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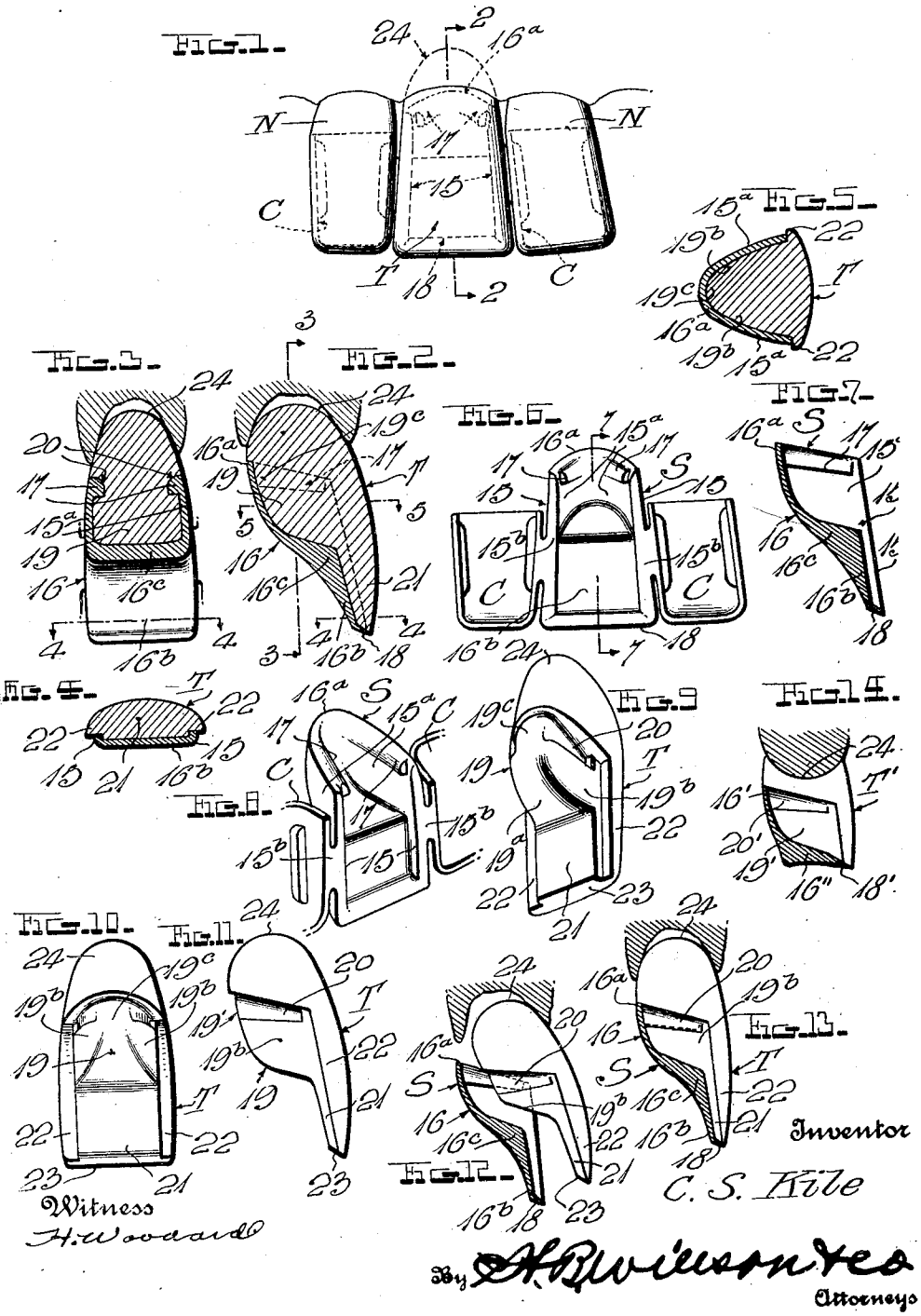

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UNITED STATES PATENT OFFICE.

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DENTAL BRIDGE.

