(No Model.)

W. H. GATES.

ARTIFICIAL TOOTH CROWN AND METHOD OF MOUNTING THE SAME.

No. 423,239. Patented Mar. 11, 1890.

Fig. 1.

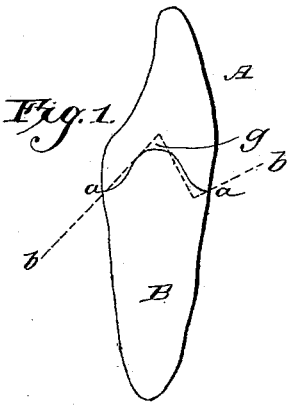


Fig. 2.

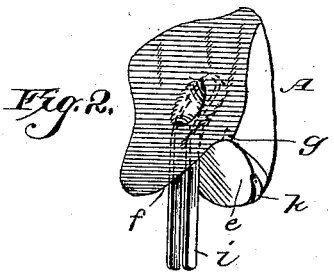


Fig. 3.

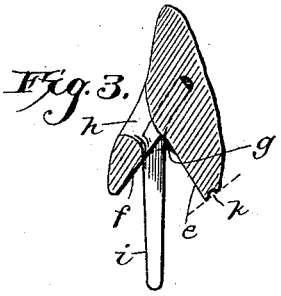
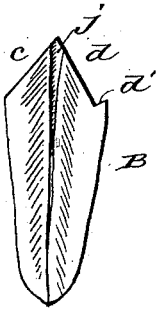


Fig. 4.



Witnesses
E. S. Smith
Ezell A. Dick

Inventor
William H. Gates
By his Attorney
Marcellus Bailey

UNITED STATES PATENT OFFICE.

WILLIAM H. GATES, OF PHILADELPHIA, PENNSYLVANIA.

ARTIFICIAL TOOTH-CROWN AND METHOD OF MOUNTING THE SAME.

SPECIFICATION forming part of Letters Patent No. 423,239, dated March 11, 1890.

Application filed July 25, 1889. Serial No. 318,629. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. GATES, of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Artificial Tooth-Crowns and the Methods of Mounting the Same, of which the following is a specification.

It is my desire to obtain a union between the root and the artificial crown, substituted for a natural crown, which shall be as nearly as possible as strong as that between the crown and root of a natural tooth, and in which the dislodging strains upon the crown shall be borne directly by the root itself, instead of by a pin or pivot between the crown and root, as hitherto has been the case.

To this end I have devised a novel form of artificial tooth-crown, as well as a novel method of mounting the same upon the natural root.

The tooth-crown itself is one which has in its base a ∧ cavity, the faces of which incline to the front and rear, or, in other words, toward the labial and lingual faces of the crown, the line along which these converging faces meet extending longitudinally of the gum. This cavity at its ends is preferably bounded by side curtains, which embrace the sides of the root or of the coronal portion thereof. Said crown also has in its lingual face a channel opening into the upper part of the ∧ cavity; and in connection with this it is provided with a divided post or staple extending down from said channel in position to enter the pulp-canal in the root when the crown is applied to the latter, said staple or divided post forming a passage through which amalgam can be introduced to the apex of the pulp-canal and finished from that point outward to a perfectly-reliable and quick-setting condition. The root itself at its coronal end is fashioned into a crown-base, with inclined sides, which, when the crown is applied, project up into the ∧ cavity in said crown and has its face coincident with the faces of said cavity, the crown-seat being trimmed at its ends, so that it may be received within the lateral curtains of the crown. The inclined faces of the crown-seat formed on the coronal end of the root are practically coincident at their outer edges with the enamel line of the natural root, and at the outer edge of the labial face of the crown-seat is formed a ledge, against which the corresponding edge of the crown abuts and rests. A thin film only of amalgam is required between the root and the crown, whose contiguous inclined faces fit closely against one another, the root projecting into and against the faces of the cavity in the crown and forming in itself a solid support which reaches up into the very center of the crown.

