United States Patent [19]

Linkow

[11] **3,849,888**

[45] **Nov. 26, 1974**

[54] **BONE ADAPTING TISSUE PACKING POST SYSTEM**

[75] Inventor: **Leonard I. Linkow,** Cedarhurst, N.Y.

[73] Assignee: **Oratronics, Incorporated,** New York, N.Y.

[22] Filed: **Oct. 19, 1973**

[21] Appl. No.: **407,948**

[52] **U.S. Cl.** ..... **32/10 A**

[51] **Int. Cl.** **A61c 13/00**

[58] **Field of Search** ..... 32/10 A

[56] **References Cited**

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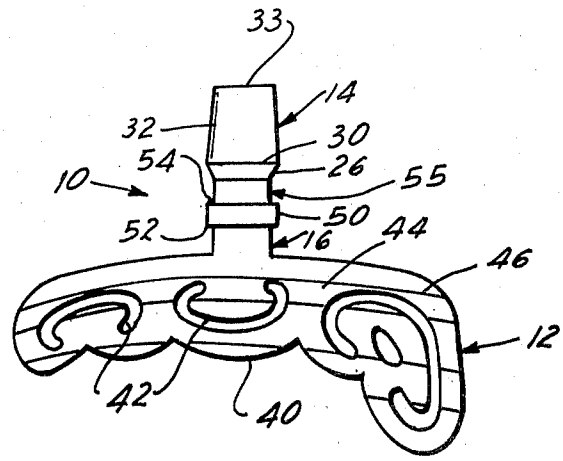
Primary Examiner—Robert Peshock

[57] **ABSTRACT**

An improved oral implant of the vented blade type comprises a relatively thin vented blade adapted to be seated into a groove in the patient's jawbone, a crown-supporting head or support, and a neck integrally connecting the support to the blade.

The neck has a flange of enlarged width with a blade-facing surface and a support-facing surface. The blade-facing surface comprises a bone adaptor providing initially automatic limitation on the depth of insertion of the implant into the jawbone without enlargement of the groove and thereafter protection of the underlying surface of the jawbone from outside influences. The support-facing surface defines, in conjunction with the flange-facing surface of the support and the length of the neck therebetween, a tissue packer to receive fibromucosal tissue after insertion of the implant and encourage regeneration thereof about such neck portion length, thereby reducing or eliminating crimping of the regenerating tissue. Thus, the improved oral implant encourages superior adaptation of the jawbone and fibromucosal tissue to the presence of the implant.

