the facial and or intra-oral references previously noted, osteotomy site location, position and angulation are verified and osteotomy site and subsequent implant placement can be completed.

If there is disharmony and or an asymmetrical position of the anatomic components of tooth contour aspect **12** of implant surgical guide **53** is noted with respect to the facial and or intra-oral references previously noted, a correction as to position, angulation and location of the osteotomy site can be made and verified prior to final implant placement.

As illustrated in FIGS. **3***c* and **3***d*, as the osteotomy site **46** is deepened and developed, the implant guide **53** with the increasing apical post lengths **15** and **17** can be tried into deepening osteotomy site **46** to further verify and or to correct the position and or angulation of osteotomy site **46** prior to final implant body placement. This is accomplished by comparing the position of tooth contours **12**, **14**, and **16** (as the osteotomy site is deepened) of guide **53** with some other facial or intra-oral reference point (i.e. other teeth, gingiva, shape of the arch, lips, face, etc.) with posts **13**, **15**, and **17** of

guide **53** sequentially engaged in osteotomy site **46**. This verification process is accomplished as previously described in FIG. **3***b*. In this fashion, osteotomy site **46** is gradually prepared (deepened) and continuously verified during the preparation process to ensure accuracy in final location, angulation and position of the implant body and final prosthesis prior to its placement.

Referring now to FIGS. **4***a*, **4***b*, **4***c* and **4***d*, yet another embodiment of the prefabricated dental implant surgical guide generally referred to as **70** is illustrated. Implant surgical guide **70** comprises a tooth contour **62**, collar **65**, finger grip **63** and apical post **64**. The tooth shaped contour **62** is further defined by its anatomical components: the incisal edge (for an anterior tooth) or occlusal table (for a posterior tooth) **61**, facial contour **58**, lingual contour **66**, interproximal aspect **69** and apical aspect **71**.

The tooth-shaped contour **62** can be represented by any tooth shape found in the mouth (central incisors, lateral incisors, cuspids, premolars, and molars of both the upper and lower jaws) and can therefore be used as a surgical guide to verify implant body placement with respect to any tooth and its corresponding position in the mouth prior to implant placement.

In this embodiment, the surgical guide **70** has a central bore **60** which extends the entire length of guide **70** (through tooth contour **62** and collar **65**). This central bore **60** can be either smooth or threaded. An adjustable and removable post generally referred to as **67**, comprises a central portion **68** which is located in central bore **60**, finger grip portion **63** that extends beyond the coronal end of guide **70** and apical post portion **64** that extends beyond the apical end of guide **70**. The central post portion **68** of post **67** remains in the central bore **60**. Central post portion **68** and central bore **60** can be either smooth or threaded. If smooth, central post portion **68** of post **67** may be pushed through the central bore **60** thereby adjusting the length of apical post **64**. If threaded, central post portion **68** of post **67** may be turned through central bore **60** thereby adjusting the length of apical post **64**. In this fashion apical post portion **64** of adjustable removable post **67** can be adjusted and made shorter or longer to fit into a developing osteotomy site **46** to verify or correct final implant body location, position and angulation in jaw bone **48** prior to implant body placement.

During this process, as in other embodiments described above, proper implant location and position can be verified by comparing the position of tooth contour **62** of guide **70** with some other facial or intra-oral reference point (i.e. other teeth, gingiva, shape of the arch, lips, face, etc.) with apical post **64** of guide **70** engaged in osteotomy site **46**.

Referring now to FIG. **4***b*, an osteotomy site is identified, and an initial osteotomy site **46** of minimum depth is prepared in jaw bone **48**. Surgical guide **70** is placed over osteotomy site **46**. Finger grip portion **63** of adjustable, removable post **67** is pushed or turned so that central post portion **68** of adjustable, removable post **67** moves through central bore **60** increasing the length of apical post portion **64** of adjustable, removable post **67** until it engages the base **49** of osteotomy site **46**. By comparing the position of tooth contour **62** of guide **70** with some other facial or intra-oral reference point (i.e. other teeth **50**, gingiva, shape of the arch, lips, face, etc.), with apical post portion **64** of adjustable, removable post **67** of guide **70** engaged in osteotomy site **46**, an initial verification or correction of position and or angulation of osteotomy site **46** can be done with minimal trauma to jaw bone **48**.

