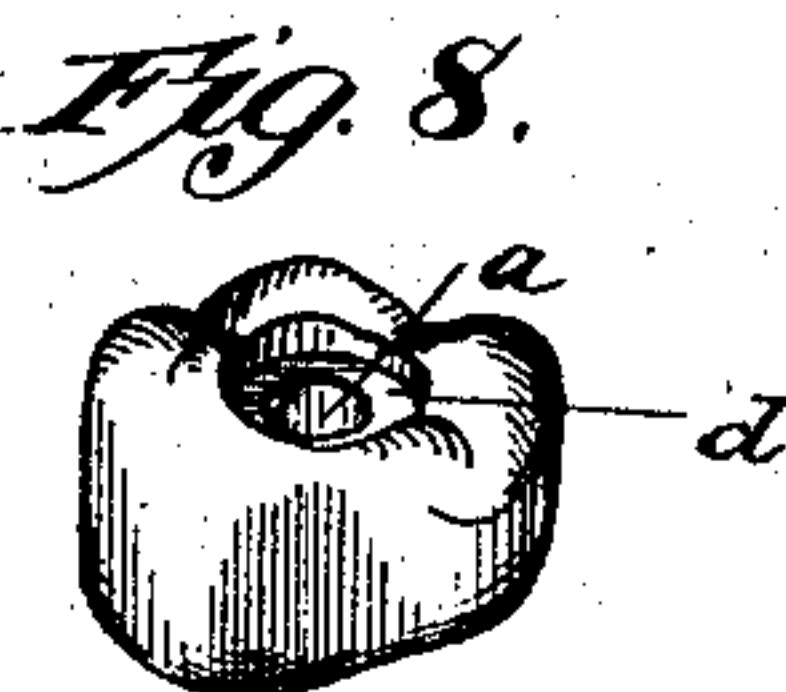
