

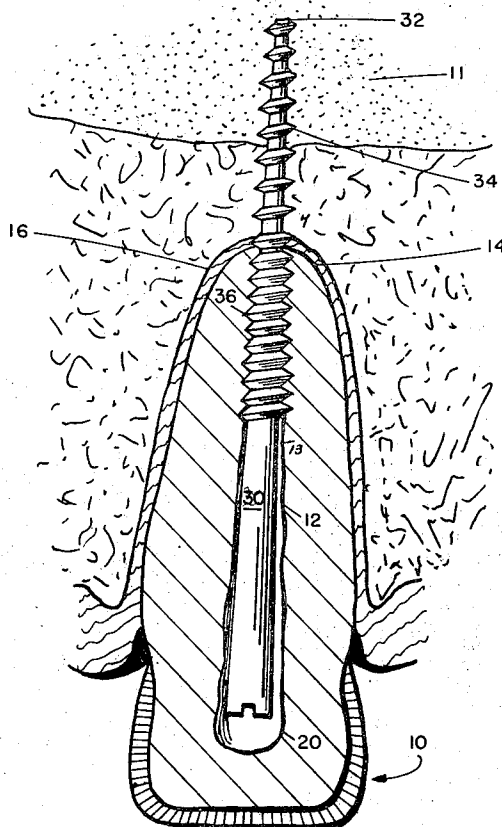
- [21] Appl. No.: 141,349

[58] **Field of Search** 32/6, 9, 13, 10 A

1,018,803	2/1912	Anderberg.....	32/15
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126,184	1/1901	Germany	32/15
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2 Claims, 4 Drawing Figures



