April 29, 1952 B. F. TOFFLEMIRE 2,594,367

GINGIVAL-APERTURE DENTAL MATRIX BAND

Filed Dec. 12, 1950

Fig. 4.

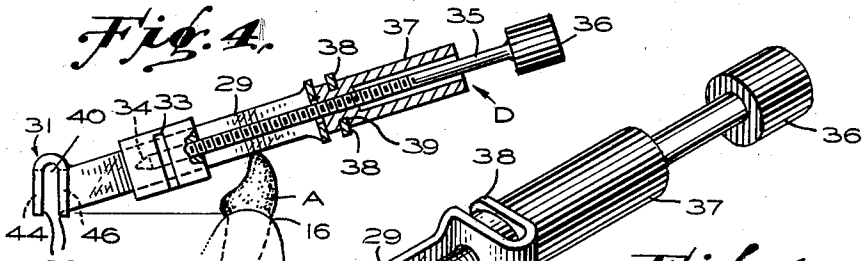


Fig. 1.

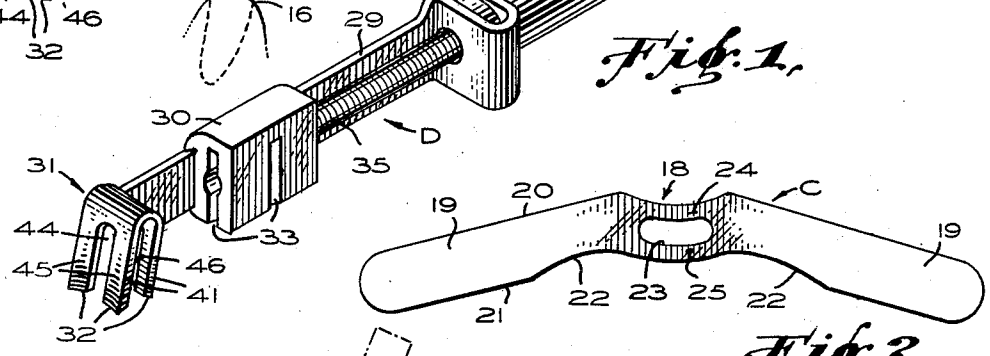


Fig. 2.

Fig. 3.

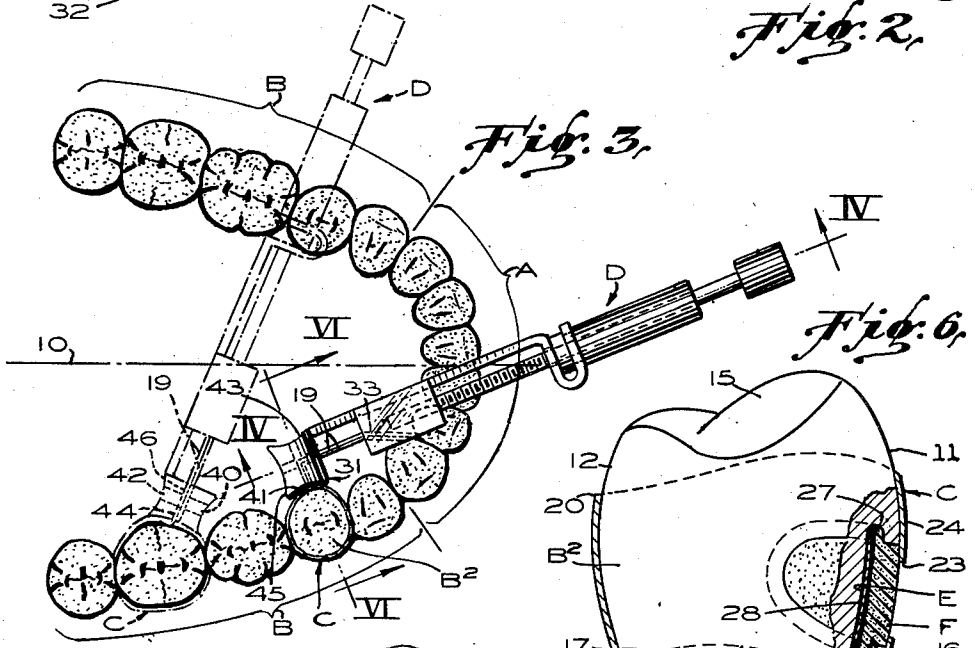
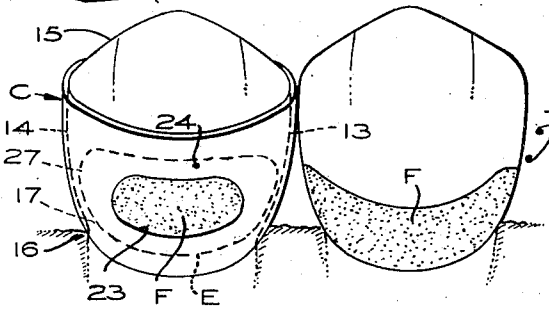


Fig. 6.