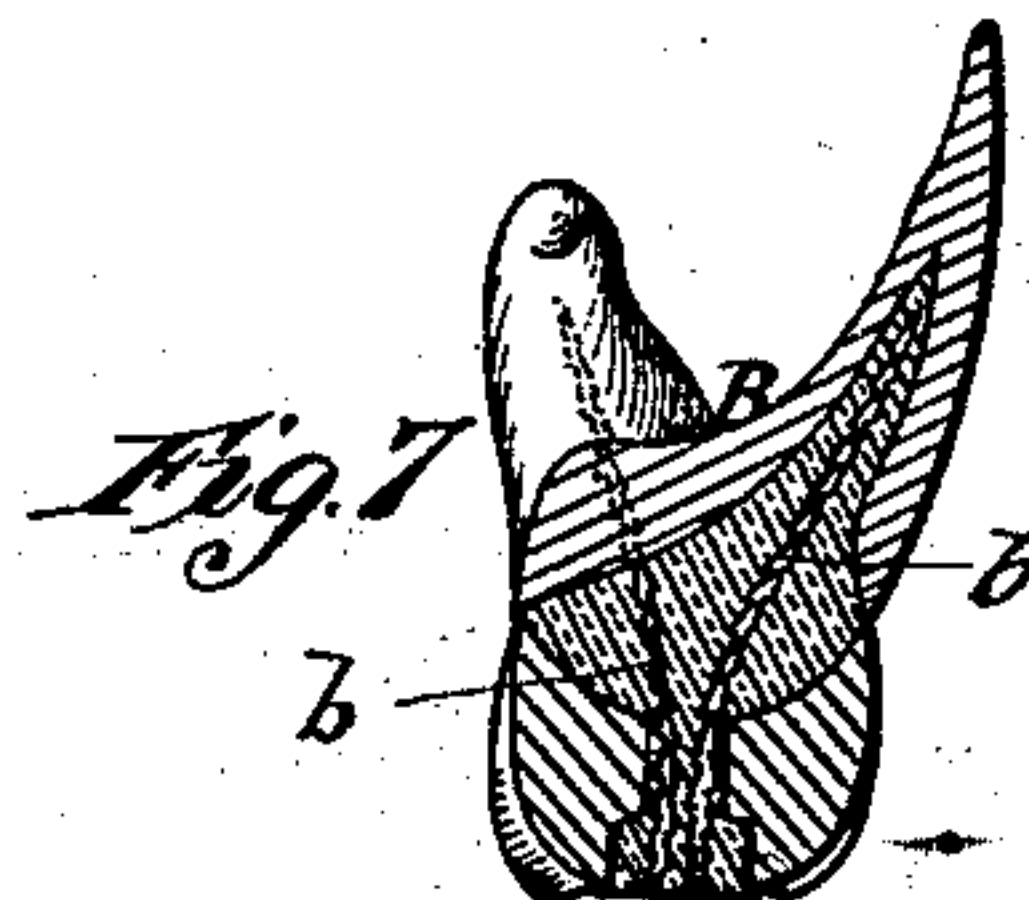
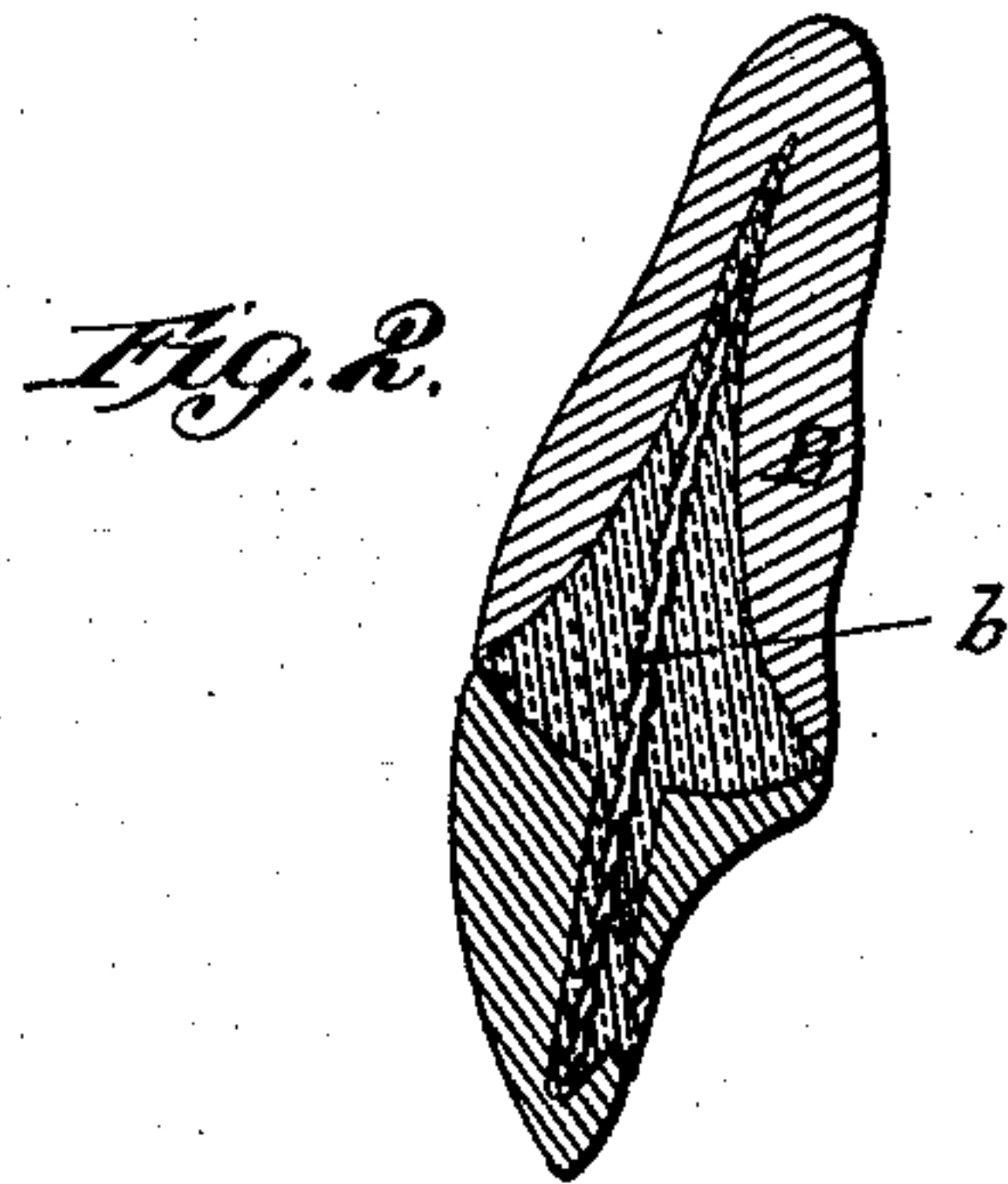