12 Claims, 12 Drawing Figures



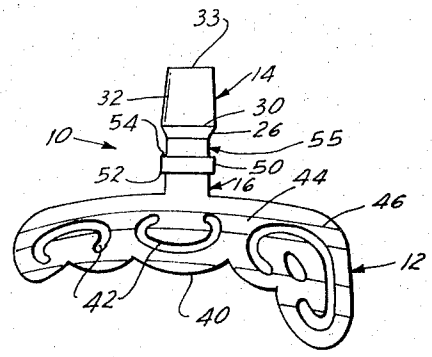


FIG. 1

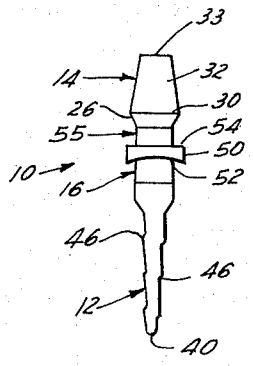


FIG. 2

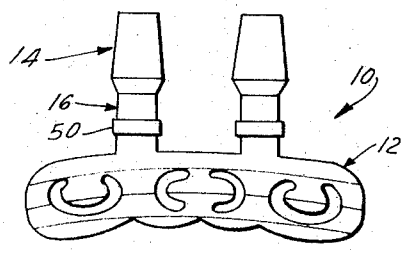


FIG. 3

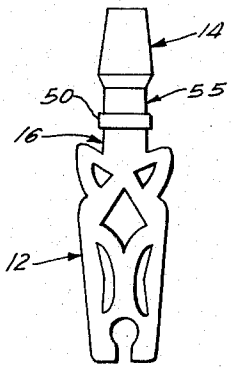


FIG. 4

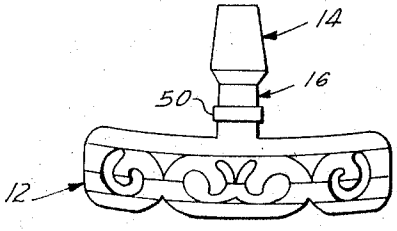


FIG. 5

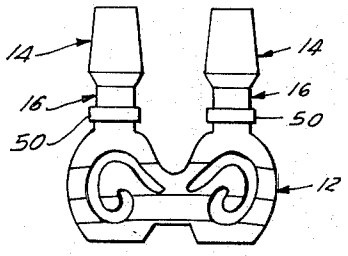


FIG. 6

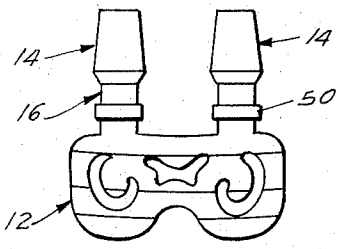


FIG. 7

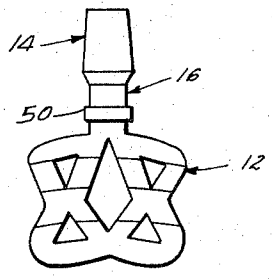


FIG. 8

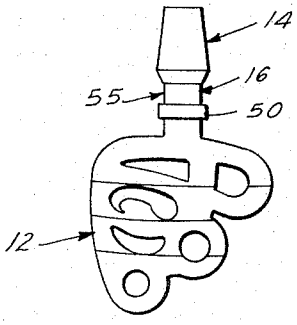


FIG. 9

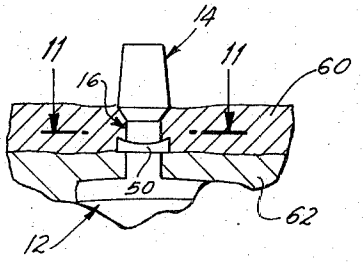


FIG. 10

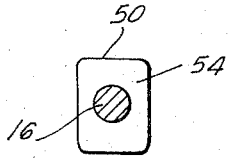


FIG. 11

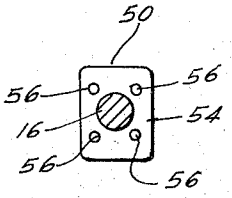


FIG. 12

BONE ADAPTING TISSUE PACKING POST SYSTEM

BACKGROUND OF THE INVENTION

Oral implantology provides a means of permanently mounting an artificial tooth or teeth in the absence of sufficient natural tooth structure for constructing a conventional fixed bridge while avoiding the cleaning problems inherent in the use of removable bridges. Endosteal implants used for this purpose include the various pin type and spiral screw type implants which are inserted directly into the jawbone at the ridge crest; the self-tapping vented implant designed by Dr. Leonard I. Linkow; the blade vent or ring type implant developed by Dr. Leonard I. Linkow and described in his U.S. Pat. No. 3,465,441 (issued Sept. 9, 1969 and entitled "Ring Type Implant For Artificial Teeth"), and the latest type of vented blade endosteal implants having a novel perio head developed by Dr. Leonard I. Linkow and his associates and described in U.S. Pat. No. 3,729,825 (issued May 1, 1973 and entitled "Oral Implant").

As described in the last mentioned patent, a vented blade endosteal implant generally comprises a relatively thin vented blade adapted to be seated into a groove in the patient's jawbone, a crow-supporting perio head and neck integrally connecting the head to the blade. The perio head is formed in the shape of a truncated pyramid and is provided on the side adjacent the neck with inclined beveled surfaces adapted to securely seat on correspondingly chamfered surfaces at the mouth of a groove in the ridge crest of the patient's jawbone, thereby to provide an automatic limitation on depth of insertion and tremendous increased lateral stability. The head may also be provided with a plurality of accurately spaced scorelines for facilitating measurement of interocclusal clearance. The blade may take on a variety of contours designed to conform to various anatomical structures encountered and is preferably provided with a series of bone-engaging teeth extending parallel to the blade edge. Various blade contours and tooth profiles are disclosed, including a preferred staggered tooth arrangement.

The insertion technique is rather simple and comprises incising the fibromucosal tissue at the ridge crest along the endendulous span involved, and reflecting that tissue to expose the jawbone. The bone is then grooved to the selected blade depth and the blade is seated to the desired depth into the jawbone. The tissue is then sutured. The open vents in the blade allow for substantial regeneration of bone therethrough, thereby providing greatly increased retention after healing and bone growth. As healing takes place after about a few weeks, final impressions are taken to complete the final bridge.

