United States Patent [19]

Barnett

[11] **3,775,848**

[45] **Dec. 4, 1973**

[54] **PERIODONTAL AND DENTAL CLEANSER AND PERIODONTAL STIMULATOR**

[76] Inventor: **Edward M. Barnett,** 1 Masters Ct., Potomac, Md. 20854

[22] Filed: **Nov. 3, 1972**

[21] Appl. No.: **303,342**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 130,395, April 1, 1971, abandoned.

[52] **U.S. Cl.** **132/89,** 32/40

[51] **Int. Cl.** **A61c 15/00**

[58] **Field of Search** 32/40; 132/89, 93

[56] **References Cited**

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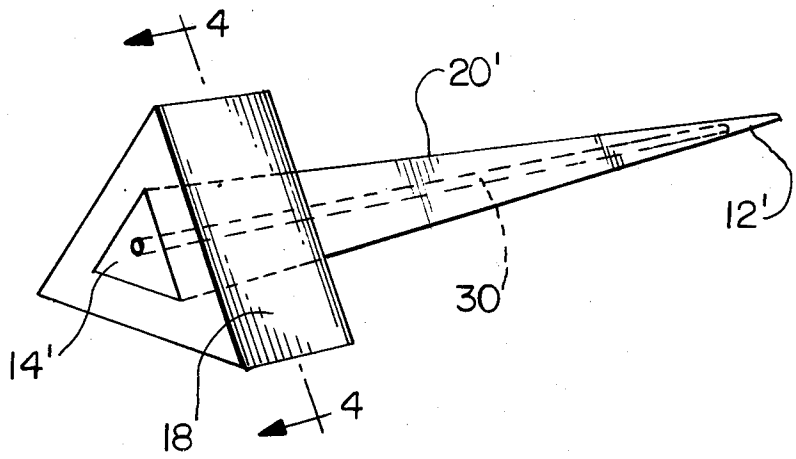
Primary Examiner—Louis G. Mancene
Assistant Examiner—J. Q. Lever
Attorney—D. C. Roylance et al.

[57] **ABSTRACT**

A periodontal and dental cleaning and periodontal stimulating device for both interdental spaces of anterior teeth and interproximal tunnels of posterior teeth comprising an elongated body member having a tapered configuration and fabricated of a material which is partially elastic and is deformable on contacting the hard surfaces of the teeth or firm, healthy gingival tissue, and a core member ensheathed within the body member. The core member is fabricated of a material which is generally stiff axially of its length and sufficiently bendable in all other directions when the device encounters the hard surfaces of the teeth and firm, healthy gingival tissue to enable the device to pass through the spaces and tunnels, but is also sufficiently resistant to bending to enable the device to depress or displace unhealthy, edematous or inflamed gingival tissue in the spaces and tunnels.