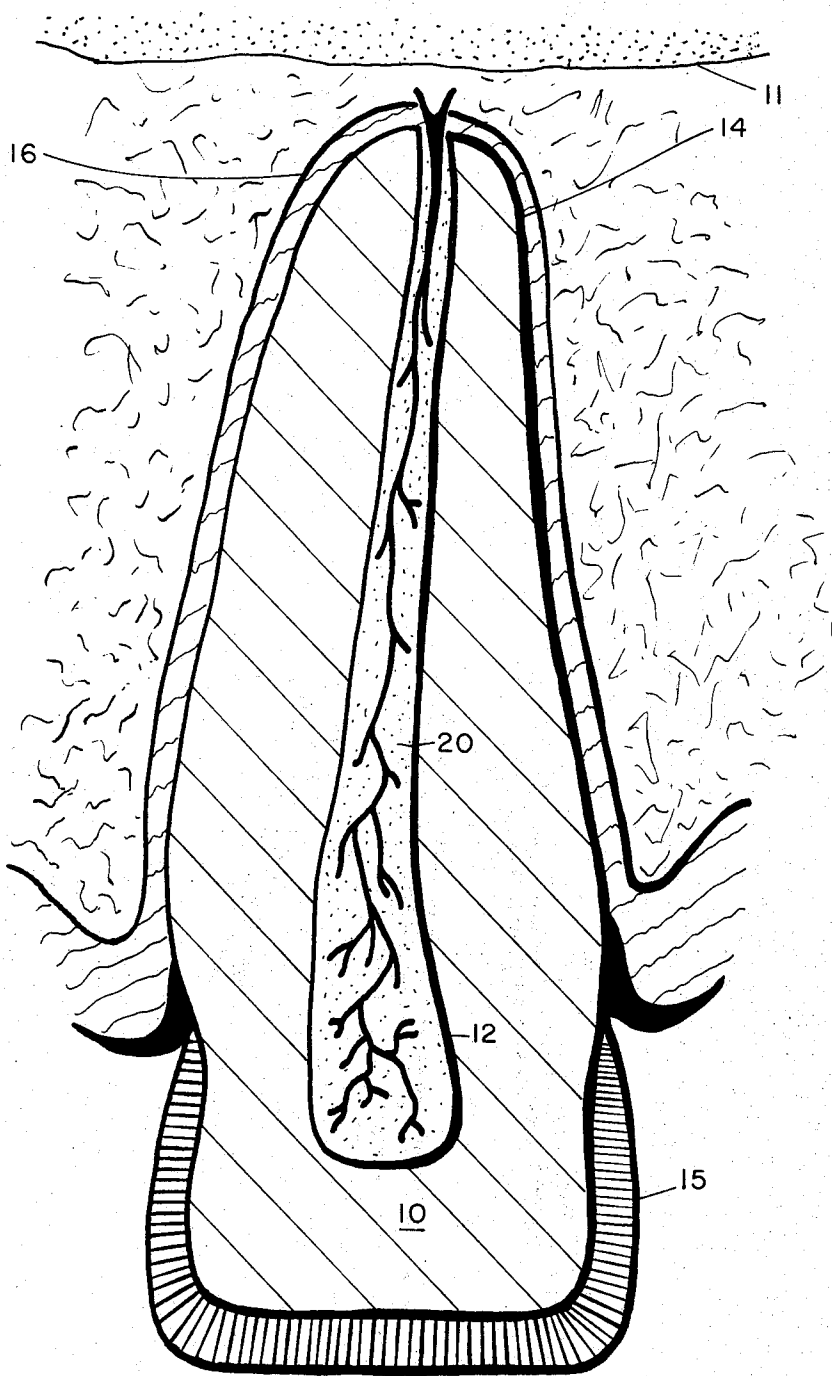


FIG. 1

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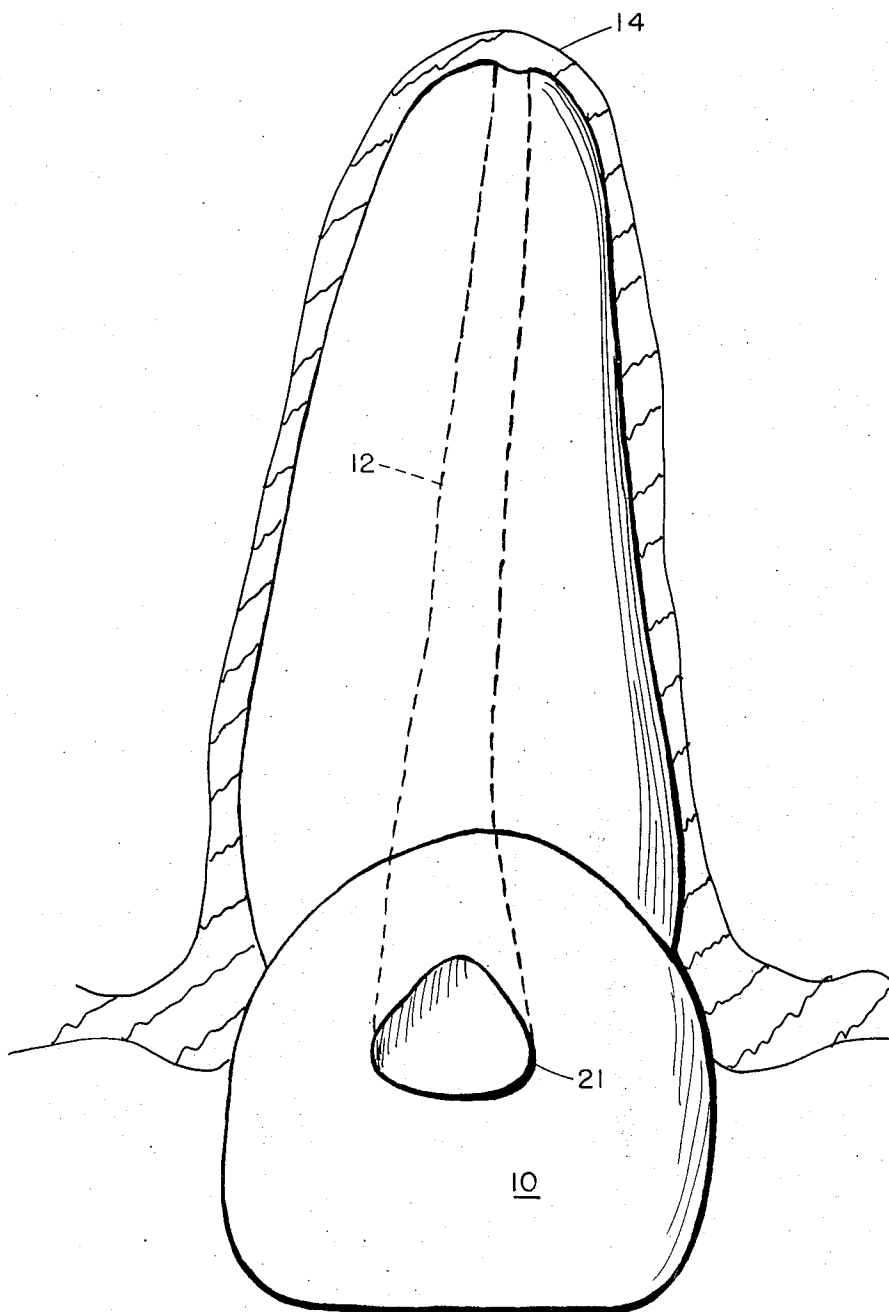