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The invention relates to an improved dental bridge for mounting either a root stump tooth or a saddle tooth of proper design at any point needed in either the upper or lower set of teeth.

One object of the invention is to provide new and improved means for detachably securing the artificial tooth to the bridge in such a manner as to permit quick and easy substitution of a new tooth for one which may have been injured in any manner, the construction being such that no screws, pins, cement, etc., are needed to detachably secure the tooth in place, although cement is preferably used.

Another aim is to provide a construction which will insure that the gum shall not be injured in any manner when removing one tooth and substituting another, this being accomplished by engaging the root extension in or with the gum and then rocking the tooth body into position on its backing or cusp.

A still further aim is to provide a retaining shell for the artificial tooth which is open only at its outer or buccal side and at its gum side, said shell having an occlusal portion which covers and protects the occlusal or biting portion of the artificial tooth, and is additionally advantageous in that it may readily be built onto or ground to conform to the occlusal face or edge of the coacting tooth.

Other objects are to provide a construction which will not form a food trap, will not irritate the gum, will be very efficient as a masticating medium, will restore either the lingual or the buccal contour of the alveolar arch, will give an unsually natural appearance even where it engages the gum, will protect the tooth of porcelain or the like, on all sides but the front and hence will lessen the danger of chipping or cracking when chewing, can be used in either a freshly extracted tooth case or in one where the natural tooth has been out a long time and the gum has fully healed, may be used at any necessary point in the mouth with only the necessity of changing the design of tooth, will permit grinding of the tooth to accurately fit the space it must occupy, etc.

With the foregoing in view, the invention resides in the novel subject matter hereinafter described and claimed, the description being supplemented by the accompanying drawings.

Figure 1 is an outer side elevation of a dental bridge embodying my improvements.

Fig. 2 is a vertical transverse sectional view as indicated by line 2—2 of Fig. 1.

Fig. 3 is a vertical sectional view on line 3—3 of Fig. 2.

Fig. 4 is a detail horizontal section on the plane of line 4—4 of Figs. 2 and 3.

Fig. 5 is a horizontal section as indicated by line 5—5 of Fig. 2.

Fig. 6 is an outer side elevation of the bridge removed from the natural teeth and also having its artificial tooth detached.

Fig. 7 is a vertical sectional view on line 7—7 of Fig. 6.

Fig. 8 is a perspective view showing more particularly the construction of the artificial-tooth retaining-shell of the bridge.

Fig. 9 is a perspective view of the artificial tooth shown in certain preceding figures.

Fig. 10 is an inner side elevation of this tooth.

Fig. 11 is a side view looking at right angles to Fig. 10.

Fig. 12 is an elevation of the tooth and a transverse section on its retaining shell, illustrating the manner in which said tooth may be inserted or removed.

Fig. 13 is a view similar to Fig. 12 but showing the tooth completely seated in the shell.

Fig. 14 is a view similar to Fig. 13 but showing a saddle tooth, whereas the other figures disclose a root-stump tooth.

A metallic bridge is shown, preferably formed of gold, said bridge including the required number of shells for the artificial teeth which are to be substituted for natural teeth. In the present disclosure, only one shell S is shown, and any desired means may be employed for securing this shell to two natural teeth N, caps C being shown for this purpose, said caps and shell being integrally united with each other or otherwise rigidly secured together. The caps C may be of conventional form and secured to the teeth N by cement or in any other adequate manner.

A construction is shown for use in the upper set of teeth and while this construction will be hereinafter specifically de-

scribed, it is to be understood that such terms as "upper", "lower", etc., are relative rather than limiting.

The shell S is open only at its gum side or upper end, and at its outer or buccal side, may possess the form disclosed by certain of Figs. 1 to 13, the form disclosed in Fig. 14, or other desired form, according to the shape and location of the tooth to be replaced. The construction disclosed in the first group of figures of the drawings will now be described and an explanation of Fig. 14 will follow.