5 Claims, 14 Drawing Figures



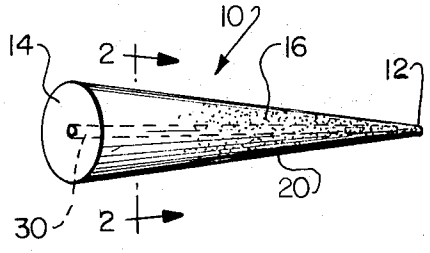


FIG. 1

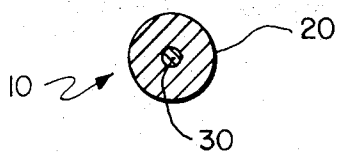


FIG. 2

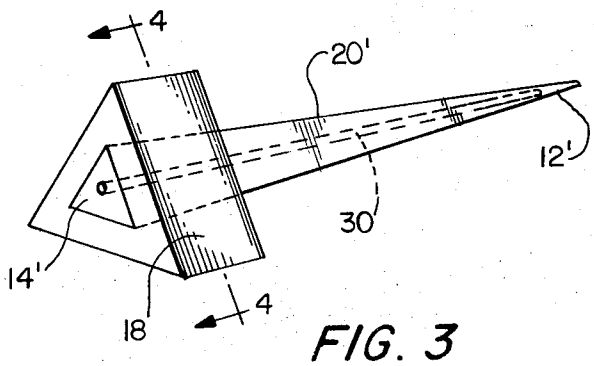


FIG. 3

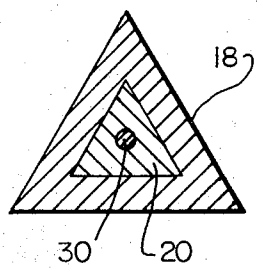


FIG. 4

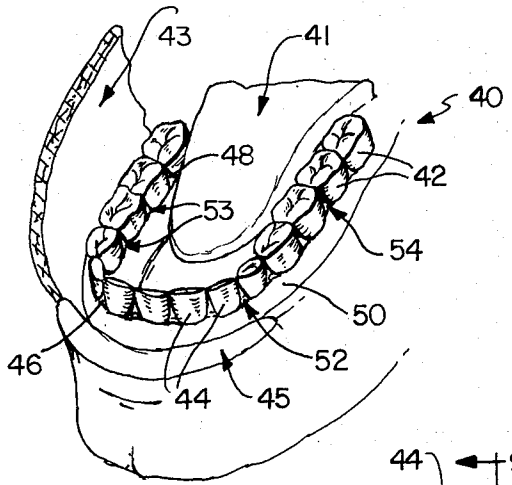


FIG. 5

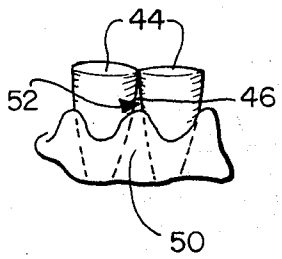


FIG. 6

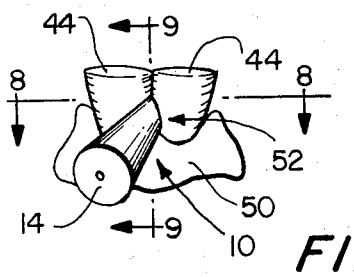


FIG. 7

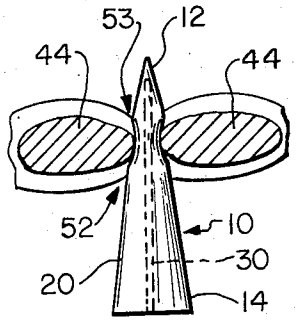


FIG. 8

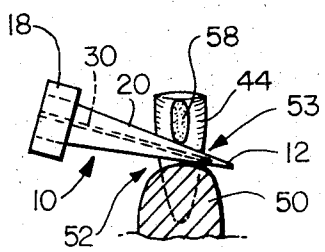


FIG. 9

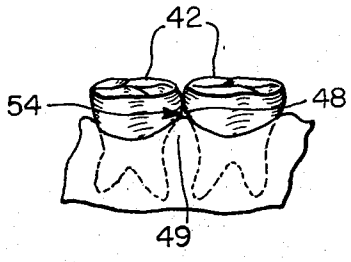


FIG. 10

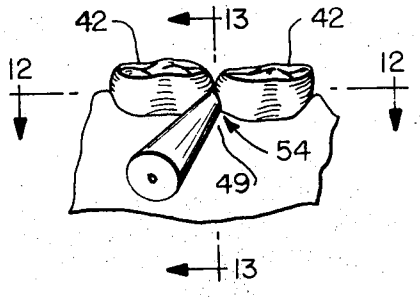


FIG. 11

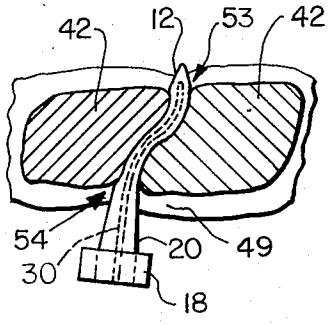


FIG. 12

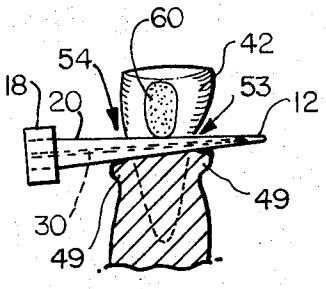


FIG. 13

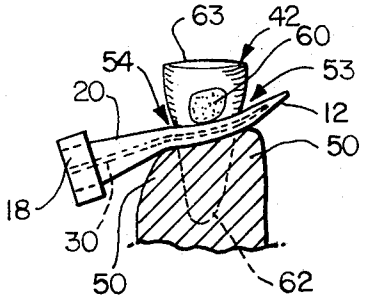


FIG. 14

PERIODONTAL AND DENTAL CLEANSER AND PERIODONTAL STIMULATOR

This application is a continuation-in-part of my application Ser. No. 130,395, filed Apr. 1, 1971, now abandoned.

This invention relates to a device to be inserted between the teeth for cleaning the sides of adjacent, contacting teeth and for cleaning and gently stimulating the gums lying between the contacting teeth. One main function of the device is to remove plaque from the teeth and gums.

As referred to herein the terms gums, gingival tissue and periodontal tissue are meant to be synonymous. Also as referred to herein, interdental spaces are defined as being the spaces between adjacent, contacting front or anterior teeth and interproximal tunnels are defined as being the spaces between adjacent, contacting rear or posterior teeth.