FIG. 2

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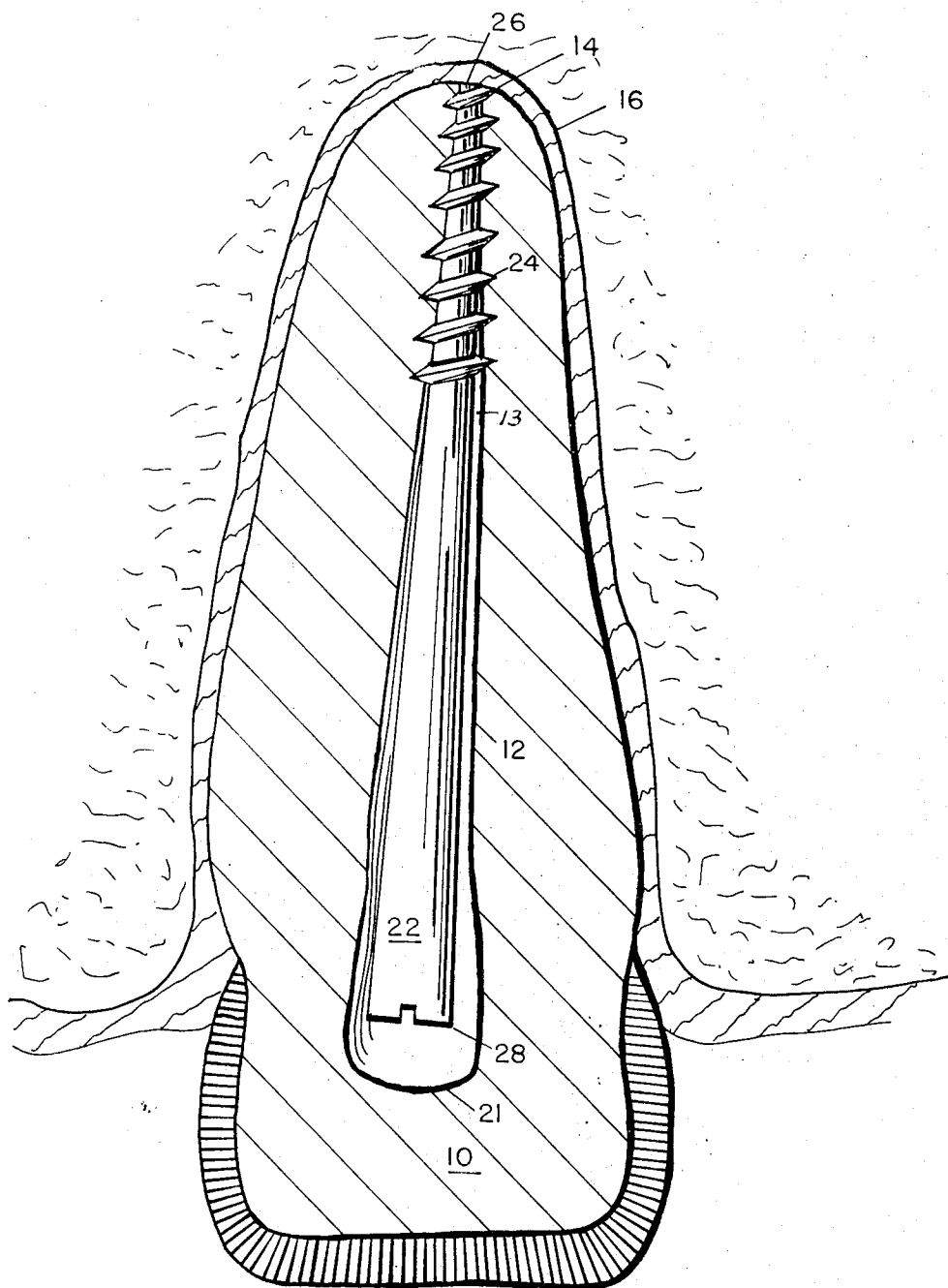