Fig. 5.



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GINGIVAL-APERTURE DENTAL MATRIX BAND

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4 Claims. (Cl. 32—63)

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The present invention relates to a gingival-aperture dental matrix band. It consists of the constructions of the band as hereinafter described and claimed.

An object of this invention is to provide a dental matrix band, which is adapted to be looped around an axial contour of a tooth to be restored, this band having an aperture fashioned therein through which filling material may be inserted into a gingival cavity of the banded tooth.

It is a well-known rule of dentistry that cavities in the teeth take the name of the surfaces in which they occur. Those occurring in the buccal (toward the cheek) surfaces of bicuspids and molars (posterior teeth) are called "buccal" cavities. In a like manner, cavities in the lingual (tongue-side) surfaces of bicuspids and molars are known as "lingual" cavities; they are not frequent. The term "gingival" (gum), as used herein, referes to cavities on either the buccal or lingual aspects of the tooth, which are situated near the gum border.

These gingival cavities are very apt to occur adjacent to and often extend below the gum borders; accordingly, they are difficult to prepare and fill. Although my bands find their greater use when restoring buccal cavities, nevertheless they may be employed when filling lingual cavities.

Briefly stated, my improved bands are designed for: (*a*) retraction of the gingival (gum) tissues from the confines of the prepared cavity; (*b*) confinement of sterilizing medicament to the area of the cavity; (*c*) prevention of blood, mucous and salivary seepage into the prepared cavity, thereby making possible the application of an intermediate cement base; (*d*) prevention of the plastic filling material from extruding beyond the cavity border on the gingival floor; (*e*) prevention of "land-sliding" of the alloy during packing and condensing, both gingivally and interproximally (between the teeth); (*f*) the aperture in the band provides a "window" for giving visibility when checking the sub-gingival adaptation of the band prior to filling; (*g*) the aperture serves as a surgical draping of the operative field; and (*h*) the area of the filling within the outline of the aperture constitutes the only part of the filling that requires final finishing.

An additional object of the present invention is the provision of a gingival aperture, which is superimposed over the prepared cavity along the gum-line of a tooth in such a manner that the gingival border of the form fitting band extends subgingivally, beyond the margin of the cavity, as well as occlusally beyond the coronal or occlusal

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margin of the cavity; permitting the insertion of the plastic alloy through the aperture by means of a small-nozzle conveyor, and the thorough condensation of the plastic alloy from within the enveloping peripheral "side-board-walls" of the aperture. Suitably-shaped pluggers and condensers are inserted through the aperture, and directed in all necessary angles and directions in order to thoroughly condense the alloy into all retention areas. The surrounding walls of the enveloping aperture provide a firm support for the plastic material, preventing the "land-sliding" of the material in cavities that extend around the interproximal areas, beyond the summit of convexity of the tooth, as so often happens in this type of restoration. The surrounding aperture of the band thereby converts an annular-shaped, complex, gum line cavity into "four-walled" simple cavity—an achievement not hitherto possible in dealing with this particularly difficult cavity.

Other objects and advantages will appear as the specification continues. The novel features of the invention will be set forth in the claims hereunto appended.

Drawing

For a better understanding of the invention, reference should be had to the accompanying accompanying drawing, forming part of this application, in which:

Figure 1 is an isometric view of an improved retainer adapted for securing my dental matrix band around a tooth;

Figure 2 is a face view of one of my bands;

Figure 3 is an occlusal view of the lower quadrants, illustrating my band applied around the right second bicuspid, and held in place by my retainer;

Figure 4 is an elevational view of the retainer, taken along the plane IV—IV of Figure 3, parts being shown in section;

Figure 5 is a buccal view of the banded tooth in Figure 3, and further disclosing a restored lower right first bicuspid; and

Figure 6 is a bucco-lingual sectional view taken along the plane VI—VI of Figure 3.

While I have shown only the preferred form of my invention, it should be understood that various changes, or modifications, may be made within the scope of the annexed claims without departing from the spirit thereof.