This is accomplished by comparing the location, angulation and position of the tooth shape-contour **62** of the surgical guide **70** with some facial and/or intra-oral guidelines or references such as the adjacent teeth, gingiva, shape of the arch and lips etc. with apical post **64** of surgical guide **70** engaged in osteotomy site **46**.

To verify osteotomy site position, angulation, location, subsequent proper implant location, angulation and placement and ultimately proper prosthesis location, requires tooth contour **62** of prefabricated dental implant surgical guide **70** be in proper alignment with the facial and or intra-oral guide lines or references previously stated. This alignment is verified by comparing the anatomic components of tooth contour **62**, that being the incisal edge or occlusal table **61**, facial contour **58**, lingual contour **66**, interproximal aspect **69** and apical aspect **71** of tooth contour **62** of surgical guide **70** while engaged in the mouth, with facial and or intra-oral references previously stated.

If the alignment of the anatomic components of tooth contour aspect **62** of surgical guide **70** are in harmony with and are symmetrical to the facial and or intra-oral references previously noted, osteotomy site location, position and angulation are verified and osteotomy site and subsequent implant placement can be completed.

If there is disharmony and or an asymmetrical position of the anatomic components of tooth contour **62** of implant surgical guide **70** is noted with respect to the facial and or intra-oral references previously noted, a correction as to position and location can be made and verified prior to final implant placement.

Referring now to FIG. **4***c*, as osteotomy site **46** is further deepened, guide **70** can repeatedly be placed over osteotomy site **46**, with apical post portion **64** of adjustable, removable post **67** further lengthened into osteotomy site **46** by turning or pushing finger grip portion **63** of adjustable, removable post **67** (See FIG. **4***a*) to move central post portion **68** of adjustable, removable post **67** thru central bore **60**, thus providing a means of continuous verification and or correction of position and or angulation of osteotomy site **46** prior to final implant body placement. Again, this is accomplished by comparing the position of tooth contour **62** of guide **70** with some other facial and or intra-oral reference point (i.e. other teeth **50**, gingiva, shape of the arch, lips, face, etc.) with apical post portion **64** of adjustable, removable post **67** of guide **70** engaged in osteotomy site **46**. This verification process is accomplished as previously described in FIG. **4***b*.

Referring now to FIG. **4***d*, adjustable, removable post **67** can be removed from surgical guide **70**. Surgical guide **70** can be held in place in the mouth at osteotomy site **46** with a buccal and or lingual finger grip **45**. By stabilizing guide **70** with buccal and or lingual finger grip **45**, osteotomy bur **47** attached to surgical drill **59** can be placed thru central bore **60** of tooth contour **62** of implant guide **70** and activated allowing further preparation and continuous verification of osteotomy site **46** with surgical guide **70** in place in the mouth.

This verification process is accomplished as previously described in FIG. **4***b*.

As more fully explained below, in another embodiment, a bottom face of the apical end of the movable post comprises a marking agent. In this embodiment, the prefabricated dental implant surgical guide is placed in a desired position on the jaw bone at a proposed osteotomy site before a hole is drilled. Once the correct position and location of the osteotomy site is established, the movable post is pressed downward to engage the bottom face of the apical end with the jaw bone thereby marking the location of the osteotomy site.

Referring now to FIG. **5**, embodiments as illustrated in FIGS. **1-4** is described when placing multiple implants in a side by side format. Initial osteotomy sites **46***a-c* are identi-

fied, made and verified into jaw bone **48** as previously described. As an example, the most mesial osteotomy site **46***a* could be prepared and verified or corrected as previously described. Leaving the implant guide **40***a* in place, the next implant osteotomy site **46***b* can be prepared and verified or corrected as previously described. Now, leaving that implant guide **40***b* in place, another osteotomy site **46***c* can be prepared with implant guide **40***c* put in its place and verified or corrected as previously described. This type of verification process can be used to place implants side by side in a partially edentulous arch and or in a continuous fashion all the way around a completely edentulous arch. Thus all potential multi-unit side by side implant sites can be properly and accurately prepared, verified and or corrected prior to implant body placement.

