This invention relates to new and useful improvements in the dental art and more particularly to an improvement in the structure of certain prosthetic dental devices such as clasps and various sorts of attachments.

In the operations of reconstructive prosthetic dentistry it is frequently necessary to replace missing teeth by means of movable and removable bridges or dentures. In these, clasps or various types of tooth attachments are frequently employed.

Clasps are partial band-like appliances adapted to the natural teeth for retaining in the mouth the partial denture or bridge of which they form a part and whose existence also aid in giving stability to the replacement. They are usually cast in the shape of a half round wire but they may also be constructed from strips of half round or full round wire or even flat plate.

When half round wire is used the flat side is generally the side lying on the tooth surface. In this description that surface of the clasp touching or lying on any surface of the tooth is generally referred to as the "tooth facing surface."

The proper distribution of such clasps and/or attachments gives a well-seated comfortable restoration with evenly divided forces of stress or strain throughout the mouth. These clasps or other attachments also serve as guides for the accurate reseating of the bridge or denture after it is removed, as for cleaning.

Their use cannot be disputed but the disadvantages stemming from their application give rise to much concern. A clasped tooth often suffers. Caries frequently starts below the clasp, often before the patient is made aware of the situation and the degree of decay can be such as to undermine the tooth and even cause its loss.

To obviate somewhat the conditions that will cause decay around a clasp, the clasp itself has been made thinner and narrower and to try to guard against destruction of good teeth members, the number of clasps employed for retention purposes on the restoration is kept to a minimum. Thus, where for ideal stability, the denture or bridge should perhaps be held by clasps on several teeth, the tendency is strong to put the burden of holding the whole structure on fewer teeth than good judgment dictates so as not to encourage decay in several areas.

Certainly, placing on one or two teeth the burden of carrying a force that were better distributed among several teeth is an alternative fraught with its own risk of endangers the tooth or teeth taxed. Thus, it almost becomes a question of sacrificing an abutted tooth to the ill effects of unusual and concentrated strain and pressures or running the risk of decay in several other teeth which could ease the situation if they were encircled by clasps.

In some mouths, very susceptible to decay, when a decision on replacement must be made, the fixed bridge is often selected even when a removable bridge might be more desirable, from a health standpoint and for sanitary reasons. The less desirable replacement is chosen because experience shows that in such a mouth, teeth used for abutments or holding the removable bridge might soon become the scene of rampant decay.

It is an object of this invention to provide a clasp which will have the tendency and means to prevent decay in the tooth surface embraced by the clasp, and adjacent to it.

Another object of this invention is to provide a clasp which will stimulate and encourage the better practice of distributing the forces of mastication to as many abutting teeth as the need warrants.

Still another object of this invention is to enable the dental profession to construct removable dentures in any case necessary, regardless of a condition of rampant decay that may be afflicting the patient.

This invention comprises the production of an immovable area on the tooth surfacecontacted by the clasp by means of a chemical carried by the clasp and held against the susceptible tooth surface.

The immunizing chemicals are employed, such as sodium or stannous fluoride or any of the other effective salts of fluoride—or any other fluoride which provides the nonvain F— ion upon the ionization of the said fluoride in a solution. Such fluoride may be added in concentration from 1/2% to 30%, to a temporary or permanent cement, which can be silicate or copper cement or the like. Or—the fluoride may be dissolved in gutta percha or temporary dental stopping, or even added to the silver amalgam mix. It may also be incorporated in a synthetic resin or cellulosic or any other substance which is minutely soluble in mouth fluids. Tyrothricin from 0.5 to 10% is another of the many anti-decay factors that may be used in the cement or plastic compound, to be employed with the clasp.

Some of the silver salts such as silver chloride or silver nitrate and the salts of copper, such as copper oxide, may be utilized, also.

Other objects, advantages, and features of this invention will become apparent from the following description read in connection with the accompanying drawings:

Figure 1 is a cross section of a clasp wire positioned on the buccal of a tooth.

Figure 2 is a cross section of another clasp wire.

Figure 3 is a cross section of another clasp wire.

Figure 4 is a cross section of still another type of clasp wire.

Figure 5 is a view of a small length of clasp wire.

Figure 6 is still another modification of a clasp wire.

Figure 7 is still another modification of a clasp wire.

Figure 8 is yet another modification.

A more detailed description will now be given. Similar numerals indicate similar structural portions on the various figures of the drawings.

Referring now to Figure 1. At 2 is an outline of the buccal aspects of a bicuspid against which rests a cross sectioned clasp 3. Clasps are usually made of metal such as stainless steel, alloys of gold and platinum or gold, nickel and platinum, or gold and palladium, or gold and iridium, or any combinations of metals such as will yield, or a strong, springy metal with resistance to tarnishing or breaking. At 4 is a cavity in the metal filled with a cement, 6, containing an anti-decay material such as sodium fluoride or stannous fluoride or any combination of anti-decay drugs in a percentage to effectively prevent decay on the area contacted.

The cavity 4 is shaped to offer retention to a cement plug as can be seen at the undercuts 5 and 8. Since the cement or other medium which carry the decay retarding drug are slightly soluble in mouth fluids, their presence in the tooth-facing surface of the clasp, assures
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3 a constant flow of dissolved, decay-preventing medication in the critical areas.