Thus, more particularly the present invention relates to a device for cleaning and stimulating the interdental spaces of a human's anterior teeth and the interproximal tunnels of a human's posterior teeth in both healthy and pathological conditions in normal and most abnormal alignments of the teeth.

Although, the recent use of fluorides in water and in toothpaste has materially reduced the susceptibility of teeth to decay, this use of fluorides does not affect the susceptibility of gums to disease which is now the principal cause of loss of teeth in adults. Because of improved methods of oral hygiene, such as better manual toothbrushes as well as electric toothbrushes, the exposed surfaces of the teeth and gums are maintained in better states of oral hygiene. However, toothbrushing is generally ineffective in cleansing the spaces and tunnels between the teeth. It is in these spaces and tunnels where most of the gum problems and many cavities now develop. While there are devices that have been invented and used to clean these areas, these devices have not been sufficiently convenient and effective for them to provide a significant contribution to the public dental health problems now existing.

Presently, persons in this country are rightfully concerned about and place a high value on dental health and spend a significant sum of money each year to repair teeth from the ravages of tooth decay and gum disease. In addition to the high expense, considerable inconvenience and discomfort is experienced in repairing tooth decay and gum disease.

The major cause of tooth decay and gum disease in the human mouth is the buildup of a thin film of bacteria on the surfaces of the teeth and gums, commonly known as dental plaque. Plaque is continually formed in the mouth and if allowed to remain on the teeth can result in the accumulation of calcular irritants. Plaque results from bacteria, saliva, food debris and dead cells. It usually adheres tenaciously to the tooth and is transparent and difficult to remove. When it results in calculus formation, it can only be removed by a skilled dentist or hygienist. When the plaque is allowed to remain on the teeth it can cause cavities and irritate the gums. In the latter case bleeding can result. Progressive damage can eventually destroy the bone or occeous tissue supporting the teeth. In order to easily prevent the buildup of this plaque, the teeth should be cleaned as soon after eating as possible. A less obvious factor in cleaning the mouth, and particularly the spaces and tunnels between the teeth, involves the prevention of

accommodation by the patient and a dulling of his sensitivity to interdental oral debris. That is, when food debris is left to accumulate between the teeth for a period of time, the patient becomes accustomed to it and gradually ceases to feel a need for its removal. However, the patient who keeps these spaces clean at all times becomes quite sensitive to food debris between his teeth and will remove it as soon as possible. Thus, for behaviorable reasons as well as for dental pathological reasons, the mouth and particularly the spaces and tunnels between the teeth should be kept free of food debris and dental plaque at all times.

These areas between adjacent contacting teeth, i.e., the interdental spaces and the interproximal tunnels, are actually like a passageway with a somewhat triangular cross-sectional shape. The base of the triangle is the gum or gingival tissue; the sides of the triangle are the proximal surfaces or side walls of the contacting teeth; and the apex of the triangle is the incisal or occusal contact area of the two adjacent teeth.

Quite often the openings to these tunnels and spaces are blocked by slightly swollen or edematous gum tissue. Therefore, in order to enter the spaces or tunnels, the cleaning instrument must be sufficiently resistant to bending perpendicular to its longitudinal axis to enable it to depress or displace the gum tissue blocking the entrance or exit to the tunnels or spaces. Furthermore, the posterior interproximal tunnels are often quite tortuous, i.e., the path of the passageway is circuitous. Therefore, the instrument must be sufficiently bendable to follow this tortuous tunnel as it contacts the hard surfaces of the teeth and firm healthy gingival tissues. It must also have sufficient strength to dislodge food debris and loosely adherent calcular material from the walls of the tunnel or space. It must also intimately conform to the walls of the sides of the tunnels and spaces and must have sufficient abrasiveness to remove the dental plaque without injuring the tooth or gum tissues. Additionally, it must be able to fit into the usually narrow space between the anterior teeth.

There are presently numerous types of devices being marketed for cleaning the areas between the teeth. One of these devices is referred to as "dental floss." Although dental floss and similar tapes can effectively remove larger pieces of fibrous food debris and clean the contact areas of the teeth, they often merely pass through the triangle comprised by the sides of the two adjacent teeth and the gum and do not usually come into intimate contact with the total surface area of the adjacent teeth and gingival tissue. Therefore, because they cannot remove dental plaque from all of the surfaces of the teeth and gums when used with reasonable and average skill, they cannot effectively prevent and control tooth decay and gum disease in these specific areas.

Another of the presently used methods of cleansing interdental spaces comprises the interdental spray device such as "Waterpik" and "Aquajet." These devices cannot, in most cases, effectively remove adherent dental plaque from the surfaces of the teeth. They can, however, force out loose food debris from interdental spaces, but perhaps most importantly, they are inconvenient to use and therefore cannot be routinely used after eating. Since such devices generally require a source of water and electricity, they are inconvenient for regular use immediately after eating and hence are ineffective in the control of tooth decay and oral hy-

giene, and particularly, in prevention of buildup of dental plaque.