FIG. **6** illustrates another embodiment of the present invention generally referred to as **72**. In this embodiment, the surgical guide is formatted as a one piece, multi-unit surgical guide having tooth contours **72***a*, **72***b*, and **72***c*. Affixed to these tooth contours are collars **75***a*, **75***b*, and **75***c*, apical posts **74***a*, **74***b*, and **74***c* respectively, and corresponding finger grips **73***a*, **73***b*, and **73***c* respectively. The purpose of this embodiment is to guide the placement of multiple, side by side implants in a multi tooth edentulous site. Although formatted as such, guide **72** can be fabricated and used as described in FIGS. **1-4**. In this embodiment, a proper guide size **72** and corresponding contour would be chosen that corresponds to the size and location of the edentulous site. Multiple initial osteotomy sites **46***a-c* would be made in jaw bone **48** with apical posts **74***a*, **74***b*, and **74***c* tried in osteotomy sites **46***a-c* to verify and or correct position, angulation and location of osteotomy sites **46***a-c* prior to implant body placement as previously described in FIGS. **1-4**.

As will be appreciated by those skilled in the art, the multi-unit surgical guide may use movable (adjustable) posts as previously described in place of the fixed posts illustrated in FIG. **6**.

Thus the embodiments as described may be used to guide the placement of dental implants in a single tooth format, multi tooth format and fully edentulous format.

Referring now to FIG. **7***a*, another embodiment of the prefabricated dental implant surgical guide **40** is illustrated. Surgical guide **40** as depicted in FIG. **1***a*, has fixed apical post **44** with bottom end face **75** and marking agent **77** on it for the purpose of marking and identifying an osteotomy site **46**.

Referring now to FIGS. **7***b* and **7***c* use of the embodiment of FIG. **7***a* is illustrated. By holding coronal post **43** and by using tooth shaped contour **42** as a guide as previously described, osteotomy site **46** in jaw bone **48** can be located and demarcated by pressing end face **75** with marking agent **77** of fixed apical post **44** on top of jaw bone **48** leaving a mark denoting the osteotomy site **46**. Osteotomy bur **47** of surgical drill **59** can then be used to initiate osteotomy site preparation. Further preparation, verification and completion of the osteotomy site **46** via drill **59** can then be accomplished as previously described in FIGS. **1***b* and **1***c*.

Referring now to FIG. **8***a*, another embodiment of the prefabricated dental implant surgical guide **51** is illustrated. In this embodiment, surgical guide **51**, comprises a fixed apical post **24** with bottom end face **85** and marking agent **87** on it for the purpose of marking and identifying an osteotomy site **46**.

Referring now to FIG. **8***b* and **8***c*, by holding coronal post **23** and by using tooth shaped contour **22** as a guide as previously described, osteotomy site **46** in jaw bone **48** can be located and demarcated by pressing bottom end face **85** with marking agent **87** of fixed apical post **24** on top of jaw bone **48** leaving a mark denoting the osteotomy site **46**. Osteotomy bur **47** of surgical drill **59** can then be used to initiate osteotomy site preparation. Subsequent to osteotomy site preparation and implant placement, the tooth shaped contour **22** of guide **51** can be converted to a provisional crown (immediate or delayed) as previously described in FIG. **2***b*.

Referring now to FIG. **9***a*, yet another embodiment of the prefabricated dental implant surgical guide **53** is illustrated. Surgical guide **53** comprises a fixed apical post **13** with bottom end face **95** and marking agent **97** on it for the purpose of marking and identifying an osteotomy site **46**.