The shell comprises two spaced vertical side walls 15 which diverge outwardly and have widened upper ends 15^a and straight outer edges 15^b. An inner wall 16 is integrally joined to the side walls 15 and has its upper or gum end 16^a inwardly offset from its lower end 16^b, these upper and lower wall portions being connected by an outwardly declined wall portion 16^c. This portion 16^c preferably curves upwardly to the portion 16^a and the latter by preference curves horizontally to the widened ends 15^a of the side walls 15. These widened ends are provided on their inner faces with integral ribs 17 which are spaced upwardly from the wall portion 16^c, are substantially parallel with the latter, and increase in height from the outer or buccal side of the shell to the inner or lingual side thereof. The lower end of the wall portion 16^b is formed with an outwardly extending flange 18 which is adapted to underlie and protect the occlusal portion of the artificial tooth, this occlusal portion being in the present instance, the incisal or biting edge of the tooth.

The tooth T to be held by the shell S, is provided with a body portion 19 for tight wedging between the widened wall ends 15^a, said body portion having a lower side 19^a to contact tightly with the wall portion 16^c, having inwardly converging side surfaces 19^b to tightly contact with the aforesaid wall portions 15^a, and having an inner surface 19^c to abut the upper wall portion 16^a, the sides 19^b being formed with outwardly tapered grooves 20 to tightly receive the ribs 17. The occlusally disposed surface 19^a and the corresponding wall portion 16^c are somewhat curved, at least at their lingual portions. The body 19 is formed with a downward extension 21 at its front portion to contact with the wall portion 16^b of the shell and to lie between and in tight contact with the relatively narrow lower ends of the shell walls 15, and the entire front portion of the tooth is provided with laterally extended vertical flanges 22 which extend in front of and abut the straight edges 15^b of the shell walls 15. Initially, these flanges 22 may project laterally beyond the side walls 15 as shown for instance in Fig. 4, and they may be ground away to any required extent to permit proper fitting of the tooth T in the space which it is to occupy, it being observed that this grinding is confined to the tooth only and not performed upon the shell.

The lower end or incisal edge 23 of the tooth T rests tightly upon the flange 18 and is effectively covered and protected by this flange, but it will be observed that the latter is not visible at the front of the tooth. Not only does this flange protect the tooth T against splitting or chipping when masticating, but said flange constitutes a metal portion which may be readily ground into desired shape, according to the formation of the occlusal portion of the natural tooth with which the artificial tooth is to coact. Attention is further to be directed to the fact that by covering the tooth on practically all sides except its front, it is still further protected against chipping or splitting. Moreover, certain other advantages which will be clear from the first portion of this specification, flow from this construction.

The upper or gum end of the tooth T is of substantially hemispherical form as indicated at 24 and it projects beyond the shell S and is so shaped as to abut the upper edge of said shell. This formation 24 is termed a root-stump and said stump is intended for reception in a gum cavity, from which a natural tooth has been withdrawn, and in a short while, the gum will snuggle down around the root stump and the artificial tooth will have substantially the same appearance as a natural tooth, even at its juncture with the gum. This artificial tooth is usually formed of baked porcelain, suitably glazed, and its efficiently glazed root stump has no more tendency to irritate the gum, than a glass eye has to irritate the eye socket.

After the metallic bridge has been secured in place, the artificial tooth T may be inserted into the shell in the manner depicted in Fig. 12, that is by first canting the tooth so as to permit entrance of the root stump 24 into the gum socket, and then tilting or rocking the tooth downwardly and inwardly. The widened inner ends of the grooves 20 are spaced forwardly of the wide rear extremities of the ribs 17 during the initial tilting movement and they readily permit the necessary relative angling of the tooth and the shell, and when said tooth is finally forced entirely into the shell as shown in Figs. 2 and 13, it wedges in place with a sufficient degree of tightness, to positively prevent accidental detachment, and any thrusts on the tooth, toward the gum, tend to force said tooth more tightly into the shell, due to the inclination of the contacting surfaces of the ribs 17 and the grooves 20. Before the tooth can be removed from the shell, it is necessary to forwardly force the projecting upper end of said tooth to some

extent, thus loosening the engagement of the ribs and grooves and thereby permitting angling of the tooth as shown in Fig. 12. When this loosening of the rib and groove engagement is effected, the necessary angling or rocking may be easily done to permit easy removal of the tooth without injuring or irritating the gum.