Another device utilized to clean interdental spaces comprises the wooden or plastic toothpick. These devices are rigid and generally hard and therefore cannot conform to a large enough portion of the walls of the interdental spaces and interproximal tunnels to remove a significant amount of the dental plaque, although they can dislodge food from these spaces and tunnels. Also, because of their hardness, they can injure the gingival tissues between the teeth and create pain and discomfort even to slightly edematous and inflamed tissues. Therefore, because of their inability to remove a sufficient amount of plaque and their danger to natural tissues as well as the discomfort they create, these devices are limited in value.

Other cleaning devices are the various forms of wooden toothpick type devices of generally triangular cross-sectional shape and constructed of balsa wood or the like. A typical device of this type is presently marketed under the name "Stim-U-Dents" and functions in a manner similar to a toothpick in cleaning between the teeth. Stim-U-Dents are constructed of a soft and somewhat deformable wood, such as balsa wood and may therefore be somewhat deformed as they pass into the spaces between the teeth. Further, Stim-U-Dents include tapered tip end portions which may be moistened and clamped between the teeth for flattening the top end portions enabling them to be more readily inserted in the interdental spaces defined between closely spaced teeth. However, when the tip end portions of Stim-U-Dents are flattened for insertion between closely spaced teeth or they are inserted into tortuous interproximal tunnels, the tip end portions tend to buckle and break which results in either the user not being able to insert the Stim-U-Dent into the often narrow interdental spaces or breaking off of the tip end of the Stim-U-Dent in a tortuous interproximal tunnel. Also, in many situations the Stim-U-Dents do not have a sufficiently long taper to allow the tip portion to exit from most interproximal tunnels and therefore remove food debris. Furthermore, the Stim-U-Dents are often too bulky in width and height to permit adequate penetration of the interdental spaces and interproximal tunnels. When their bulk is reduced by biting or cutting to enable them to be properly inserted between the teeth, their stiffness is so reduced that they cannot depress swollen edematous tissue, and they tend to readily buckle or break so that they become unusable and must be discarded. Also the configuration of the Stim-U-Dents requires that it be oriented specifically in relation to the gum and teeth. This not only creates an inconvenience to the user but failure to comply with the correct orientation can cause damage to the gum tissue and teeth. These malfunctions tend to be frustrating and costly to the user and thus discourage sufficient and further use to fully complete cleaning of all of the spaces and tunnels. Also, the instructions for use of Stim-U-Dents direct that they be thoroughly moistened to prevent breakage and while this full moistening prior to use may reduce the tendency of the Stim-U-Dent to break in a manner leaving sharp edges, a thoroughly moistened Stim-U-Dent is softened and thus weakened and is more readily buckled and deformed. Accordingly, even the better forms of interdental space cleansers and stimulators presently on the market do not perform in the best manner possible.

Therefore, the main object of the present invention is to provide a device which will more effectively and consistently cleanse interdental spaces and interproximal tunnels of dental plaque and stimulate adjacent gum tissue without causing their injury.

Another object of the present invention is to provide a device which will provide cleaning to all of the spaces between teeth and slight stimulation of the gingival tissue in both the anterior and posterior portions of the mouth.

Another object of the present invention is to provide a device which can fit into the often narrow interdental spaces of the anterior teeth as well as into the larger and often tortuous interproximal tunnels of the posterior teeth.

Another object of the present invention is to provide a device which will provide cleansing of the teeth and stimulation of the gums without the possibility of the device buckling, breaking or splintering and therefore damaging the gum tissue.

Another object of the present invention is to provide a device which is sufficiently resistant to bending to depress edematous gingival tissue blocking a space or tunnel between teeth, and yet sufficiently bendable to follow the often tortuous paths of the interproximal tunnels.

A further object of the present invention is to provide a device to clean the interdental spaces and interproximal tunnels in both healthy and pathological conditions.

A further object of the present invention is to provide a device to clean the interdental spaces and interproximal tunnels between well-aligned and malaligned teeth.

A further object of the present invention is to provide a device which can be used to cleanse the teeth and stimulate the gums without a strict orientation of the device with regard to the side walls of the teeth and the surface of the gum tissue.

Other objects, advantages and salient features of the present invention will become apparent from the following detailed description, which, taken in conjunction with the annexed drawings, discloses preferred embodiments of the present invention.