There remains yet room for improvement in the endosteal implant of the type described above. While the inclined beveled surfaces of the perio head limit the depth of insertion of the implant into the jawbone, they also tend to "wedge" into the jawbone groove and may thus undesirably enlarge the groove. There is also the tendency of plaque, calculos and other irritating materials to enter any slight space or gap between the inclined beveled surfaces of the perio head and the adjacent correspondingly chamfered surfaces of the groove in the jawbone. Another difficulty encountered is that the relatively massive perio head rests directly on the jawbone, and the regenerating fibromucosal tissue at

the ridge crest tends to "crimp" or bunch about the diameter of the perio head, in some cases leaving gaps between the regenerated tissue and a portion of the perio head in the same plane. As a result, plaque, calculos and other irritating matters are able to enter between the crimped fibromucosal tissue and the perio head at one level and then between the dished down chamfered surfaces of the jawbone groove and the inclined beveled surfaces of the perio head at another level.

Accordingly, it is an object of the present invention to provide an endosteal implant having a bone adaptor which merely abuts atop the jawbone and protects the underlying jawbone surface from outside influences.

It is another object to provide such an implant which will not undesirably enlarge the jawbone groove during the insertion process.

It is also an object to provide such an implant which has a tissue packer to provide room for and encourage the regenerating fibromucosal tissue to tenaciously bind about the neck portion of the implant without crimping.

It is a further object to provide such an implant of an improved design which encourages superior adaptation of bone and tissue thereto.

SUMMARY OF THE DISCLOSURE

It has now been found that the above and related objects of the present invention are provided in an oral implant for permanently implanting an artificial tooth-supporting structure in the jawbone adjacent the fibromucosal tissue of a patient's mouth, comprising a relatively thin blade portion adapted to be seated directly into the jawbone to a suitable depth, a comparatively massive support portion substantially wider than the blade portion adapted to extend outwardly of the jawbone for mounting an artificial tooth structure, and a neck portion operatively connecting the blade portion to the support portion. The neck portion has a flange of enlarged width providing a blade-facing surface and a support-facing surface. The blade-facing surface defines a bone adaptor providing initially automatic limitation on the depth of insertion of the implant into the jawbone by abutment against the jawbone and thereafter protection of the underlying surface of the jawbone from outside influences. The support-facing surface defines, in conjunction with the flange-facing surface of the support portion and the length of the neck portion therebetween, a tissue packer to receive fibromucosal tissue after insertion of the implant, thereby to encourage regeneration of such time about such neck portion length.

The blade-facing surface of the flange may be substantially planar or preferably slightly concave buccolingually to conform to the surface of the jawbone. The support facing surface may be substantially planar or preferably slightly concave to further encourage regeneration of the fibromucosal tissue about the neck portion length. The support-facing surface of the flange may be imperforated or preferably fenestrated with vents extending from the support-facing surface into or through the flange to encourage adaptation of regenerating tissue to the implant.

Preferably the support portion is substantially wider than the neck portion, and the flange is substantially wider than the blade portion, the flange typically being

about as long as the support portion along the axis of the blade portion.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a front elevation view of an embodiment of the improved endosteal implant according to the present invention; FIG. 2 is a side elevation view of the implant of FIG. 1;

FIGS. 3–9 are front elevation views of additional embodiments of the improved endosteal implant according to the present invention;

FIG. 10 is a fragmentary elevation view of an embodiment of the improved endosteal implant according to the present invention, pertinent areas of its ultimate oral environment being indicated in section;

FIG. 11 is a top plan view of the implant of FIG. 10 along the line 11—11; and

FIG. 12 is a top plan view of the implant of FIG. 10 along line 11—11 in which the flange is shown as fenestrated.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawing, wherein like referenced numerals designate identical or corresponding parts throughout the several views, and in particular to FIGS. 1 and 2 thereof, therein illustrated is a representative embodiment of an improved endosteal implant. The implant generally designated by the numeral 10 comprises a unitary metallic structure including an implant or blade portion generally designated by the numeral 12, a crown-supporting head or support portion generally designated by the numeral 14, and a linking or neck portion generally designated by the numeral 16 integral with and the connecting blade portion 12 to support portion 14. Neck portion 16 comprises an upstanding neck formed integral with blade portion 12 and support portion 14, and operatively connecting the upper surface of the blade portion 12 to the lower surface of the support portion 14. The implant 10 is preferably formed of pure titanium.