Referring now to FIGS. **9***b* and **9***c*, use of the surgical guide **53** is illustrated. By holding coronal post **6** and by using tooth shaped contour **12** as a guide as previously described, osteotomy site **46** in jaw bone **48** can be located and demarcated by pressing end face **95** with marking agent **97** of fixed apical post **13** on top of jaw bone **48** leaving a mark denoting the osteotomy site **46**. Osteotomy bur **47** of surgical drill **59** can then be used to initiate osteotomy site preparation. Further preparation, verification and completion of the osteotomy site **46** can then be accomplished as previously described in FIGS. **3***b*, **3***c* and **3***d*.

Referring now to FIG. **10***a*, another embodiment of prefabricated dental implant surgical guide **70** is illustrated. Surgical guide **70** comprises an adjustable removable post **67** with apical post aspect **64** with a bottom end face **102**, and marking agent **104** on it for the purpose of marking and identifying an osteotomy site **46**.

Referring to FIGS. **10***b* and **10***c*, use of the prefabricated dental implant surgical guide is illustrated. By pushing or turning coronal post **63** of adjustable removable post **67** so that central post portion **68** moves through central bore **60**, thereby lengthening apical post portion **64** and by using tooth shaped contour **62** as a guide as previously described, osteotomy site **46** in jaw bone **48** can be located and demarcated by pressing end face **102** with marking agent **104** of apical post aspect **64** of adjustable removable post **67** on top of jaw bone **48** leaving a mark denoting the osteotomy site **46**. Osteotomy bur **47** of surgical drill **59** can then be used to initiate osteotomy site preparation. Further preparation, verification and completion of the osteotomy site can then be accomplished as previously described in FIGS. **4***b*, **4***c* and **4***d*.

Referring now to FIG. **11***a*, still another embodiment of prefabricated dental implant surgical guide **72** is illustrated. The multi unit one piece surgical guide **72** comprises fixed apical posts **74***a*, **74***b*, and **74***c* with bottom end faces **109***a*, **109***b* and **109***c* and with marking agents **110**A, **110***b*, and **110***c* on them for the purpose of marking and identifying an osteotomy sites **46***a*, **46***b* and **46***c*.

Referring now to FIGS. **11***b* and **11***c*, use of the prefabricated dental implant surgical guide is illustrated. By holding coronal posts **73***a*, **73***b* and or **73***c* and by using tooth shaped contour **72***a*, **72***b* and **72***c* as a guide as previously described, osteotomy sites **46***a*, **46***b* and **46***c* in jaw bone **48** can be located and demarcated by pressing end faces **109***a*, **109***b* and **109***c* with marking agents **110***a*, **110***b* and **110***c* of fixed apical posts **74***a*, **74***b* and **74***c* on top of jaw bone **48** leaving marks denoting the osteotomy sites **46***a*, **46***b* and **46***c*. Osteotomy bur **47** of surgical drill **59** can then be used to initiate osteotomy site preparations. Further preparation, verification and completion of the osteotomy sites can then be accomplished as previously described in FIGS. **1-4**.

A method and apparatus for using a prefabricated implant surgical guide during dental implant placement surgery has now been illustrated. It will also be understood that the invention may be embodied in other specific forms without departing from the scope of the invention disclosed and that the

examples and embodiments described herein are in all respects illustrative and not restrictive. Those skilled in the art of the present invention will recognize that other embodiments using the concepts described herein are also possible. Further, any reference to claim elements in the singular, for example, using the articles "a," "an," or "the" is not to be construed as limiting the element to the singular.

What is claimed is:

1. A method for dental implant surgery comprising:

placing a prefabricated implant surgical guide in the mouth of a recipient at an implant site;

the prefabricated implant surgical guide consisting essentially of a single tooth-shaped contour having an apical end and a coronal end; and

a post affixed to the apical end of the tooth-shaped contour, the apical end post comprising a bottom face and a marking agent on the bottom face;

marking an implant osteotomy site via the marking agent on the bottom face of the apical post;

drilling a hole at the osteotomy site to an initial depth;

placing the prefabricated implant surgical guide apical end post into the hole at the osteotomy site, wherein the apical end post is dimensioned to fit within the hole of the osteotomy site; and

verifying the positional and angular alignment of the osteotomy site upon insertion of the apical end post into the hole of the osteotomy site.