The nature of my invention can best be explained and understood by reference to the accompanying drawings, in which—

Figure 1 is a view, to a great extent diagrammatic, representing in full line the anatomical line of union between the root and crown of a natural tooth and in dotted lines the slight modification in this natural line of union made by me in carrying out my invention. Fig. 2 is a perspective view of an artificial tooth-crown embodying my improvements. Fig. 3 is a transverse vertical central section of the same. Fig. 4 is a like section of a natural root having its coronal end fashioned into a crown-seat in accordance with my invention.

The crown A is made of porcelain, as usual. In its base is the ∧ cavity, the labial and lingual faces *e f* of which are inclined, as hereinbefore stated, and as shown clearly in Figs. 2 and 3, and are bounded at the sides of the crown by wings or curtains *g*. The inclination of these faces to each other is a little less than a right angle. In the lingual face of the crown is a channel *h*, which extends through to and opens into the upper part of the ∧ cavity, as seen in Fig. 3. To the crown is attached a divided post or staple, the legs of which form a passage to which access can be had through channel *h*. Said staple is attached to the crown by having its loop end bent outward toward the labial face of the crown and embedded and baked into the porcelain, thus securing most stable and strong connection between the staple and the body of the crown. The seat for this crown is formed upon the coronal end of the natural root B. This end of the root is shaped into a wedge form, the counterpart of that of the cavity in the crown A, the inclined faces *c d* extending longitudinally of the gums, and at

their outer edges being practically coincident with the enamel line of the root, and a ledge d' being formed along the outer edge or base of the labial face d, against which the crown may solidly abut when in place. The sides of the upper part of the wedge crown-seat are trimmed off to permit it to fit between the curtains or wings g at the side of the crown A, and thus to properly enter and fill the wedge-cavity in said crown. The pulp-canal j in the root is reamed out to receive the ends of the post or staple i, and this operation is preferably performed after the crown-seat has been shaped.

The anatomical outline (inside elevation) of the joint between the natural crown and root, as well as the strong and defensive and supporting angle of the coronal end of the root under these conditions, I have indicated by the full line $a\ a$ in Fig. 1. The modification which is made therein for the purpose of mounting the artificial crown in accordance with my invention is indicated by the dotted line $b\ b$ in the same figure. In the joint which I make between the crown and root I follow nature's suggestion, the crown-seat being upon the root in the form of a wedge which extends lengthwise of the gums, and which when in use projects up into and fits and fills the counterpart wedge-cavity in the crown, the latter thus deriving its support directly from the root which is embraced between its front and rear inclined faces and the ledge d', forming a solid abutment to resist pressure in that direction upon the crown. In this way the strain upon the crown, instead of being borne by a pin or pivot and an amalgam body interposed between the root and crown, is borne by the root itself, which projects up as a solid mass into the interior and practically as far as the center of the crown.

The shaping of the crown-seat to conform to the cavity of the crown is effected by means of any proper tools, gages having faces of the form and inclination of those of the cavity in the crown being employed to insure correspondence between the seat and the crown-cavity, so as to insure an accurate fit of that portion of the crown-seat which enters the cavity. Special tools, gages, and other appliances for this purpose have been devised by me, but are not here described, inasmuch as I contemplate protecting them by Letters Patent.