Referring now to the drawings which form a part of this original disclosure:

FIG. 1 is a perspective view of one embodiment of the device in accordance with the present invention;

FIG. 2 is a cross-sectional view of the device in FIG. 1 taken substantially along lines 2—2 in FIG. 1;

FIG. 3 is a perspective view of a second embodiment in accordance with the present invention;

FIG. 4 is a cross-sectional view of the device in FIG. 3 taken substantially along the lines 4—4 in FIG. 3;

FIG. 5 is a perspective view of the lower teeth of an adult human including the gingival tissue surrounding the teeth, the interdental spaces in the anterior teeth, and the interproximal tunnels in the posterior teeth;

FIG. 6 is an enlarged view of two anterior teeth showing normal gingival tissue in the interdental space;

FIG. 7 is an enlarged view of the two anterior teeth of FIG. 6 with a device in accordance with the present invention in place in an interdental space;

FIG. 8 is a cross-sectional view taken substantially along lines 8—8 in FIG. 7 showing two adjacent anterior teeth and the device in accordance with the present invention located in the interdental space therebetween;

FIG. 9 is a cross-sectional view taken along lines 9—9 of FIG. 7 showing the device and its relation to the suprabony gingival tissue;

FIG. 10 is an enlarged view of two posterior teeth shown in FIG. 5 and including the interproximal tunnel located between them and suprabony edematous gingival tissue surrounding them;

FIG. 11 is a view similar to FIG. 10 but also showing the device in accordance with the present invention in place in the interproximal tunnel between the two posterior teeth of FIG. 10;

FIG. 12 is a cross-section view taken along lines 12—12 in FIG. 11 showing the device in accordance with the present invention in the interproximal tunnel between the posterior teeth of FIG. 10;

FIG. 13 is a cross-sectional view taken substantially along lines 13—13 in FIG. 11 showing the device in relationship to the edematous gingival tissue disposed between the two posterior teeth; and

FIG. 14 is a view similar to FIG. 13 but showing normal gingival tissue in a common anatomical configuration and contact area with the device disposed between two posterior teeth.

The foregoing objects are attained by utilizing a device comprising an elongated body member having a tapered configuration with a substantially small, pointed forward end and a larger, blunted rear end. The body member is formed from a material which is deformable and partially elastic so that it will conform to the walls of the sides of the adjacent teeth and gums on insertion between the teeth. Enclosed and ensheathed by the body member is a core member which extends substantially from the rear end to the forward end of the body member. This core member is fabricated of a material which is generally stiff in the axial direction of its length, sufficiently bendable in all other directions when the device encounters the hard surface of the teeth and firm healthy gingival tissue, and resistant to bending when the device encounters edematous gingival tissue. The body member preferably has a circular cross-section, although it can also have a triangular or rectangular cross-section. Preferably, the core member is a rod or tube having a circular or annular cross-section.

Referring to the drawings in further detail, a first embodiment of the present invention is generally designated **10** as seen in FIG. **1.** The device consists generally of a conically shaped body member **20** and a rod-like core member **30** enclosed therein. The taper of the conical body member **20** is preferably 2 to 1 and the diameter of the core member **30** is preferably from 0.010 to 0.029 inches.

The device **10** has a forward end **12** and a rear end **14** with the core member **30** extending substantially from the forward end to the rear end. As seen in FIG. **1**, the body member **20** tapers uniformly from its rear end **14** towards its forward end **12** so that the cross-sectional configuration thereof progressively diminishes from the rear end to the forward end. The forward end **12** has a small diameter and is substantially blunt. The rear end **14** is blunt and has a diameter substantially larger than that of the forward end **12.**

The body member **20** is to be constructed of any suitable material which may be reasonably soft, deformable and preferably slightly abrasive, as well as partially elastic. The term "partially elastic" means that the material has an elastic memory such that after it is deformed the material will return to 25 to 75 percent of its original configuration. Such materials having these characteristics may include the flexible polyvinyl chlorides; synthetic rubbers such as neoprene; elastomers such as the butadiene styrene copolymers; closed cell foamed materials, particularly foamed polyethylene, foamed polyurethane, and foamed polypropylene; fiber-filled silicones; and fiber-filled nylons.

If the body member **20** is constructed of polyurethane as well as some of the above-mentioned materials, it will inherently include outer surface portions capable of effecting a scrubbing action upon adjacent teeth defining the interdental spaces or interproximal tunnels and thus will remove dental plaque therefrom. However, if the materials utilized in the construction of the body member are not inherently abrasive or not inherently abrasive enough, small quantities of light duty abrasives such as zirconium silicate or flour pumice can be embodied into at least the outer surface portions of the body member **20** as indicated by stippling **16** in FIG. **1.** In addition, the body member **20** can be treated with certain drugs releasable during use to cure, treat or prevent tooth decay or gum disease. Such drugs may include, but need not be limited to sodium fluoride, stannous fluoride, monofluophosphate, hydrogen peroxide, antisceptics, antifungals and antibiotics.