FIG. 3

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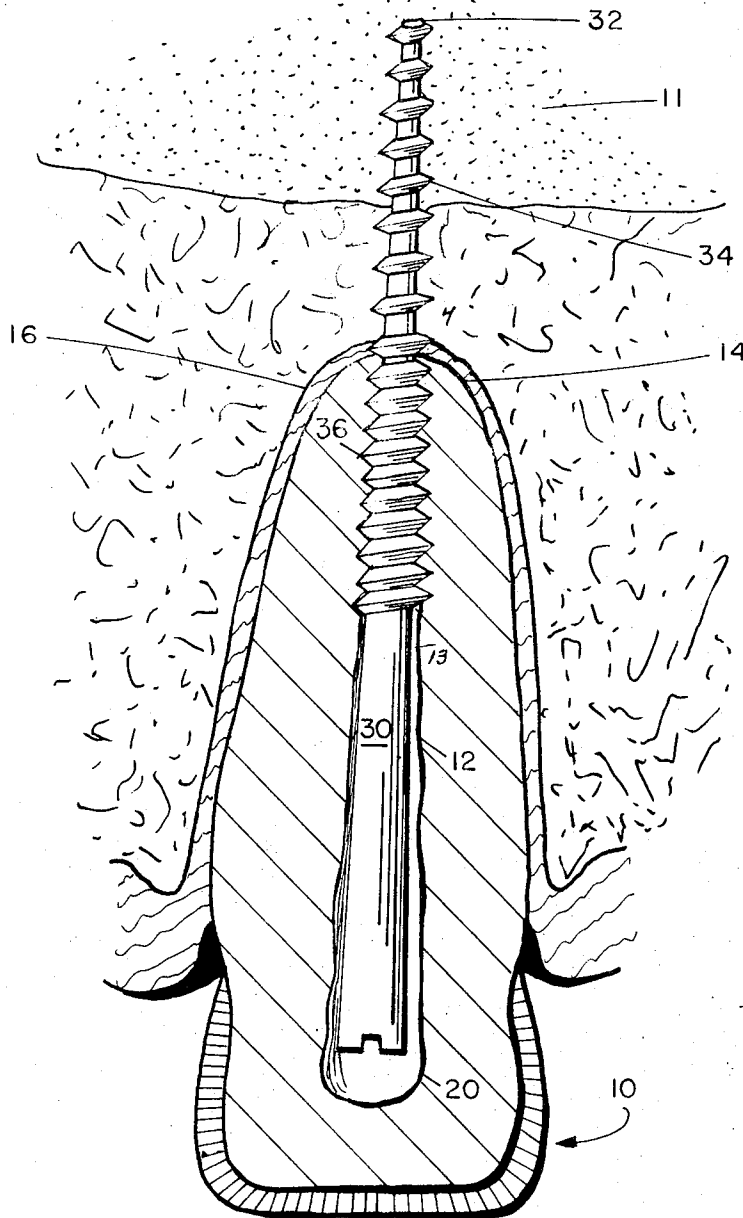


FIG. 4

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METHOD AND APPARATUS FOR SEALING ROOT CANALS AND ANCHORING TEETH

The present application is a continuation of my co-pending application entitled "Method and Apparatus For Sealing Root Canals and Anchoring Teeth," Ser. No. 846,164 filed July 30, 1969, and now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to a root canal filler. Various means have been employed in trying to obtain a desired hermetic seal once the tooth has been treated endodontically. Silver points and gutta-percha have been used, but the seal achieved has been somewhat less than desirable. The use of silver points, in addition to failing to provide the proper hermetic seal, may involve jamming, pushing and ramming of the point with consequent discomfort to the patient due to contact with the periapical tissue which provides a cushion around the apex of the tooth.