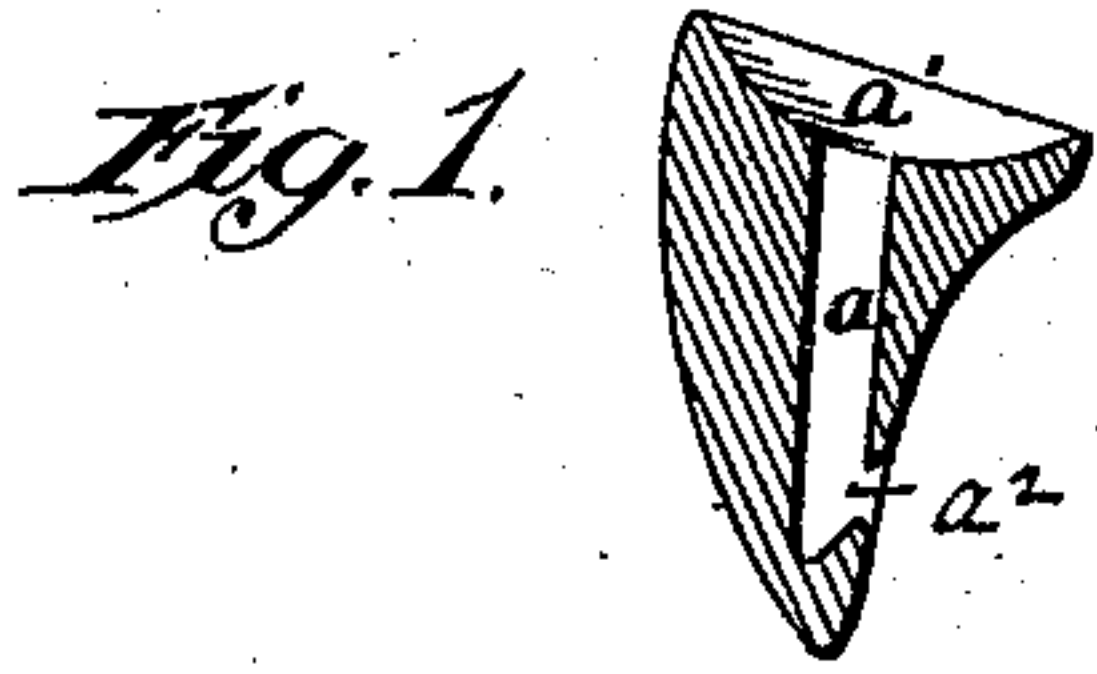