In any event, the material of which the body member **20** is fabricated should be such that it may be reasonably deformed when the device **10** is pushed through interdental spaces or interproximal tunnels so that the opposite sides of the body member will embrace and move along in intimate contact with the opposing tooth surfaces of the passageway. Additionally, the material of which the body member **20** is constructed should also be at least reasonably resilient, i.e., partially elastic, so that one portion of the body member previously compressed to pass through the narrowest portion of the passageway may substantially return to its original shape as wider portions of the associated passageway are traversed in order to contact them also.

The core member **30** preferably has a substantially uniform cross-section throughout its axial length which assures that it can bend in any transverse direction when the device encounters the hard surfaces of teeth or firm healthy gingival tissue as it is pushed through the spaces and tunnels between the teeth. Thus, for example, if the core member **30** is in the form of a wire having a uniform circular cross-section, then the resultant forces exerted by the teeth and healthy gums as the device is moved through the spaces and tunnels will cause that wire to bend. In contrast, if the core member was in the form of a flat sheet of metal, like a leaf spring, it could bend easily if a force were applied against its flat surface but it would not bend at all or it would buckle and be rendered unusable upon an application of great force to its side edges. Thus, a non-uniform cross-section for the core member would create two specific problems avoided by the present invention. First, if the core was non-uniform in cross-section, the user would have to properly orient the device to make it work whereas in the present invention no orientation is required. Second, if the core was non-uniform in cross-section and was misoriented in use, a greater force would be required to bend the core member to enable the device to pass through the spaces or tunnels, and that greater force could be damaging to the teeth or gingival tissue. In contrast, in the present

invention, the core member can be constructed so that it bends upon application of forces resulting from encountering the hard surfaces of the teeth and healthy gingival tissue and those forces can be precalculated to avoid damage to the teeth or gingival tissue of the user.

It is not necessary that the core member be exactly circular in cross-section, nor is it necessary that the cross-sectional area be identical throughout the axial length of the core member. However, the cross-sectional configuration must be substantially circular throughout its length. The term "substantially circular" as used herein in connection with the cross-section of the core member can include a configuration wherein the core member tapers very slightly throughout its length so long as it is bendable in all directions perpendicular to its axial length when the device is pushed through the circuitous tunnels and spaces and encounters the hard surfaces of the teeth or firm, healthy gingival tissue without inflicting damage to those tissues.

Thus the core member **30** should be sufficiently bendable to allow bending of both it and the body member as they both pass through the interdental space or interproximal tunnel, and yet sufficiently stiff axially of its length to reinforce the body member **20** to prevent it from buckling. Also, although the core member is bendable under the above mentioned conditions, it must be sufficiently resistant to bending so that the device will depress or displace edematous gingival tissue which might be partially blocking the entrance to one of the spaces or tunnels.

In this regard, the core member **30** can be constructed of various types of plastics such as polystyrene, metals, and wood having the desired axial stiffness and degree of bending. As mentioned, the core member should be bendable in any direction so that there is no need to or requirement to orient the device as it is being used.

Additionally, the core member can be either a separate structure from the body member, or chemically bound to the body member, as well as integrally formed with the body member and thus represent the inner portion of the body member.

As shown in FIG. **2**, the core member **30** can be located centrally of the body member **20** which encloses it. Additionally, if desired the core member **30** can be ensheathed by the body member **20** in a position so that the axis of the core member is parallel to a plane tangential to the surface of the conical body member **20** or it can be skewed relative to the longitudinal axis of the body member **20.**

As shown in FIGS. **3** and **4**, a second embodiment of the device can have a body member **20'** with a triangular cross-section. Also if desired a handle **18** may be affixed at the rear end **14'** of the device **10** in order to facilitate the grasping of the device by the patient. The forward end **12'** may be sharpened to a point as shown. As shown in FIG. **4** the handle **18** is triangular in cross-section, however, any desired shape and cross-section may be utilized.

Turning now to FIG. **5**, the various relevant portions of the human anatomy with which the present invention relates are shown for a better understanding of the manner of operation of the device of the invention. The lower row of teeth and gingival tissue shown therein are generally designated **40.** Also shown is a portion of a tongue **41**, a portion of the cheek **43**, and a portion of the lower lip **45.** The posterior teeth are designated **42** and the anterior teeth are designated **44.** The spaces between the anterior teeth **44** are the interdental spaces **46.** The spaces between the posterior teeth **42** are the interproximal tunnels **48.** The gingival or gum tissues forming the floor of the spaces **46** and tunnels **48** are designated **50.**

The openings of the spaces **46** between the lower anterior teeth adjacent the lip **45** are known as the labial openings and are designated **52.**

The openings of the spaces **46** between the lower anterior teeth adjacent the tongue **41** are known as the lingual openings and are designated **53.**