Detailed description

Referring to Figure 3 of the drawing, it will be noted that the teeth in the lower quadrants are illustrated therein. The anterior (front) teeth A

include central incisors, lateral incisors and cuspids, respectively, starting at the mesial plane 10 of the body and advancing toward the outer ends of the quadrants. The posterior (back) teeth B include the first bicuspids, second bicuspids, first molars, second molars, and third molars or wisdom teeth.

The tooth B^2 in Figure 3, which has been encircled by my improved dental matrix band C (full-line illustration), is a lower right second bicuspid. This band is held in place by my retainer D, which forms the subject matter of a copending application, Serial No. 205,143, filed in the United States Patent Office on January 9, 1951.

The following anatomical parts of the second bicuspid B^2 are identified as follows (see Figures 5 and 6): 11—buccal surface (toward the cheek); 12—lingual surface (tongue-side); 13—mesial surface (toward the mesial plane); 14—distal surface (remote or away from the mesial plane); 15—occlusal (grinding) surface; and 16—gingival (gum) border.

It will be apparent from Figure 5 that the mesial and distal surfaces 13 and 14, respectively, have a decided pitch, flaring outwardly from the neck 17 of the bicuspid to the occlusal surface 15. In Figure 6, the buccal and lingual surfaces 11 and 12, respectively, have a moderate or slight upward flare. Human teeth are not round in cross section, but are characterized by a decided mesio-distal flattening or constriction at the interproximal (between the teeth) gingival curvature or border 16. Both molars and bicuspids have this mesio-distal constriction in common.

Turning now to the details of my matrix band C, Figure 2 illustrates a flattened-out view of this flexible band. In its structural features, an arcuate central portion 18 has arms 19 projecting outwardly therefrom in diverging relation with one another. The occlusal-facing and gingival-facing edges, respectively, of the band are designated at 20 and 21. It will be noted that the central portion 18 is concaved and convexed on its occlusal-facing and gingival-facing edges, respectively, while the arms 19 are straight. The gingival-facing edges 21 are undercut, as at 22, so as to follow the gingival borders 16 of a banded tooth in the interproximal areas. An elongated gingival aperture 23 pierces the arcuate central portion 18. The band is substantially uniform in width throughout its entire length.

As shown in Figures 5 and 6, a bucco-gingival cavity E has been prepared in the bicuspid B^2, and my dental matrix band C applied thereover. The aperture 23 of the band registers with this cavity, but is somewhat smaller so that an encapsulating section 24 of the band will be disposed occlusally above the cavity. A gingival section of the band provides a sub-gingival extension 25 that projects below the free gingival tissues 26 when the band is looped around the tooth.

The prepared buccal cavity E shows axial retention locks 27 at the base of this cavity so as to retain a filling F therein. The material for the filling may be of any suitable type, for instance amalgam. An intermediate cement base 28 may be inserted into the cavity before the filling material is introduced.

Briefly described, the retainer D includes a bar-like frame 29 on which a matrix-clamping block 30 is slidably mounted. This frame has a head 31 at its forward end which defines four parallel and spaced-apart fingers 32. The arms

19 of the matrix band are adapted to be introduced edgewise into a diagonally-extending slot 33 formed in the block 30, and clamped thereto by the pointed end 34 of a spindle 35 that is threaded into the block (see Figure 4). This spindle is rotated by an operating knob 36.

A rotatable internally-threaded sleeve 37 is held against endwise movement relative to the frame 29. This is accomplished by a pair of fingers 38 that project into an annular groove 39 formed in the sleeve 37. When the sleeve is turned, the spindle 35 and clamping block 30 are advanced or retracted relative to the head 31.

In the full-line illustrations of the retainer D in Figure 3, the arms 19 of the band extend through a lateral slot 40 defined between a lateral pair of the fingers 32. It will be observed that the lateral edges of these two fingers are concaved, as at 41 (see Figure 1) for fitting up against the lingual or buccal surfaces of the banded tooth, and to follow the tooth contour when the band is drawn into place. This full-line showing of the retainer in Figure 3 may be referred to as a "lateral hook-up."

It is quite apparent that when the band and retainer are used in conjunction with posterior teeth B of the left quadrant in Figure 3, the band ends 19 may be guided through a lateral slot 42 provided between another set of the lateral fingers 32 (see dot-dash line disclosure). These fingers have concaved edges 43 shaped to conform with the lingual or buccal surfaces of the tooth against which they are to be drawn.