(Model.)

W. G. A. BONWILL.  
Artificial Tooth Crown.

No. 238,334.

Patented March 1, 1881.



Witnesses.  
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# UNITED STATES PATENT OFFICE.

WILLIAM G. A. BONWILL, OF PHILADELPHIA, PENNSYLVANIA.

## ARTIFICIAL TOOTH-CROWN.

SPECIFICATION forming part of Letters Patent No. 238,334, dated March 1, 1881.

Application filed December 24, 1880. (Model.)

*To all whom it may concern:*

Be it known that I, WILLIAM G. A. BONWILL, of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Artificial Tooth-Crowns and the method of mounting or attaching the same in place, of which the following is a specification.

The object I have in view is principally to attach an artificial tooth-crown to the natural root or roots in such a manner that the crown shall be held in place in a most secure and permanent manner. The crown which I have devised is, however, also equally applicable to "plate-work," so called.

My invention has relation to that method of securing the crown in which the crown is fitted upon and secured to a pin held in place in and projecting from the root, said pin being held to both crown and root by amalgam. Hitherto, so far as I am aware, the point at which the amalgam has united the crown to the pin has been near the base of the crown, and the consequence has been that the tooth-crown is incapable of withstanding the strain that frequently comes upon it, and consequently breaks away or separates from the root.

The gist of my invention consists in extending the cavity through the crown to or very near the grinding or cutting surface thereof, and in giving the said cavity at this point retaining form, so that the amalgam which fills this portion of the hollow or opening in this crown around the pin may act to take hold and retain in place the crown. By thus extending the support to, or nearly to, the grinding-surface of the tooth, and holding the crown at this point, I secure the latter in a most permanent manner to the root and impart to it the needed strength to resist the lateral thrusts or strains to which it must necessarily be subjected from time to time.

The nature of my invention and the manner in which the same is or may be carried into effect will be understood by reference to the accompanying drawings, in which—

Figure 1 is a vertical central section of an incisor tooth-crown made in accordance with my invention. Fig. 2 is a like view of the same mounted and secured in place on a root,

all the parts being represented in section. Fig. 3 is a plan of a tooth-crown such as in Fig. 1, with a modified form of opening therein. Fig. 4 is a vertical section of the same on  $x x$ , Fig. 3. Figs. 5, 6, and 8 represent, in section and perspective, other forms of tooth-crowns. Fig. 7 is a sectional view of the tooth-crown in Fig. 8, mounted and secured in place on a root.

All of the tooth-crowns shown in the drawings are hollow or virtually open from end to end. The opening  $a$  in the tooth-crown shown in Fig. 1 does not extend out through the cutting edge or surface of said crown—which is that of an incisor—but it extends to a point very near that edge, and out through the rear or lingual or palatal face of the tooth, as shown. The opening  $a$  is enlarged at the base of the tooth, as seen at  $a'$ , the said hollow being formed with sides which slope gradually toward the contracted part  $a$ , having such form as shall, when the tooth-crown is pressed in place upon the root, tend to force the amalgam placed in said enlarged portion  $a'$  toward the pin  $b$ , and into and more or less through the longitudinal passage  $a$  around the pin, as shown in Fig. 2.

At or near the grinding or cutting face of the crown the walls of the cavity  $a$  have retaining form. This retaining form may be obtained by properly shaping the mouth  $a^2$  of the cavity, or by undercutting the lateral walls of the said passage or cavity at its outer end, as shown in Fig. 4 at  $c$ . In some instances I prefer to give the passage  $a$  a triangular form in cross-section, as shown in Fig. 3, which form admits a comparatively large body or filling of amalgam or gum without unduly weakening the shell of the crown. I remark that when the cavity is undercut, as shown at  $c$  in Fig. 3, the mouth  $a^2$  of the cavity may be closed before the tooth is burned. I prefer, however, to leave it open, inasmuch as it will form a vent to permit escape of surplus cement or amalgam.

The crown shown in Fig. 5 is a bicuspid, and in Fig. 6 a molar. These crowns are longitudinally hollow, and have at the coronal opening a retaining form, as indicated at  $d$ . In case more than one pin is employed, the crown may have a like number of passages,  $a$ ,



leading from the enlarged basal cavity *a'*, as indicated in Fig. 6; or the several pins may pass through one opening, as indicated in Fig. 7.

Root B of the tooth is excavated in such a manner that its cavity shall correspond at its outer edge with the like edge of the basal portion of the cavity in the crown. By this means the bone portion of the tooth is entirely protected by the cement from the action of the juices of the mouth, since the cement extends to the outer surface of the root at the point of its junction with the crown.