The form of tooth so far described, is of course not applicable to all parts of the dental arch, but it is to be understood that my invention may be used with slight variations, for securing any artificial tooth or teeth in place upon a bridge. Fig. 14 will give an idea of a variation which is necessary in some instances, due to the necessary shape of the tooth T′ to be substituted for a natural tooth. This tooth is provided with a body portion 19′ identical with the body portion 19 and formed with grooves 20′ for engagement with two ribs identical with the ribs 17. The side walls of the shell and the inner and lower portions thereof are necessarily varied to accommodate this form of tooth. In the view under consideration, the inner or lingual wall 16′ is merely provided at its lower portion with an outwardly projecting, inclined wall portion 16″ which corresponds to the wall portion 16ᵉ, the front edge 18′ of this wall portion 16″, being thinned so that it is not visible from the front of the tooth, even though it extends substantially to the front side of the latter. In this construction shown in Fig. 14, the backing or shell is in the form of a cusp. The occlusal portions 16″ and 18′ may be effectively built onto or ground as circumstances may dictate, for proper co-action with the occlusal face of the opposing, natural tooth.

The tooth illustrated in Fig. 14, further differs from the construction first described, in that it is a saddle tooth instead of a root-stump tooth, the upper end of said tooth being transversely channeled as disclosed at 24′ to seat upon rather than within a portion of the gum. This tooth is used in cases where the natural tooth has been absent for some time and the gum has completely healed over. The root-stump tooth however is employed when a bridge is to be inserted shortly after making an extraction. In both cases, the gum-engaging or root extension on the tooth body projects beyond the metal backing or cusp and the tooth body is applied to the latter while fixed in the mouth, by first dipping the extension into the root socket or into position on the gum and then by a rocking movement of the tooth body bringing the latter to its operative position on the backing or cusp without scraping or injuring the gum.

The tooth T′ may be inserted and removed by the same operations as the tooth T and both forms of construction will be greatly advantageous. In neither instance, is any cement or other fastening means necessary to secure the artificial tooth to the shell, (cement being used merely as a protection against bacterial invasion) as the wedging action which takes place between them is sufficient to produce the necessary securing, particularly when it is remembered that a forward thrust on the upper portion of the tooth is necessary to loosen it and the gum normally holds the tooth against any accidental forward movement.

Further attention is invited to the fact that in each instance, the gingival end of the artificial tooth projects through and beyond the open gingival end of the shell, said projecting gingival end of the tooth having substantially the same lingual-to-buccal-or-labial-dimension and other transverse dimensions as the natural tooth which it is to replace. Moreover, this projecting end of the tooth is shaped either as a saddle or a root-stump tooth, to contact with the gum at both the lingual and buccal or labial portions of said projecting end.

As excellent results have been obtained from the general construction disclosed, it is preferably followed. However, within the scope of the invention as claimed, slight variations may be made.

I claim:

1. A dental bridge having an artificial-tooth retaining-shell open only at its outer side and its gum side, said shell having an inner wall portion, a pair of opposed side walls diverging outwardly from said inner wall portion, and an inclined wall portion extending outwardly from and at an obtuse angle to said inner wall portion, said side walls having ribs on their inner faces spaced from and substantially parallel with said inclined wall portion, said ribs increasing in height from their outer to their inner ends; and an artificial tooth whose body portion is fitted snugly into said shell and is provided with tapered grooves receiving said ribs, said tooth projecting beyond the shell for engagement with the gum, the portion of the tooth thus projecting being of substantially the same cross-sectional size as the corresponding portion of the natural tooth which it replaces, said shell having an occlusal portion covering and protecting the occlusal or biting end of the artificial tooth the latter having vertical edge portions extending across the outer edges of said side walls.