The openings of the tunnels **48** between the lower posterior teeth adjacent the cheek **43** are known as the buccal openings and are designated **54.**

The openings of the tunnels **48** between the lower posterior teeth adjacent the tongue are known as the lingual openings and are designated **53.**

As seen in FIG. **9**, the proximal contact area of anterior teeth is designated **58.** As seen in FIG. **13**, the proximal contact area of posterior teeth is designated **60.**

In use, the goal of the present invention is to clean dental plaque from the walls of adjacent teeth and gums (both anterior and posterior), remove food debris from the spaces and tunnels between teeth, and also stimulate the gingival tissue which forms the floor of the passageway between adjacent teeth. It may be noted here that the present invention is related to suprabony gingival tissue and is not necessarily intended to be used for infrabony tissue stimulation. Additionally, the device is capable of use in both healthy and pathological conditions and in situations of malaligned and correctly aligned teeth.

FIG. **6** shows two adjacent anterior teeth **44** viewed from the labial side and illustrates the anatomical relationship of the teeth and the gums in a view somewhat larger than FIG. **5.** For purposes of illustration, the gingival tissue **50** is assumed to be normal and healthy and therefore not swollen or edematous. If the gingival tissue was swollen the labial opening to the interdental space might be partially blocked.

Referring now to FIGS. **7**, **8** and **9**, the use of the present invention will be described in relation to the two anterior teeth **44** present in an adult human's mouth shown in FIG. **6.** These anterior teeth **44** are usually characterized by being reaonably close together, having usually narrow interdental spaces **46** and having fairly smooth walls which define the interdental spaces therebetween in conjunction with the gingival tissue **50.** The gingival tissue **50** usually has a nonplanar surface. In order to penetrate this narrow interdental space the instant device is provided with a substantially pointed forward end **12** which is to enter the labial opening **52** to the interdental space **46.**

Thus, in use, the patient grasps the rear end **14** or the handle **18** of the device **10** and maneuvers the forward end **12** into the labial opening **52.** Then the patient passes the forward end **12** and a substantial portion of the device **10** through the interdental space **46** until the forward end **12** exits through the lingual opening **53** and the device **10** completely fills the space **46** with the surface of the body member coming into intimate contact with its walls as shown in FIG. **8.** This traversal of the interdental space removes any food debris therein from the space and its walls and deposits the debris in the mouth distant from the teeth and gums. Be-

cause of the tapered configuration and deformable properities of the body member **20,** the outer abrasive surface of the body member conforms to and rubs against the lateral sides of the adjacent teeth as shown in FIG. **8.** This rubbing action of the device on its way through the space removes the plaque from adjacent teeth and gums. Since the body member is tapered, all of the surface area of the sides of the teeth are contacted and cleaned although the size of the space may vary.

Furthermore, if the device encounters swollen or edematous suprabony gingival tissue blocking the labial or lingual openings to the interdental spaces, the core member **30** allows the device to depress or displace the swollen tissue and enter the interdental space due to the resistance to bending of the core member when the device encounters such tissue. Although the device is described above as passing from the labial opening to the lingual opening, this procedure can be reversed, if desired or needed.

One added advantage of the present invention is that it is not limited to use in the interdental spaces of the anterior teeth or in healthy gingival conditions, but can also be utilized in the interproximal tunnels of the posterior teeth and in pathological gingival conditions.

In this regard, FIG. **10** shows two adjacent posterior teeth **42** and the interproximal tunnel **48** viewed from the buccal side and illustrates the anatomical relationships of the teeth and the gums in a view somewhat larger than FIG. **5.** For purposes of illustration, the gingival tissue **49** is assumed to be swollen or edematous and therefore not normal and healthy. In this situation the buccal opening **54** is partially blocked by the edematous suprabony gingival tissue **49** and must be depressed out of the way by the device **10** as it is maneuvered into the tunnel, as will be described hereinafter. Of course, the device **10** could also be used on posterior teeth in healthy conditions as well as will be described hereinafter.

As shown in FIGS. **10, 11, 12** and **13,** the overall passageway between adjacent teeth in the posterior portion of the mouth has a somewhat different configuration than that of the anterior portions. These passagways are rather tortuous due to the nonplanar, convex and concave walls of the adjacent posterior teeth. This taken in conjunction with the nonplanar and often convex, concave, or convex-concave configuration of the suprabony gingival tissue between posterior teeth, provides a rather circuitous route for the device **10** to follow in order to clean all of the surfaces of the adjacent teeth and gingival tissue, and gently stimulate the gingival tissue.