2. The method for dental implant surgery of claim **1**, wherein the apical end post comprises a length approximating a final depth of the osteotomy site.

3. The method for dental implant surgery of claim **1**, wherein verifying the alignment of the osteotomy site comprises verifying the proper location, angulation, and rotational position of the tooth-shaped contour by comparing the tooth-shaped contour of the prefabricated dental implant surgical guide to other dental features of a patient with the apical end post of the surgical guide engaged in the osteotomy site.

4. The method for dental implant surgery of claim **1**, wherein the tooth-shaped contour is selected from the group consisting of a central incisor shape, a lateral incisor shape, a cuspid shape, a premolar shape, and a molar shape of an upper and lower jaw.

5. The method for dental implant surgery of claim **1**, further comprising placing the tooth-shaped contour apical end at a proposed osteotomy site, causing the bottom face of the apical post to contact a jaw bone at the proposed osteotomy site thereby marking a drill site at the osteotomy site with the marking agent.

6. A method for dental implant surgery using a prefabricated dental implant surgical guide consisting essentially of a single tooth-shaped contour having an apical end and associated bottom face and a coronal end, the tooth-shaped contour comprising a central bore along an axis extending from a center of an apical end through a center of a coronal end and an adjustable removable post located in the central bore, wherein the post comprises a post apical end that extends beyond the apical end of the tooth-shaped contour and a post coronal end that extends beyond the coronal end of the tooth-shaped contour, where in the method comprises:

placing the tooth-shaped contour in the mouth of a recipient at an implant site;

marking an implant osteotomy site via a marking agent on a bottom face of the apical end of the adjustable removable post;

drilling a hole at an osteotomy site to an initial depth;

placing the post apical end into the hole at the osteotomy site;

adjusting the length of the post apical end to the initial depth of the hole at the osteotomy site by manipulating the coronal end thereby extending the post apical end to the initial depth of the hole at the osteotomy site; and

verifying the alignment of the hole at the osteotomy site upon insertion of the apical end post into the hole at the osteotomy site by comparing the tooth-shaped contour position of the surgical guide to other dental features of a patient.

7. The method for dental implant surgery of claim **6**, wherein placing the adjustable removable post apical end of the tooth-shaped contour into the hole at the osteotomy site comprises positioning the post apical end of the tooth-shaped contour into the hole at the site using the coronal end of the adjustable removable post to position the surgical guide.

8. The method for dental implant surgery of claim **6** further comprising deepening the osteotomy site hole to a final depth, and verifying the location, position and angulation of the osteotomy site by manipulating the coronal end of the adjustable removable post, thereby allowing the apical end to engage the depth of the osteotomy site; and

comparing the tooth-shaped contour position to other dental features of a patient.

9. The method for dental implant surgery of claim **6** further comprising:

removing the adjustable removable post from the central bore of the tooth-shaped contour; and

placing an osteotomy drill through the central bore of the tooth-shaped contour while the tooth-shaped contour is engaged in the mouth of the recipient, thereby allowing the initial depth of the osteotomy site to be developed.

10. The method for dental implant surgery of claim **9** further comprising:

removing the adjustable removable post from the central bore of the tooth-shaped contour; and

placing an osteotomy drill through the central bore of the tooth-shaped contour while the tooth-shaped contour is engaged in the mouth of the recipient, thereby allowing a final depth of the osteotomy site to be developed.

11. The method for dental implant surgery of claim **6**, wherein the shape of the tooth-shaped contour is selected from the group consisting of a central incisor shape, a lateral incisor shape, a cuspid shape, a premolar shape, and a molar shape of an upper and lower jaw.

12. The method for dental implant surgery of claim **1** further comprising:

drilling the hole at the osteotomy site to a final depth;

placing the prefabricated implant surgical guide apical end post into the hole at the osteotomy site, wherein the apical end post is dimensioned to fit within the hole of the osteotomy site; and

verifying the positional and angular alignment of the osteotomy site upon insertion of the apical end post into the hole of the osteotomy site.

* * * * *