The dot-dash line illustration in Figure 3 shows an "end hook-up," with the retainer being directed across the mouth. In this case, the arms 19 of the matrix band are guided through a front slot 44 defined between the forward pair of fingers 32. The latter have concaved faces 45 shaped to conform to the surface of the tooth upon which the matrix band is applied. With either a "lateral" or an "end hook up," the arms 19 of the matrix band extend through a rear slot 46, the latter being provided between the rearmost guide fingers.

It will be noted from Figures 1 and 4 that the length of the guide fingers 32 are inclined with respect to the length of the bar-like frame 29. This angular arrangement will permit the fingers of the retainer to remain parallel with the long axis of the tooth, while the retainer itself is permitted to extend upwardly to clear the incisal edges of the anterior teeth A, as shown in Figure 4. When using an "end hook-up," as in the dot-dash line illustration in Figure 3, the inclined arrangement of the fingers 32 will allow concaved edges of the latter to adapt themselves to the lingual contour of the tooth, while the retainer clears the tongue and the occlusal surfaces of the teeth B on the opposite side of the mouth.

In either case, it will be noticed that I have made provision for the portion of the head 31 fitting up against the lingual surface of the banded tooth, following the contour of the latter.

While most of these difficult gum-line cavities occur on the bucco-gingival aspect 11, they do occur on the lingual surface 12. The aperture side of the band C, in such a case, simply is placed on the lingual side of the tooth and the retainer D applied from the buccal, or a "reverse-position" to the ones shown in the drawings.

Inasmuch as the matrix band C is substantially uniform in width throughout its entire length, the arms 19 have great strength, and are

firmly gripped in the diagonal slot 33 and guided by the fingers 32. This provision prevents "rotation" of the band during heavy packing and condensation of the metal during the filling operation.

Summary of operation

Assuming that the bucco-gingival cavity E on the lower right second bicuspid B^2 is to be filled, this cavity is prepared by the dentist in the usual way, including the axial retention locks 27.

After the cavity has been completed, the matrix band C is looped, with the arms 19 thereof arranged parallel and in abutting relation with respect to one another. Thereupon, the end portions of these arms are inserted edgewise into the diagonal slot 33 of the block 30. The intermediate portions of the arms are inserted through the rear slot 46 and the lateral slot 49, these slots being defined by the guide fingers 32.

Next, the operating knob 35 is turned so as to advance the spindle 35 until the pointed end 34 of the latter clamps the arms 19 of the band to the block 30. Now the dentist telescopes the looped part of the band downwardly over the tooth B^2 until the sub-gingival extension 25 is inserted into the tooth socket below the free gingival (gum) tissues 26, as shown in Figure 6 of the drawing.

At this time, the sleeve 37 is rotated so as to retract the block 30 away from the head 31, until the band snugly embraces the entire axial contour of the banded tooth. This will result in bringing the concaved edges 41 of the fingers up against the band. The bar-like frame 29 of the retainer will extend upwardly at an angle so as to clear the incisal edges of the anterior teeth A, as shown in Figure 4.

The aperture 23 in the band provides a "window" for giving visibility in checking the sub-gingival adaptation of the band prior to filling. Moreover, this aperture serves as a surgical draping of the operative field. In placing the aperture over the prepared cavity, it provides an opening through which the plastic filling material of the filling F may be inserted and condensed. The surrounding metal of the band prevents extrusion of the filling material. The filling is condensed with suitable pluggers, which may be inserted through the aperture and directed in every direction until the restoration is completed to the required anatomical contour.

The aperture 23 converts a complex curved gingival cavity into a simple cavity. The metal band provides a form and contour of the filling beneath the peripheral outline of aperture. The area of the filling within the confines of the aperture is the only part of the filling that requires final finishing.

Gingival overhanging excesses of filling material is avoided, and "land-sliding" of the plastic alloy is prevented. The matrix band provides a peripheral metallic seal, preventing the folding-in of the gum tissues, and the escape of any sterilizing agent used in asepticizing the cavity prior to placing the filling. Moreover, it precludes seepage of any blood, mucous, or saliva into the cavity. The cavity may be kept dry, and this will permit an intermediate cement base 28 to be used.

The aperture, moreover, provides an unobstructed field of operation, corresponding comparably to the "surgical-draping" of the field of operation in abdominal surgery; and, in a similar manner, the operation is conducted through the aperture thus made.

Again, the peripheral band of metal provided by the superimposition of the aperture over the gingival cavity, provides a smooth, metallic-guide for early trimming of the area of the filling within the aperture. The trimming instrument is placed against the aperture band and the central contour of the freshly condensed alloy is evenly and smoothly formed, in a manner similar to the drawing of a line with a ruler as the guide.