Another root canal filling technique is disclosed in U.S. Pat. No. 3,318,000 to Paris. This technique does not provide for sealing in the apical one-third of the root canal. A stainless steel sphere is used to provide sealing at the apex of the tooth. The sphere is not rigidly fastened to the tooth and thus may move longitudinally therein. Also, the periphery of the sphere may not provide complete three dimensional contact with the walls of the root canal.

The present invention seeks to provide a method and apparatus for insuring a tight hermetic seal in the apical one-third of the root canal with resulting healthy cementosis around the apex and the cessation of the egress of pathogenic bacteria and their toxins from the root canal into the periapical tissue.

The ideal filling material should have the following qualities which the present invention generally obtains:

1. The material should be able to hermetically seal the canal.
2. It should be easy to insert.
3. It should be easily removed if retreatment is necessary.
4. It should be capable of being condensed into a compact (mass or inserted in a compact mass.
5. It should be free of dimensional change.
6. It should be impervious, non-absorbent to tissue fluid.
7. It should be a non-conductor of thermal stimuli to the supporting tissues.
8. It should be relatively inexpensive.
9. It should be easily sterilized.
10. It should be non-staining to the tooth structure.
11. It should be radio-opaque for ease of X-ray examination.

SUMMARY OF THE INVENTION

A novel method and apparatus is herein provided to insert a filler composed of silver or a material having generally the characteristics listed, supra, in the root canal of a tooth to provide as nearly as possible a hermetic seal in the apical one-third thereof. The apical portion of the root canal should be sealed in three dimensions, i.e., all of the walls of the canal should be equally and completely sealed. With the technique as

hereinafter disclosed, such an objective is accomplished.

The root canal filler, as provided here, generally resembles a self-threading screw. The threads of the filler are arranged to engage (bite into) the prepared dentine and, with the aid of a sealing cement such as the Richert formula, sold commercially as Kerr's Sealer by the Kerr Manufacturing Company, produce a tight seal. The nature of the dentine, e.g., its elasticity, scratch hardness, etc., has been considered in the determination of the design and composition of the filler. The micro-hardness or scratch hardness of root dentine is known to be between 115 and 130. The filler is also constructed to negotiate any canal that has been prepared without breakage while still being resilient enough to thread into the dentine.

The placement of the filler is accomplished by screwing in, using a tool such as a finger wrench or the like. Although the placement is easily accomplished, the filler cannot be dislodged by any reasonable pulling force. However, if it is necessary to remove the filler, it can be unscrewed with relative ease.

A sealing cement enhances the use of the filler when it is placed into the canal previous to the introduction of the filler. The point of the threaded portion of the filler may also be swabbed with the sealing cement. The point of the filler is then inserted into the canal and the filler is screwed in to the desired length, the point reaching the apex, producing the hermetic seal.

Since the filler material is generally radio-opaque, an x-ray may be used to determine if the point is slightly past the apex of the tooth whereby the point may be unscrewed to the desired position without any loss of sealing value. This is generally not possible with any technique now in use. Further, if it is determined at a later date that retreatment is necessary, the point can be removed easily, although the chances of retreatment being necessary due to improper obturation of the root canal is almost non-existent.

DESCRIPTION OF THE FIGURES

FIG. 1 is a general cross section of an incisor showing the root canal in its normal state.

FIG. 2 shows the incisor in a prepared state with the root canal pulp removed and part of the tooth removed forming a recess axially aligned with the root canal.

FIG. 3 shows a root canal filler properly inserted in the root canal providing the desired hermetic seal of the root canal.

FIG. 4 shows an alternate form of the invention wherein a root canal filler implant support is provided also to the incisor by anchoring the incisor into the jaw bone while still maintaining a hermetic seal in the root canal.