The method which I preferably employ of attaching the artificial crown to the natural root is as follows: I first fill the previously-prepared root with amalgam or cement, and then insert into the amalgam while still plastic a pointed tool, of a diameter slightly less than that of the metallic pin to be afterward inserted. After the tool has been withdrawn the barbed metallic pin is forced into the hole thus formed for it, and the cement, by means of a suitable instrument, is closely packed around the pin, which should be kept in about the center of the root-cavity. The crown is then placed over the pin in order to determine when the latter is in proper position and of a proper length to extend to, or nearly to, the grinding or cutting face of the crown. The crown is then withdrawn and additional amalgam is placed about the pin in the root. The crown is next filled to excess with the amalgam, (mixed to set more quickly than that used in the root,) and is then forced over the pin and firmly but gradually pressed to its proper position on the root. By this means not only is the pin securely fixed in place in both crown and root, but the amalgam or cement in the two is also firmly pressed into one coherent and homogeneous mass about the pin, the sloping walls of the enlarged cavities in the upper part of the root and the basal portion of the crown tending to drive the plastic material toward the pin, and thus effect a more perfect union of the parts, the pin consisting of the central stem and the amalgam exterior virtually having the exact shape of the cavity as the crown or root, as indicated in Figs. 2 and 7, with retaining form at or near the grinding-surface of the tooth. At the coronal opening the amalgam around the pin is, by means of a suitable instrument, finished off, and the work is then complete.

Where the artificial tooth-crown is to be attached to an artificial base-plate of rubber, celluloid, or metal, instead of the natural root of the tooth, a metallic pin of great strength and stiffness is embedded into the base-plate, and the crown fixed upon it at the same time or by a subsequent operation, substantially as before described. My invention here offers the advantage (as it does in the case of the natural root) that a crown, when broken from the pin, may be replaced with another by simply removing a portion of the hardened cement from about the pin and proceeding as in the

first instance in pivoting. In the case of rubber plates, the opening in the crown may be first filled with the softened unvulcanized rubber, the pin then inserted, and the body of the plate molded so as to firmly embrace the other end of the pin, so that the substance of the plate will extend in a homogeneous mass into the extremity of the tooth or crown, receiving additional strength and rigidity from the metallic pin inclosed in it; or, as above described, the crown may be placed onto the plate after the vulcanization of the same by removing the tooth-crowns after they have been suitably arranged, and returning the same to their places by any of the cements in use.

With reference to the triangular form of a cavity shown in Fig. 3, with the base of the same toward the face or labial surface of the tooth, and the apex toward the palatal or lingual surface of the same, I remark that the advantage of this form of opening is, that the whole strain is thereby transferred to the front of the tooth-crown, thus enabling me to make the crowns of extreme thinness on the palatal or lingual surfaces and at the base without impairing their effective strength.

Tooth-crowns embodying my invention may be made either singly or in blocks of two or more, with or without artificial gum attached.

I am aware that prior to my invention artificial tooth-crowns had been made with a vertical opening extending through the tooth and countersunk on the palatal surface for the head of a screw, which was relied upon to fasten the crown to the root.

I am also aware that there has been a crown composed of either metal alone or porcelain, or a crown of both porcelain and gold, having a large opening at the base, which was to be filled with cement and placed over the pins previously fixed in the natural root.

I am also aware that an artificial tooth-crown provided with a longitudinal cavity has been mounted on a natural root by means of a pin and amalgam filled around the pin into the cavities in the root and crown. I am not aware, however, that a crown has before been provided with a cavity enlarged at the base, extending through to or near the grinding or cutting surface, and made at the latter point of retaining form, so as to anchor and hold the crown at said point by means of the amalgam filling around the pin.

What I claim, and desire to secure by Letters Patent, is—

1. An artificial tooth-crown, having an opening or cavity of a size to contain the pin and surrounding amalgam, which extends from the base of such crown to or near the grinding or cutting surface of the same, at which point such opening is enlarged or undercut, so as to have retaining form, substantially as set forth.

2. A longitudinally-hollow artificial tooth-crown having an enlarged basal cavity and coronal opening of retaining form, substan-



tially as and for the purposes hereinbefore set forth.

3. The method described of mounting artificial tooth-crowns on roots, which consists in making the crown hollow, with enlarged basal cavity, and a coronal opening of retaining form, and then uniting said crown with the root on which it is placed by means of a pin and amalgam or cement, which fills the cavities in the root and crown around the pin, and

extends up into and is anchored in or near the coronal opening of the crown, substantially as hereinbefore set forth.

In testimony whereof I have hereunto set my hand.

WM. G. A. BONWILL.

Witnesses:

S. M. GAYLEY,  
AND. W. GAYLEY.