Since the retainer is applied from the lingual aspect on the bucco-gingival restorations, interproximal wedges may be applied mesially and distally to the aperture, thereby positively preventing any bulging or springing of the narrow band of the aperture, and will assure the operator of a positive sub-gingival seal against seepage of fluids or the extrusion of metal in packing.

It will also be apparent that the aperture 23 of the band C may be utilized as a shield for the protection of the non-involved area of the tooth where the new air-abrasive cavity-preparation equipment is used. In such a case, the sand-blast will be directed through the aperture to prepare the cavity to be filled, leaving the remainder of the tooth unabraded. A band with a smaller aperture then may be used.

I claim:

1. In a dental matrix band: a strip of material adapted to be looped around a tooth in embracing relation with the axial contour thereof; the strip providing arms adapted for attachment to a matrix retainer; this strip, when thus looped, presenting an exterior surface on its looped portion facing away from the tooth; this portion having an aperture therein piercing the strip through which a filling may be inserted into a tooth cavity communicating with the aperture; this aperture having an entrance end defining an unobstructed rim, which is disposed flush with the exterior surface of the strip; the aperture being sufficiently large to give a clear view therethrough for checking the adaptation of the strip to the tooth, and being dimensioned for accommodating pluggers for unobstructed condensing of the filling in any direction within the tooth cavity; this rim of the aperture providing a smooth guide for an instrument in trimming the area of the filling within the aperture.

2. In a dental matrix band; a strip of material adapted to be looped around a tooth in embracing relation with the axial contour thereof; the strip providing arms adapted for attachment to a matrix retainer; this strip, when thus looped, presenting an exterior surface on its looped portion facing away from the tooth; this portion having an aperture therein piercing the strip through which a filling may be inserted into a tooth cavity communicating with the aperture; this aperture having an entrance end defining an unobstructed rim, which is disposed flush with the exterior surface of the strip; the aperture being sufficiently large to give a clear view therethrough for checking the adaptation of the strip to the tooth, and being dimensioned for accommodating pluggers for unobstructed condensing of the filling in any direction within the tooth cavity; this rim of the aperture providing a smooth guide for an instrument in trimming the area of the filling within the aperture; the strip having occlusal-facing and gingival-facing edges; the central part of the strip being concaved and

convexed on its occlusal-facing and gingival-facing edges, respectively; the convexed part providing a sub-gingival extension adapted to be inserted between free marginal gum tissues of the patient and the tooth when the strip is applied around the tooth.

3. In a dental matrix band; a strip of material adapted to be looped around a tooth in embracing relation with the axial contour thereof; the strip providing arms adapted for attachment to a matrix retainer; this strip, when thus looped, presenting an exterior surface on its looped portion facing away from the tooth; this portion having an aperture therein piercing the strip through which a filling may be inserted into a tooth cavity communicating with the aperture; this aperture having an entrance end defining an unobstructed rim, which is disposed flush with the exterior surface of the strip; the aperture being sufficiently large to give a clear view therethrough for checking the adaptation of the strip to the tooth, and being dimensioned for accommodating pluggers for unobstructed condensing of the filling in any direction within the tooth cavity; this rim of the aperture providing a smooth guide for an instrument in trimming the area of the filling within the aperture; the strip having occlusal-facing and gingival-facing edges; the central part of the strip being concaved and convexed on its occlusal-facing and gingival-facing edges, respectively; the convexed part providing a sub-gingival extension adapted to be inserted between free marginal gum tissues of the patient and the tooth when the strip is applied around the tooth; the central part of the strip further providing an encapsulating section adapted to be disposed occlusally above the aperture, and extending toward the gingival border over a portion of the tooth cavity.

4. In a dental matrix band: a strip of material

adapted to be looped around a tooth in embracing relation with the axial contour thereof; the strip providing arms adapted for attachment to a matrix retainer; this strip, when thus looped, presenting an exterior surface on its looped portion facing away from the tooth; this portion having an aperture therein piercing the strip through which a filling may be inserted into a tooth cavity communicating with the aperture; this aperture having an entrance end defining an unobstructed rim, which is disposed flush with the exterior surface of the strip; the aperture being sufficiently large to give a clear view therethrough for checking the adaptation of the strip to the tooth, and being dimensioned for accommodating pluggers for unobstructed condensing of the filling in any direction within the tooth cavity; this rim of the aperture providing a smooth guide for an instrument in trimming the area of the filling within the aperture; the aperture being elongated in a mesio-distal direction to extend toward the interproximal areas of the banded tooth.

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