DETAILED DESCRIPTION

Generally, the use of the numerous materials and techniques available through modern technology have been neglected in the development of new and approved root canal filling techniques. To obtain proper obturation of a root canal, the environment must be considered. The environment includes a canal which is surrounded by dentine and near contact with the periapical tissue at the apex. Volumewise, dentine makes up the bulk of the tooth. It is generally harder than bone but softer than enamel. It is somewhat compressible and elastic, which are important properties for the

technique herein described. It is known by most dentists that regardless of the general shape of the root canal, as it nears the apex of the tooth, the canal becomes round or nearly so. This is one of the factors which allows utilization of the described technique, regardless of the diameter or shape of the root canal.

It is especially important that a tight seal of the entire apical area be obtained so as to provide as nearly as possible a perfect hermetic seal. The apical portion of the root canal should be sealed in three dimensions, i.e., all the walls of the canal should be equally and completely sealed and the filler should be free of any longitudinal or horizontal movement.

The method of sealing a root canal herein described includes the steps of removing a generally cylindrical portion of the tooth generally in axial alignment with the root canal to provide a vertical, generally cylindrical, shaped recess extending through the tooth, substantially axially aligned with the axis of the root canal. The root canal is prepared undergoing debidement and any necessary enlargement, and after proper cleaning with a hypochloride solution as known in the art, a well-known sealing cement such as the Richert formula, sold commercially as Kerr's Sealer by Kerr Manufacturing Company, may be introduced. A tapered filler resembling a self-threading screw and having its tip swabbed with the sealing cement is then inserted into the recess. The filler has thread over approximately one-third of its length to provide the proper hermetic seal over the apical one-third portion of the root canal. The filler is then rotated until the tip of the tapered filler reaches the apex or bottom-most portion of the tooth. The rotation is then stopped so that the periapical tissue surrounding the apex and providing a cushion to the tooth is not injured. If the tip of the filler extends beyond the apex of the tooth, the filler may be unscrewed to the desired position without any loss of sealing. Thus, a hermetic seal in the apical portion of the root canal has been achieved and any protruding portion of the filler near its opposite end of the recess may be snipped off and the recess filled.

Further, this technique may be used to apply a greater root-to-crown ratio to the tooth, thereby providing support to the tooth while still hermetically sealing the root canal. Generally, when utilizing this method, the filler has a greater percentage of its length threaded. The lower tip portion of the filler has thread having helixes spaced further apart than an adjacent threaded portion, so that proper anchoring is provided to the tooth when the filler is screwed into the jaw bone while still providing the desired hermetic seal.

Referring to FIG. 1, a typical healthy tooth 10, here shown as an incisor in a human jaw bone 11. A root canal 12 of the tooth 10 extends longitudinally from the apex 14 of the tooth 10 toward the crown 15. Adjacent to the apex 14 of the tooth 10 is the periapical tissue 16. This tissue 16 is resilient, but sensitive, and cushions the tooth 10 from the jaw bone 11.

If problems are encountered in the root canal, such as infection resulting in an abscess, the importance of the present invention becomes apparent.

Pulp tissue 20 is in the root canal 12 and can become infected. The patient is then subject to considerable distress, usually necessitating removal of the pulp 20. On the other hand, once the pulp tissue 20 is removed, the root canal 12 is a natural festering place for bacteria and toxins, the presence of which may lead to fur-

ther infections. With the present invention, such subsequent infections are eliminated.

As shown in FIG. 2, with the present invention the tooth is worked on in the gum of the patient. The technique begins with the removal of a cylindrical portion of the tooth 10 generally axially aligned with the root canal 12 whereby the root canal 12 is extended to form a cylindrical recess 21 in the tooth 10.

The root canal 12 is prepared and cleansed and a common root canal sealer cement 13 is placed therein.

A filler 22 may be comprised of silver, a low corrosion body compatible metal or a non-corrosive non-metallic body compatible material, which is sufficiently elastic to negotiate the root canal without damage thereto. A filler 22 of the correct length, generally at least as long as the tooth and of the correct size, is then selected, based on the type of tooth 10 and root canal 12 involved. The filler 22 is swabbed with sealing cement and inserted into the root canal 12.

Referring to FIG. 3, the root canal filler 22 is shown in its final inserted position providing the desired hermetic seal at the apex 14 and generally extending over the apical one-third of the root canal 12.