Each implant 10 includes one or more support portions 14, each support portion 14 being a relatively massive, multi-faceted body substantially wider than the blade portion 12 and generally tapered in the direction away from the neck portion 16. More particularly, the undersurface of the support portion 14 includes a plurality of slightly inclined beveled shoulder surfaces 26 extending upwardly and outwardly from neck portion 16. Typically, four such inclined shoulder surfaces 26 extend upwardly from the front, rear and side surfaces of the neck portion 16, the surfaces 26 being generally in the shape of a parallelogram connected at their corners by triangular surfaces (not shown), thereby to define a polygonal base line 30 from which the supporting portion extends generally upwardly. The supporting portion comprises a plurality of inwardly inclined trapezoidal side surfaces 32 intersecting the shoulder surfaces 26 at base line 30 and extending upwardly generally in the form of a pyramid. The pyramid is truncated by a generally horizontal top surface 33.

The blade portion 12 is in the form of a relatively thin blade tapering to a relatively narrow edge 40 adapted to be seated into the patient's jawbone. The blade portion 12 further includes a series of enclosed openings or vents 42 in its side walls 44 designed to facilitate bone regeneration therethrough and hence enhanced retention of the implant 10 by the jawbone. The blade portion 12 is provided on both side surfaces 44 with a series of bone-engaging teeth 46 extending in generally equally spaced, generally parallel arrangement along the entire length of the blade portion 12 and following the contour thereof. While the teeth 46 are shown as staggered on opposite sides of surfaces 44, they may also be formed generally in registration on opposite side surfaces 44 in the form of an inverted christmas tree, the exact incline or shape of the teeth 46 being varied to suit the individual circumstances.

The neck portion 16 is of substantially constant diameter except for a flange 50 of enlarged width disposed roughly midway along the length thereof and defining a blade-facing surface 52 and a support-facing surface 54. The blade-facing surface 52 comprises a bone adaptor having two functions. On one hand, during insertion it provides an automatic limitation on the depth of insertion of the implant into the jawbone by abutment against the jawbone, and on the other hand, after insertion it provides protection of the underlying surface of the jawbone from outside influences (such as plaque, calculos and other irritating substances) by overlapping any gaps in the engaging surface of the neck portion therebelow and the jawbone at that level. The blade-facing surface 52 of the flange 50 may be relatively planar, but is preferably slightly concave bucco-lingually (in a cheek-to-tongue or end view as shown in FIG. 2) to conform to the usually convex bucco-lingual configuration of the crest surface of the jawbone against which it will abut after insertion. The flange 50 may be circular or rectangular in shape so long as the sides extend bucco-lingually sufficiently beyond the sides of the blade portion 12 to serve as an insertion stop and protective cover. The ends of the flange 50 should not extend beyond the ends of the blade portion 12 and will generally extend parallel to the blade axis only about as far as the support portion 14.

A tissue packing region of the implant generally designated by the numeral 55 is defined by the upper surface 54 of the flange 50, the underbody or inclined beveled shoulders 26 of the support portion 14 and the length of the neck portion 16 therebetween. In the process of tissue regeneration, the fibromucosal gum tissue tends to enter between the support-facing surface 54 and the support shoulders 26 and is thus encouraged to tenaciously bind itself about length of the neck portion 16 therebetween as further regeneration occurs. It has been found that the regenerating fibromucosal tissue tends to pack itself securely within the tissue-packer 55 and about the length of the neck portion 16 therewithin with little, if any "crimping" or bunching of the tissue, the width of such length of the neck portion 16 being substantially less than the width of the massive support portion 14. The support-facing surface 54 may be substantially planar (as shown in FIGS. 1 and 2) or slightly concave (as shown in FIG. 10) to further encourage the regenerating fibromucosal tissue to wrap or bind around the length of the neck portion 16 within the tissue packer 55.

The flange 50 may be either imperforate (as shown in FIGS. 1–2 and 10–11) or fenestrated (as shown in FIG. 12). In the latter instance, a plurality of apertures or vents 56 extend generally perpendicularly from the blade-facing surface 54 through either part or all of the thickness of the flange 50. In either case the vents 56

further encourage tissue adaptation to the implant **10** by permitting regenerating tissue to grow therethrough. A further advantage occurs when the vents **56** extend throughout the thickness of the flange **50**; in this case, screws or staples (not shown) may be inserted through the vents **56** and into the jawbone to secure or tighten implants **10** which have become loose for one reason or another.

The environment in which the implant **10** will reside is indicated in phantom line in FIG. **10** and is best understood from a consideration of the following technique for insertion of the implant **10** into the patient's jawbone.