2. A dental bridge having an artificial-tooth retaining-shell open only at its outer side and its gum side, said shell comprising a pair of opposed outwardly diverging side walls which are widened toward their gum ends, an inner wall whose gum end is inwardly offset from its other end and is connected therewith by an inclined wall portion,

a flange extending outwardly from said other end of said back wall, and a pair of ribs formed on the inner faces of said side walls at the widened ends of the latter, said ribs increasing in height from their outer to their inner ends and being substantially parallel with said inclined wall portion; and an artificial tooth having a body portion snugly fitted into the portion of the shell between said widened ends of said side walls and formed with tapered grooves snugly receiving said ribs, said body portion of the tooth engaging said inclined wall portion and having a vertically extended front portion which lies against the aforesaid other end of said inner wall, said extended front portion having an incisal edge which engages the aforesaid flange and is protected by the latter, said tooth having vertical edge portions abutting the outer edges of said side walls, the end of the tooth remote from said incisal edge extending from the shell and being of substantially the same cross-sectional size as the corresponding portion of the natural tooth which it replaces.

3. An artificial tooth comprising a tooth body and a backing, the tooth body having a root extension and a substantially convex occlusally disposed portion, said backing having a complementary substantially concaved portion, said tooth body and backing having opposed means constructed and arranged to permit the tooth body to be rocked into operative position with the backing, while the root extension is substantially rotatably engaged in the gum socket and the backing is rigidly supported in spaced relation to the gum socket.

4. A dental bridge, having a backing open only at its outer side and its gum side, said backing having an inner wall portion, a pair of opposed side walls extending outwardly from said inner wall portion, and an inclined wall portion extending outwardly from and at an obtuse angle to said inner wall portion, said side walls having tapered means on their faces spaced from and substantially parallel with said inclined wall portion, and an artificial tooth whose body portion is fitted into said backing and is provided with tapered means to engage the means on said backing, said tooth having a root extension projecting beyond the backing for engagement with the gum.

5. An artificial tooth comprising a tooth body and a backing, said body having an extended gum-engaging portion and a substantially convexed occlusally disposed portion, said backing having a complementary substantially concaved portion, said tooth body and backing having opposed means constructed and arranged to permit the tooth body to be rocked into operative position with the backing, while said extended portion of said body is rockably engaged with the gum and the backing is rigidly supported in spaced relation to the gum.

6. A dental bridge having an artificial tooth-retaining shell open at its outer side and its gum side, said shell having an inner wall, a pair of opposed side walls projecting outwardly therefrom, and a transverse wall, the latter extending between said side walls and extending forwardly from said inner wall, said side walls being provided with ribs which have their upper and lower sides disposed at an acute angle to said inner wall; and an artificial tooth having a body portion snugly fitting into said shell and provided with inclined grooves tightly receiving said ribs, said tooth having a portion projecting beyond said gum side of the shell for snug contact with the gum, both of said ribs and grooves being widened toward said inner wall to not only effect a wedging action when the tooth is seated in the shell, but to permit the insertion of said tooth into the shell by canting it from an inclined position to a vertical position.

7. An artificial tooth comprising a tooth-body and a backing structure arranged to support said tooth-body, each having opposed faces constructed and arranged to permit the tooth-body to be rocked into operative position to slide upon the backing structure, while the root end of said tooth-body is engaged in the gum socket, and the backing structure is rigidly supported in spaced relation to said gum socket.

8. An artificial tooth comprising a tooth-body and a backing structure arranged to support said tooth-body, each having opposed faces constructed and arranged to permit the tooth-body to be rocked into operative position to slide upon the backing structure, while the root end of said tooth body is engaged with the gum, and the backing structure is rigidly supported in spaced relation to said gum.

9. An interchangeable artificial tooth for bridgework secured in the mouth comprising a backing and a tooth body, the tooth body having a backing-engaging surface and also a gum-engaging end shaped to cooperate with the gum in forming a pivot about which the tooth body may be rocked into and out of engagement with the backing while the latter is rigidly supported in spaced relation to the gum.

10. A structure as specified in claim 9; said backing and tooth body having interlocking means interengaged by said rocking movement of the tooth body.

In testimony whereof I have hereunto affixed my signature.

CLIFFORD S. KILE.