Where the fluoride salts are used, the tooth surface contacting the treated clasp area finally may become entirely immune to decay. Thus, even if all the medication is later washed out or used up, that area now becomes practically decay free indefinitely.

Where it is felt that complete immunity has not yet been conferred and all the medicated cement 6 is washed out of the area 4, such cement can be easily replaced. This process may be repeated as frequently as necessary. If the tooth becomes entirely immune and further medication is no longer indicated, the cavity 4 in the clasp may be filled with a permanent material, such as an amalgam. Even solder can be inserted.

In Figure 2 a round wire clasp 3 has just a small indentation 4 for receiving a cement medicament. It being calculated that by the time such small amount is completely washed out, immunity to decay would be established. When the dentist feels that the area treated is definitely immune, he can polish out the indentation to leave a smooth surface.

In Figure 3, a round wire clasp has a channel-like cavity 4 which holds a considerable amount of medicament 6 where very prolonged action is desirable. The side 7 of the clasp is the tooth facing side. A medicament of choice can be replaced whenever it is deemed necessary. Should the tooth become entirely immune to decay, the clasp band 3 can be pinched together so that points 17 and 18 touch, thus closing the channel against the entrance of particles.

In Figure 4 a round wire clasp 3 has a slight coating 6 of a medicated cement on its tooth-facing structure. This coating is thickest at 11, the actual point of contact with the tooth. The area on the clasp that is to be coated may be slightly roughened to facilitate the adherence of the coating.

Figure 5 is a sectional elevation showing a short length of clasp wire 14. At 3 is one of the ends of the wire in which there is a channel 4 for receiving the medicament. At 20 it can be seen that the channel traverses the entire length of the wire so that the medicament is in contact with tooth structure throughout its length.

In Figure 6 another modification of a clasp 3 is seen where the medicament is present in small, spaced areas 4. Since the spreading action of some anti-caries drugs often serves to immunize the entire tooth, only one or just a few of these islands, 4, may service the entire tooth.

In Figure 7 the clasp is the same type exactly as the clasp in Figure 3 with the exception that the cavity 4 of the clasp is filled not with the cement previously illustrated but with a medicament in a plastic resin base, designated at 16. Preferred is one of the slightly soluble plastics such as methyl methacrylate, Celluloid, styrene, or any thermoplastic resin. Into these can be incorporated a much larger percentage of active antidecay drug, such as sodium fluoride, for example, which can be employed in percentages of up to 30% and will then give anti-caries effect over an extended period of time.

In Figure 8 a wide band clasp 3 is employed and there are two channels 4 and 4' for carrying the medicament. On very long teeth a wide band is desirable. Such a band can harbor three or four or any number of channels. Where there is a multiplicity of channels, different medicaments can be carried, each to act on a separate portion of the tooth facing the clasp as conditions indicate.

While I have described my invention in accordance with desirable embodiments, it is obvious that many changes may be made in the details of construction and in the combination of parts and materials, without departing from the spirit of the invention as defined in the following claims.

I claim:

1. In the art of prosthetic dentistry, a clasp for anchoring a bridge or partial plate to a natural tooth, said clasp coated on its tooth-facing surface with slowly dissolving caries-preventing medicament for caries prevention in said natural tooth.

2. In the art of prosthetic dentistry, a clasp for anchoring a bridge or partial plate to a natural tooth, said clasp carrying in a groove in its tooth-facing surface, slowly soluble medicated cement with anti-caries properties.

3. In the art of prosthetic dentistry, a clasp for anchoring a bridge or partial plate to a natural tooth, said clasp carrying in a groove in its tooth-facing surface, slowly soluble medicated cement with anti-caries properties.

4. In the art of prosthetic dentistry, a clasp for anchoring a bridge or partial plate to a natural tooth, said clasp carrying on part of its tooth-facing surface a coating of slowly dissolving caries-preventing material for application to the tooth area so treated.

5. In the art of prosthetic dentistry, a clasp for anchoring a bridge or partial plate to a natural tooth, said clasp being formed of round wire having a small indentation containing a slowly dissolving caries-preventing medicament, said indentation being small enough to be eliminated by a polishing action.

6. A dental clasp made of wire, said clasp being C-shaped in cross section to provide a channel-like cavity, said cavity containing a slowly soluble medicated cement with anti-caries properties, the edges of said channel-shaped clasp being adapted to be pinched together to close said channel.

7. A dental clasp formed of round wire having a generally circular cross section, said clasp having a coating of a slowly-soluble medicated cement with anti-caries properties on its tooth-facing structure, said coating being thickest at the actual point of contact with the teeth, the coated area of said clasp being slightly roughened to facilitate adherence of said coating.

8. A dental clasp comprising a short length of wire of circular cross section having a longitudinal channel extending the entire length of the wire and filled with slowly soluble medicated cement with anti-caries properties which may contact tooth structure throughout its length.

9. A dental clasp for very long teeth and comprising a wide band having a plurality of longitudinal channels therein, said channels being filled, respectively, with different medicaments, each to act on a separate portion of the tooth facing the clasp, said medicaments being slowly soluble with anti-caries properties.

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