In using the device **10** in the interproximal tunnels of the posterior teeth under pathological conditions, first the pointed forward end **12** is maneuvered by the patient towards the top of the swollen edematous gingival tissue **49** to depress it downwardly out of its blocking position. The reason the tissue can be depressed or displaced is that the core member contained in the body member has sufficient resistance to bending on encountering this type of tissue as described above. Next, the pointed end **12** is moved into the unblocked buccal opening, through the interproximal tunnel and out the lingual opening **53** until the device completely fills the tunnel **48** with the surface of the body member coming into intimate contact with its walls as shown in FIGS. **12** and **13.** This movement removes any food debris in the tunnel and deposits it into the mouth distant from the teeth and gums. The depressed or displaced gingival tissue **49** is shown specifically in FIG. **13.**

Since the body member **20** is tapered and deformable, it is deformed to and contacts all of the surfaces of the adjacent teeth **42** as it passes through the tunnel therebetween. It thereby cleans all of the surfaces of the adjacent teeth and gingival tissue of plaque. Also, since the core member **30** is bendable in all directions laterally of its length, the body member can follow the circuitous route through the tunnel as shown in FIG. **12** and since it is axially stiff the device will resist buckling along its longitudinal axis.

As stated above, the material of the body member **20** can be partially elastic. This allows the body member to expand slightly after it encounters a reasonably narrow cross-section of the interproximal tunnel and therefore contact the surfaces of the teeth which are located past the narrowest point in the tunnel. This is illustrated in FIG. **12.**

FIG. **14** shows a side view of posterior tooth **42** with a commonly encountered nonplanar healthy, gingival architecture in which the gingival tissue **50** below the buccal opening **54** is closer to the tooth root tip **62** than the gingival tissue **50** below the lingual opening **53.** Furthermore, the contact area **60** is so broad that it begins to approach the gingival tissue. In use, as the device is pushed through this posterior tortuous tunnel **48,** it passes below the contact area **60** and then is bent towards the crown **63** of the tooth and away from the root tip **62** by the firm, healthy gingival tissue **50.** This is accomplished because the core member **30** is sufficiently bendable in all directions perpendicular to the device's longitudinal axis. In this manner, the device cleans all of the surfaces defining the interproximal tunnel in a healthy condition.

Although the device has been described as first entering the buccal opening of posterior teeth and then exiting through the lingual opening, this can be reversed, if desired or needed.

Also, although the device has been described in conjunction with the lower jaw and teeth, it can readily be used for the upper jaw and teeth as well.

Since the body member **20** is deformable and since the core member **30** is sufficiently bendable in all directions lateral to its length, the present invention can readily be used for correctly aligned as well as malaligned dental formations.

While two advantageous embodiments have been chosen to illustrate the invention, it will be understood by those skilled in the art that various changes and modifications can be made therein without departing from the scope of the invention as defined in the appended claims.

What is claimed is:

1. A periodontal and dental cleaning and periodontal stimulating device comprising:

an elongated body member having a forward end and a rear end, said body member being tapered in configuration from its rear end toward its forward end so that the cross-sectional configuration thereof progressively diminishes from said rear end to said forward end; and

a core member disposed within said body member and extending substantially from said rear end thereof substantially to said forward end thereof;

said core member being enclosed within and ensheathed by said body member;

said core member being substantially circular in cross-section throughout its length;

said device being adapted for insertion into and partially through the interdental spaces of a human's anterior teeth and into and partially through the tortuous interproximal tunnels of a human's posterior teeth;

said body member having sufficient length between its forward and rear ends to permit the forward end thereof to enter the entrance openings of said interdental spaces and tortuous interproximal tunnels, pass through said spaces and tunnels, and exit through the exit openings of said spaces and tunnels before the rear end thereof reaches said entrance openings;

said body member being fabricated of a material which is deformable to enable said body member to conform to the configuration of said spaces and tunnels, as such configuration is defined and formed between the lateral walls of adjacent teeth and the incisal and occlusal contact area limits and the gingival tissue;

said core member being fabricated of a material which is generally stiff axially of its length to prevent pressure at the forward end of said body member from buckling said device, yet which material is bendable in all directions by forces applied by the surfaces of the teeth and healthy gum tissue laterally to said core member to enable said core member, and the body member ensheathing it, to pass through said interdental spaces and interproximal tortuous tunnels without damaging the gingival tissue present therein and yet sufficiently resistant to bending in all directions laterally to said core member to depress edematous gingival tissue.

2. A device according to claim **1**, wherein said body member is formed from a partially elastic material so that on being deformed by the narrowest cross-sectional area of the interdental spaces or interproximal tunnels it will subsequently expand to conform to larger cross-sectional areas of the interdental spaces and interproximal tunnels on encountering them.

3. A device according to claim **1**, wherein said body member is conical in shape.

4. A device according to claim **1**, wherein said body member is triangular in cross-section.

5. A device according to claim **1**, wherein said core member is a rod having a uniform cross-section.

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