In mounting the crown A according to my invention I proceed as follows: Having first shaped the crown-seat upon the coronal end of the root so that it will enter and accurately fit the cavity in the crown A, and having properly reamed out the pulp-canal in the root for the reception of the divided post or channel i of the crown, I apply the crown to the crown-seat, having first interposed between the meeting faces of the two a thin layer or film of amalgam. This can be done by coating the interior faces of the cavity in the crown with the amalgam before the crown is set upon the root; and it may here be said that under my invention this film may be, and in practice is, so thin as to be practically imperceptible and to offer no obstacle to the meeting of the inclined faces of the crown and crown-seat, respectively. While, as above said, the film of soft amalgam is practically imperceptible, yet to prevent possibility of its appearance on the labial face of the joint I can, as shown, form on the end of the crown which abuts against the ledge d' of the root a groove k, to provide a resting-place for a slender cylinder of gold foil. This latter, before the crown is applied to the crown-seat, is placed in the groove and held there by a coating of liquid rubber or other adhesive. When the crown is carried to place upon the seat under pressure, the gold cylinder will be condensed and compacted against the ledge d', fending off and damming the soft amalgam from the labial side and itself becoming the outline of the joint, which, if seen at all at the point, will appear as a slender line of gold. By pressing the crown to place, the inclined faces of the crown-seat are brought into close contact with and embraced between the inclined walls of the cavity in the crown, and the crown-seat itself, formed as it is by the root, projects up as a solid line of support into the interior of the crown, which receives and resists all the dislodging forces or strains which may come upon the crown, and takes them off from the post or staple i. When this has been done, very dry amalgam is introduced through the channel h, and, through the passage formed by the staple i, is carried first to the apex or inner end of the pulp-canal, and is from that point finished outward, filling the passage and the channel, and acting also to absorb and take up the free mercury of the film of soft amalgam interposed between the meeting faces of the crown and crown-seat. This completes the operation, the result being that the crown is most solidly and securely mounted upon the root itself.

In case the root is far decayed or has already been cut in concave shape, as required by existing methods of mounting artificial crowns, the crown-seat required by my invention, however, may be formed sufficiently thereon by cutting away the root at front and rear sufficiently to form inclined faces upon which the inclined faces of the cavity at the base of the crown-seat can fit and rest, in this way adapting the crowns for application to roots otherwise impossible of preservation.

Having described my improvements and the manner in which the same are or may be carried into effect, what I claim, and desire to secure by Letters Patent, is as follows:

1. An artificial tooth-crown provided at its base with a $\wedge$ cavity, the front and rear faces of which incline outwardly toward the labial and lingual faces, respectively, of the crown, and formed also with a channel or aperture

in its lingual face, which opens into the upper part of said cavity, substantially as and for the purposes hereinbefore set forth.

2. An artificial tooth-crown provided at its base with a ∧ cavity, the front and rear faces of which incline outwardly toward the labial and lingual faces, respectively, of the crown, and are bounded at their extremities by curtains or wings *g*, substantially as and for the purposes hereinbefore set forth.

3. An artificial tooth-crown formed in its basal portions with a ∧ cavity, the faces of which incline outwardly toward the labial and lingual faces, respectively, of the crown, and provided with a channel or passage extending through its body into the upper part of the ∧ cavity, and with a divided post or staple which forms a continuation of said channel or passage, substantially as and for the purposes hereinbefore set forth.

4. A wedge-shaped crown-seat consisting of inclined labial and lingual faces formed upon the coronal end of the root and extending lengthwise of the gums, and a ledge or abutment *d'* along the base of the labial face, substantially as and for the purposes hereinbefore set forth.

5. The method herein described of mounting artificial tooth-crowns, consisting in forming the crown with a ∧ cavity in its basal portion, the faces of which incline outwardly toward the labial and lingual faces, respectively, of the crown, and providing the said crown with a channel leading into the upper part of said cavity and with a divided post or staple forming a continuation of said channel, forming the coronal end of the root with a corresponding wedge-shaped crown-seat to enter and fit against the faces of the ∧ cavity in the crown, then fitting and pressing said crown down upon the crown-seat so that the latter shall enter and fit the cavity in the crown, and the post or staple of the crown shall pass down into the canal formed for it in the crown-seat, first introducing between the inclined meeting faces of the crown and crown-seat a film of soft amalgam, and finally introducing through the channel in the crown amalgam to fill the passage provided by the said channel and the divided post or staple, substantially as and for the purposes hereinbefore set forth.

WM. H. GATES.

Witnesses:
JAMES W. PHILLIPS,
ALFRED J. LEVINGTON.