Referring now to FIG. **10**, after suitable X-rays have been taken, an incision is made by a sharp scalpel along fibromucosal tissue **60** in the area where the implant **10** will be inserted. The incision is made along the alveolar crest so that the tissue **60** may be retracted to expose sufficient jawbone **62** without tearing it. The soft tissue **60** is then retracted, preferably with a periosteal elevator to expose the bone **62.** A narrow groove is then cut into the cortical layer of the bone at the crest of the ridge **64** to facilitate initial placement of the implant blade edge **40** into the jawbone **62** and reduce the likelihood of the blade edge **40** skidding over the jawbone surface as it is being tapped home. The properly chosen implant **10** is then placed with its relatively narrow blade edge **40** inserted in the groove, and a suitable instrument (preferably a plastic headed mallet) is applied to the upper surface of the support portion **14** and used to tap the blade portion **12** into the alveolar bone **62** to the desired depth.

Insertion to the proper final depth is insured by the abutment of the blade-facing surface **52** of the flange **50** against the surface of the ridge crest, such abutment limiting further insertion. In addition to insuring accurate depth of insertion, this feature considerably enhances the initial retention, lateral stability and general feel of the implant **10** immediately after insertion. Moreover, proper seating of the slightly concave blade-facing surface **52** of flange **50** on the ridge crest insures that the implant **10** has been properly inserted.

The incised tissue **60** is then closed, preferably by the use of interrupted sutures along the base line **30** of the support portions **14** of the implant. The sutures may be removed after approximately 5–7 days, and the denture is then cemented directly into position over the exposed, upwardly extending support portions **14.** In the course of time, jawbone regeneration occurs through vents **42** and tissue regeneration occurs in the area of the tissue packer and through any vents **56.** The inclined beveled shoulder surfaces **26** of the underside of the support portion **14** facilitate flossing and cleaning at the gum line.

A representative sample of blade shapes and contours which may be provided in accordance with the present invention and which advantageously utilize the flange feature is illustrated in FIGS. **3–9.** The various areas of the mouth and the various bone conditions to which the illustrated implants are best suited will be immediately apparent to dental surgeons and dentists skilled in the art, and accordingly they will not be described in detail herein. Suffice it to say that the shape and size of the neck portion, blade portion and vent openings in all of the illustrated embodiments have been carefully designed from photoelasticity experiments and clinical experience to provide the maximum retention, bone regeneration and stability to various bone conditions and locations with a minimum of trauma to the bone and/or tissue upon insertion. In particular it will be noted that the vents **42** of blade portion **12** have rounded and uninterrupted edges to provide a more equal distribution of stress along the jawbone.

It will be appreciated from the foregoing that the improved endosteal implant provides a bone adaptor and a tissue packer. The bone adaptor automatically limits the depth of insertion of the implant without causing enlargement of the opening in the jawbone and protects the engaging surfaces of the jawbone and the neck portion from outside influences. The tissue packer permits and encourages regeneration of soft tissue about the neck portion and substantially reduces or eliminates crimping, thereby also diminishing the possibility of outside influences approaching the jawbone opening. As a result, the improved oral implant provides enhanced tissue and bone adaptation to the implant and reduces the liklihood of irritation resulting from outside influences entering the jawbone opening.

Now that a limited number of preferred embodiments of the present invention have been herein specifically shown and described, other modifications and variations will become readily apparent to those skilled in the art. For example, the length of the neck portion above the flange may be of lesser diameter than the length of the neck portion below the flange to facilitate tissue regeneration thereabout, provided only that the structural strength of the implant is not unduly weakened thereby. Accordingly, it is to be understood that the spirit and scope of the present invention is to be limited not by the foregoing disclosure, but only by the appended claims.

I claim:

1. In an oral implant for permanently implanting an artificial tooth supporting structure in a jawbone adjacent the fibromucosal tissue of a patient's mouth, comprising

A. a relatively thin blade portion adapted to be seated directly into the jawbone to a suitable depth,

B. a comparatively massive support portion substantially wider than said blade portion adapted to extend outwardly of the jawbone for mounting an artificial tooth structure, and

C. a neck portion operatively connecting said blade portion with said support portion;

The improvement wherein said neck portion has an enlarged substantially horizontally-extending peripheral flange with a blade-facing surface and a support-facing surface spaced from said support position; said blade-facing defining a bone-adaptor providing initially automatic limitation on the depth of insertion of said implant by abutment against the jawbone and thereafter protection of the underlying surface of the jawbone from outside influences, and said support-facing surface defining in conjunction with the flange-facing surface of said support portion and the length of said neck portion therebetween a tissue-packer to receive fibromucosal tissue after insertion of said implant, whereby said tissue-packer encourages regeneration of fibromucosal tissue about said neck portion length.