The filler 22 is a generally cylindrical, tapered shaft. Helixes 24 extend upward from the tapered end 26 toward the opposite end 28 along approximately one-third of the length of the filler 22. The distance between helixes or pitch should be approximately 0.005 inches, that is, there should be approximately 200 threads per inch. The depth of the thread should be about 0.002 inches. These criteria have proved satisfactory during actual use. This helical arrangement insures a hermetic seal along the lower one-third portion or apical portion of the root canal 12 once the placement of the filler 22 is accomplished by a simple screwing-in technique, using a finger wrench. It should be apparent that once the hermetic seal is obtained, if the opposite end 28 of the filler 22 protrudes beyond the recess 20, the protruding portion may be removed and the recess filled and smoothed to resemble and function as a normal tooth 10.

ANCHORING USING THE INVENTION

Referring to FIG. 4, a tooth implant filler 30 is shown of generally greater length than the filler 22. The filler may be composed of a cobalt-chromium alloy, Vitallium, which is compatible with the body. Vitallium is sold commercially by Howmet Austinal Corporation.

The tooth implant filler 30 generally has a greater number of helixes 34 and 36 extending upward from its tapered end 32 than the filler 22 shown in FIG. 3. The first set of helixes 34 immediately adjacent to the tapered end 32 of the implant filler 30 is of a larger pitch, i.e., approximately 0.010 inches between helixes or 100 threads per inch and having a depth of approximately 0.007 inches. This criteria provides proper threading into the jaw bone 11. A second set of helixes 36 adjacent thereto has a reduced pitch to provide the desired hermetic seal as previously described. The second set of helixes 36 extend upward over approximately one-third of the length of the remainder of the filler 30. With this arrangement, the first set of helixes 34 may be imbedded into the jaw bone 11 to provide a greater root-to-crown ratio, in effect increasing the length of the root of the tooth, adding to its support. The second

set of helixes 36 act to provide the proper hermetic seal, as described in reference to FIG. 3.

Although silver has been found to be a satisfactory material for the filler, other materials having generally the following characteristics may also be used:

1. non-corrosive
2. a minimum tensile strength of approximately (4,000-5,000 pounds per square inch)
3. hardness 2.5 through 7
4. a minimum modulus of elasticity of approximately 11 through (15 pounds per square inch).

It should be apparent that the disclosed method and apparatus utilizing a self-threading root canal filler may be employed with any type of tooth having any number of root canals.

It should also be apparent to one skilled in the art that various modifications in the arrangement of the steps in the disclosed root canal filler technique may be made without departing from the spirit or scope of the method disclosed. Further, various changes may be made in the composition of the filler or in the arrangement of the helixes thereon without departing from the spirit or scope of the present invention.

What is claimed is:

1. A method of sealing the root canal of a tooth of a patient comprising the steps of removing portions of the tooth in axial alignment with the root canal of the tooth to be treated; providing a longitudinal, generally cylindrical-shaped recess extending through the tooth;

cleansing and preparing the cylindrical recess; inserting a sealing cement therein; inserting and rotating a solid tapered filler having a circular cross-section throughout substantially its entire length, and having helixes extending upward from the tapered end over a given length thereof, until the tapered end of the filler has reached the apex of the tooth and the helixes have engaged essentially the apical one-third of the root canal.

2. A method of sealing the root canal of a tooth and implanting the tooth in the jaw bone of a patient to provide improvement of the crown-to-root ratio comprising the steps of removing portions of the tooth in axial alignment with the root canal of the tooth to be treated, to provide a longitudinal, generally cylindrical-shaped recess extending generally through the tooth; cleansing and preparing the cylindrical recess by inserting a sealing cement therein; inserting and rotating a tapered filler having helixes extending upward from the tapered end, said helixes forming two sets, said first set adjacent to the tapered end having adjacent helixes spaced farther apart than said second set adjacent to said first set, whereby said first set of helixes is securely implanted in the jaw bone of the patient, thereby providing improvement of the crown-to-root ratio by adding support to the tooth while insuring that a hermetic seal is maintained along the apical one-third of the root canal by said second set of helixes.

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