2. The oral implant of claim 1 wherein said flange-facing surface of said support portion has upwardly and outwardly beveled shoulders.

3. The oral implant of claim 1 wherein said blade-facing surface of said flange is substantially planar.

4. The oral implant of claim 1 wherein said blade-facing surface of said flange is slightly concave buccolingually to conform to the surface of the jawbone.

5. The oral implant of claim 1 wherein said support-facing surface of said flange is substantially planar.

6. The oral implant of claim 1 wherein said support portion is substantially wider than said neck portion length, and wherein said flange is substantially wider than said blade portion and about as long as said support portion.

7. The oral implant of claim 1 wherein said blade-facing surface is slightly concave buccolingually to conform to the surface of the jawbone.

8. In an oral implant for permanently implanting an artificial tooth supporting structure in a jawbone adjacent the fibromucosal tissue of a patient's mouth, comprising

A. a relatively thin blade portion adapted to be seated directly into the jawbone to a suitable depth,

B. a comparatively massive support portion substantially wider than said blade portion adapted to extend outwardly of the jawbone for mounting an artificial tooth structure, and

C. a neck portion operatively connecting said blade portion with said support portion;

The improvement wherein said neck portion has an enlarged flange with a blade-facing surface and a support-facing surface; said blade-facing surface defining a bone-adaptor providing initially automatic limitation on the depth of insertion of said implant by abutment against the jawbone and thereafter protection of the underlying surface of the jawbone from outside influences, and said support-facing surface being slightly concave and defining in conjunction with the flange-facing surface of said support portion and the length of said neck portion therebetween a tissue-packer to receive fibromucosal tissue after insertion of said implant, whereby said tissue-packer encourages regeneration of fibromucosal tissue about said neck portion length.

9. The oral implant of claim 8 wherein said support-facing surface is fenestrated.

10. In an oral implant for permanently implanting an artificial tooth supporting structure in a jawbone adjacent the fibromucosal tissue of a patient's mouth, comprising

A. a relatively thin blade portion adapted to be seated directly into the jawbone to a suitable depth,

B. a comparatively massive support portion substantially wider than said blade portion adapted to extend outwardly of the jawbone for mounting an artificial tooth structure, and

C. a neck portion operatively connecting said blade portion with said support portion;

The improvement wherein said neck portion has an enlarged flange with a blade-facing surface and a support-facing surface; said blade-facing surface defining a bone-adaptor providing initially automatic limitation on the depth of insertion of said implant by abutment against the jawbone and thereafter protection of the underlying surface of the jawbone from outside influences, and said support-facing surface being fenestrated and defining in conjunction with the flange-facing surface of said support portion and the length of said neck portion therebetween a tissue-packer to receive fibromucosal tissue after insertion of said implant, whereby said tissue-packer encourages regeneration of fibromucosal tissue about said neck portion length.

11. In an oral implant for permanently implanting an artificial tooth supporting structure in a jawbone adjacent the fibromucosal tissue of a patient's mouth, comprising

A. a relatively thin blade portion adapted to be seated directly into the jawbone to a suitable depth,

B. a comparatively massive support portion substantially wider than said blade portion adapted to extend outwardly of the jawbone for mounting an artificial tooth structure, and

C. a neck portion operatively connecting said blade portion with said support portion;

The improvement wherein said neck portion has an enlarged flange with a blade-facing surface, a support-facing surface and a plurality of apertures extending therethrough; said blade-facing surface defining a bone-adaptor providing initially automatic limitation on the depth of insertion of said implant by abutment against the jawbone and thereafter protection of the underlying surface of the jawbone from outside influences, and said support-facing surface defining in conjunction with the flange-facing surface of said support portion and the length of said neck portion therebetween a tissue-packer to receive fibromucosal tissue after insertion of said implant, whereby said tissue-packer encourages regeneration of fibromucosal tissue about said neck portion length.

12. The oral implant of claim 1 wherein said support-facing surface is slightly concave.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,849,888 Dated November 26, 1974

Inventor(s) LEONARD I. LINKOW

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 6, line 55, "position; said blade-facing" should read -- portion; said blade-facing surface --.

Col. 7, line 16, "claim 1" should read "Claim 8"--.

Col. 8, line 53, "claim 1" should read -- Claim 11 --.

Signed and Sealed this

fifth Day of *August 1975*

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks