

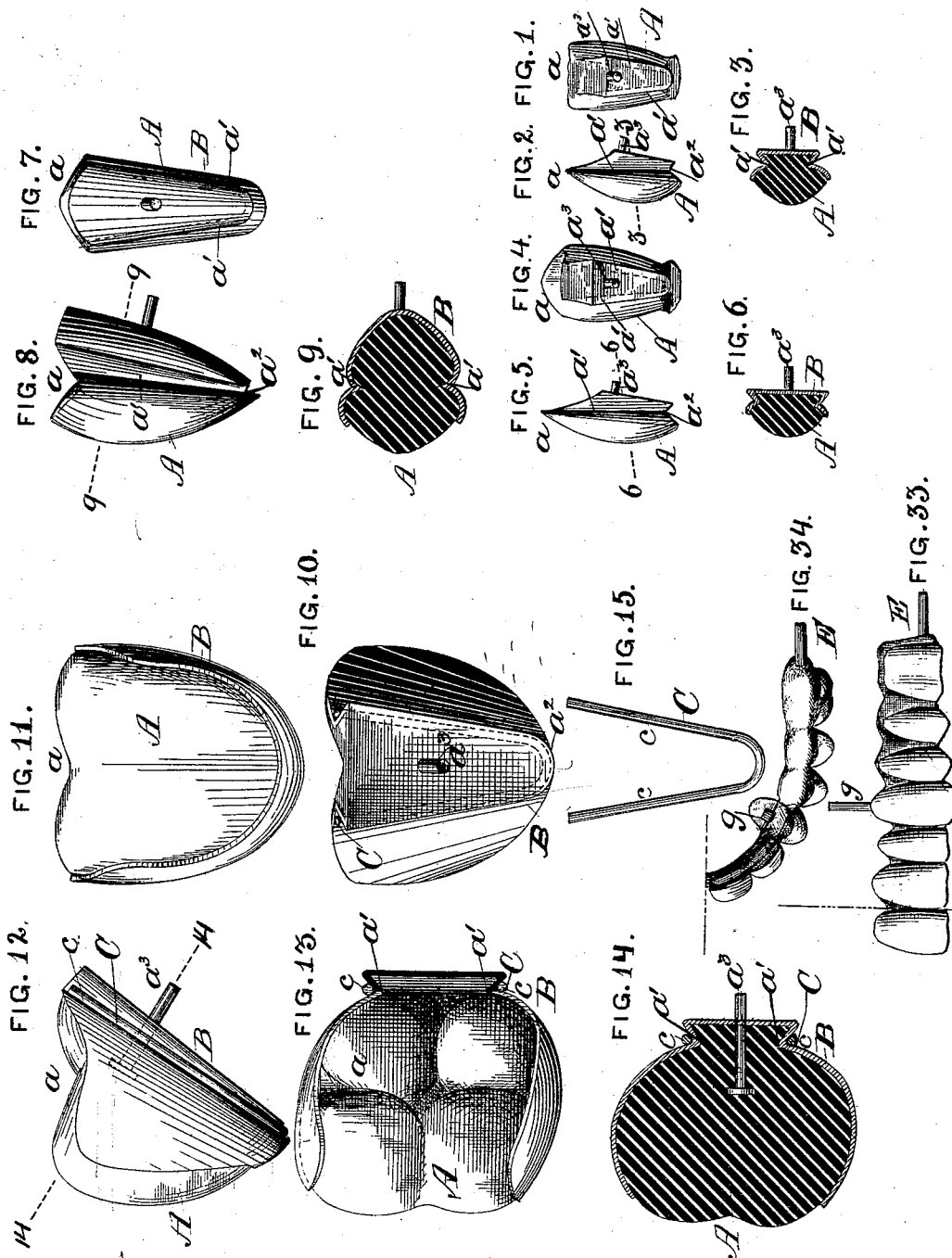
(No Model.)

3 Sheets—Sheet 1.

J. L. WILLIAMS.  
ARTIFICIAL DENTURE.

No. 347,544.

Patented Aug. 17, 1886.



WITNESSES:

Geo. A. Vaillant,  
P. J. Lancaster.

INVENTOR:

James L. Williams,  
by his atty Wm. J. Peyton

(No Model.)

3 Sheets—Sheet 2.

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FIG. 19.

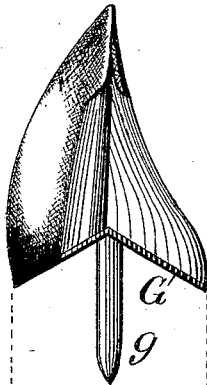


FIG. 18.

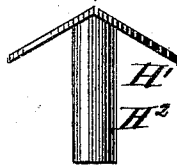


FIG. 17.

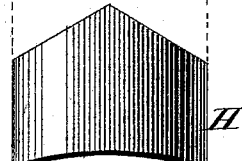


FIG. 16.

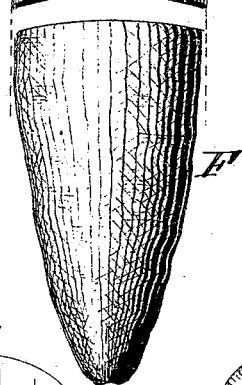


FIG. 27.

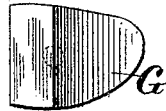


FIG. 26.

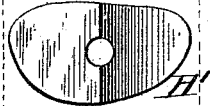


FIG. 25.



FIG. 24.



FIG. 23.

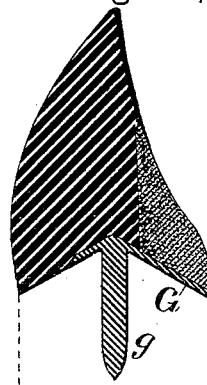


FIG. 22.

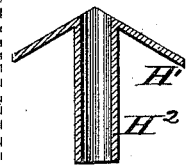


FIG. 21.

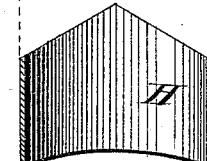


FIG. 20.

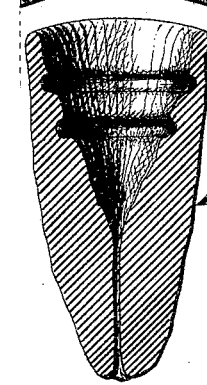


FIG. 29.

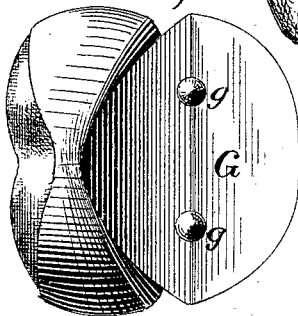
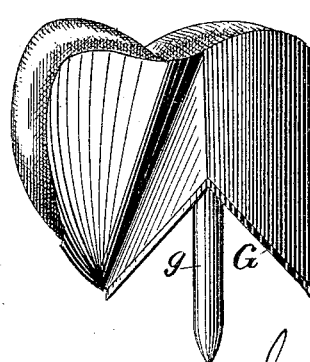


FIG. 28.



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(No Model.)

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FIG. 31.

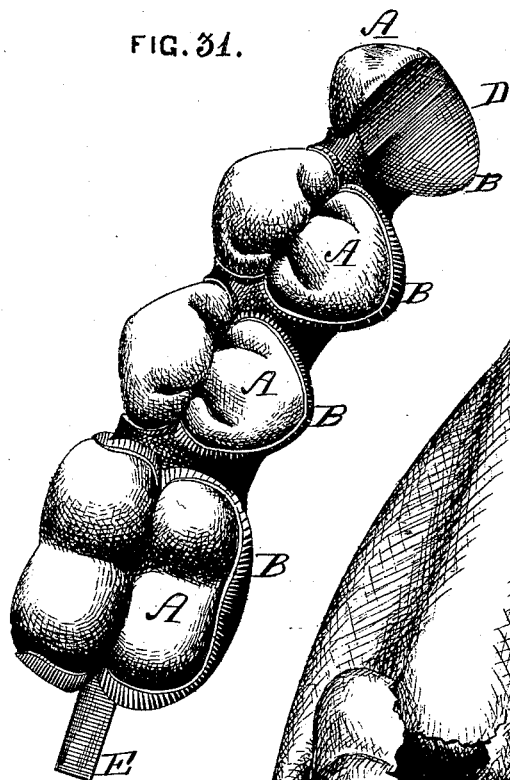
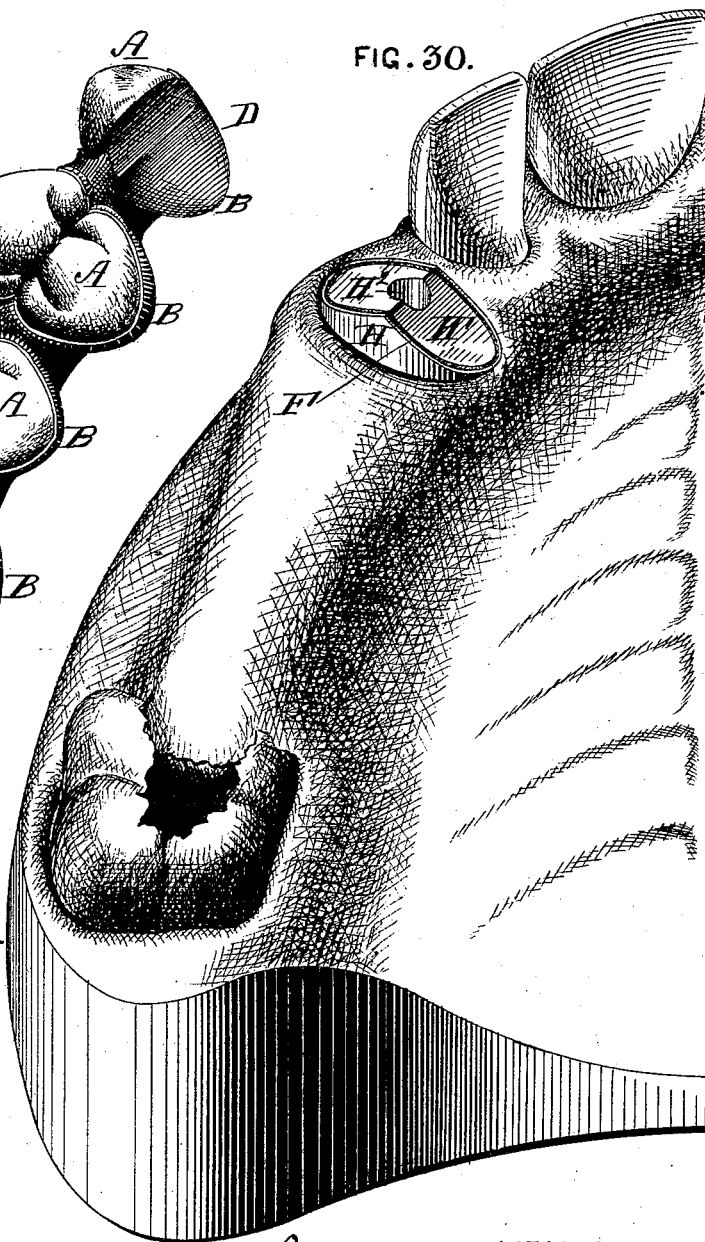


FIG. 30.



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# UNITED STATES PATENT OFFICE.

JAMES L. WILLIAMS, OF PHILADELPHIA, PA., ASSIGNOR TO THE S. S. WHITE DENTAL MANUFACTURING COMPANY, OF SAME PLACE.

## ARTIFICIAL DENTURE.

SPECIFICATION forming part of Letters Patent No. 347,544, dated August 17, 1886.

Application filed May 13, 1886. Serial No. 202,048. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES L. WILLIAMS, of the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Artificial Dentures of which the following is a specification.

My invention relates to bridge-work dentures, a class of artificial dentures well understood in the art.

The objects of my invention are to enable a more perfect denture to be made than heretofore; to improve the construction of the porcelain portions of the teeth of such dentures; to improve the means and methods of securing the porcelain portions of the denture to the support or bridge thereof, and to improve the means and methods of attaching such dentures to natural teeth or tooth-roots remaining in the mouth.

I will first describe my improvements in detail as organized and carried out in the best ways now known to me, and in illustration of their practical embodiment, with reference to the accompanying drawings, making part of this specification, and will then distinctly recite the subject-matter herein claimed by me at the close of this specification. I will first premise, however, that some of my improvements, so claimed by me, may be used without the others and in ways differing from those herein particularly described.

In said drawings, Figure 1 is a rear elevation of one of my improved central incisor teeth. Fig. 2 is a side elevation thereof, and Fig. 3 is a horizontal section therethrough on the line 3 3 of Fig. 2. Fig. 4 is a rear elevation of one of my improved cuspid teeth. Fig. 5 is a side elevation thereof, and Fig. 6 is a horizontal section therethrough on the line 6 6 of Fig. 5. Fig. 7 is a rear view of one of my improved bicuspid teeth. Fig. 8 is a side elevation thereof, and Fig. 9 is a horizontal section therethrough on the line 9 9 of Fig. 8. Fig. 10 is a rear elevation of one of my improved molar teeth. Fig. 11 is a view of the face or buccal surface thereof. Fig. 12 is a side elevation thereof. Fig. 13 is a top or plan view thereof, and Fig. 14 is a section therethrough on the line 14 14 of Fig. 12.

Fig. 15 is a view in elevation of the fastening-staple I employ, in some instances, in the embodiment of my improvements, to aid in securing the porcelain portion of the teeth to the metal backing thereof. Fig. 16 is a view of the tooth-root to which my improved denture may be applied. Fig. 17 is a metal band to be fitted thereto. Fig. 18 is a view of the cap to said band, and Fig. 19 is a crown to fit said cap and be secured thereto and to the tooth-root. Figs. 20 to 23 are vertical sectional views of the parts shown in Figs. 16 to 19, respectively. Figs. 24 to 26 are plan views of the parts shown in Figs. 16 to 18, respectively. Fig. 27 is a plan view of the metal plate secured to or forming part of the base of the crown shown in Figs. 19 and 23. Fig. 28 is a side elevation of a molar-crown constructed substantially like the cuspid-crown of Figs. 19 and 23, and Fig. 29 is an inverted plan or basal view of said molar-crown. Fig. 30 is an elevation of a partial alveolar ridge of the human mouth, showing the cuspid-root as fitted with a metal band and cap, as shown in Figs. 16 to 18 and 20 to 22, and the second molar as decayed on the approximate side. Fig. 31 is a view of one of my improved artificial bridge-dentures fitted to supply the denuded ridge with an artificial denture, the bridge being supported at one end by a crown fitted to the prepared cuspid-root, and at the other end by a pin or bar to fit the recess or socket in the second molar, as shown in Fig. 30, said recess in the molar being, of course, suitably prepared for the purpose. Fig. 32 is a sectional view of the root, band, and cap therefor, fitted and secured together with plastic filling material. Fig. 33 is a front or buccal and labial view of a partial artificial denture, showing the anchoring-pins thereof; and Fig. 34 is a basal view of the gum surface of the denture shown in said Fig. 33.

My improved artificial bridge-work tooth consists of a porcelain face or body portion, A, which constitutes the face, and also the cutting or masticating surface of the artificial tooth, and a metal socket or backing, B, united firmly thereto. These metal sockets or backings of the porcelain portions of the tooth are united together by solder or otherwise to form

the denture, and are fitted in place in the mouth in various ways, as by suitable connections at the end of the bridge, formed by soldering the metal sockets together. The metal sockets or bases constitute the holding and supporting medium of the porcelain portions of the denture, and when constructed as hereinafter particularly described the denture is remarkably strong, firm, and durable, and permits the ready replacement of any porcelain portion or tooth that may be by any means broken or defaced.

The porcelain portion A of my improved tooth is preferably comparatively thin or shallow, as respects thickness, from front to rear, and is provided with a suitable cutting or tearing and grinding or masticating surface, *a*, according to the nature of the tooth to be replaced, so that a durable wearing-surface is provided for the artificial tooth. Said porcelain portion is also provided with vertical or longitudinal grooves *a' a'* at the sides or approximate edges. The lower ends or bases of said porcelain portions or bodies are also preferably provided with a horizontal groove, *a''*, preferably of an inverted-V shape, to fit and rest or bear upon a correspondingly-shaped end of a supporting-tooth root—for instance, as when the artificial crown is made to constitute and support one end of the bridge or denture. Both ends of the bridge-denture may be so supported. It is not necessary, of course, that the intermediate bridge-teeth should have the inverted-V-shaped basal groove, although such a groove, or an equivalent interlocking connection between the porcelain portion of the teeth and its metal socket or backing, is desirable for the strength and durability of the denture. The back of the porcelain body portion A is also preferably provided with a projecting pin or pins, *a''*, (baked into the porcelain body,) at or about the center of said back, for example.

The porcelain bodies or portions A of the teeth are fitted with metallic backings, casings, or sockets B, as before stated, and the method of attaching or connecting said bodies and sockets is preferably as follows: The said sockets, bases, or backings B are preferably made of thin pure gold or platina plate, although, of course, any suitable metal may be employed. A piece of the plate or sheet metal having been cut to a proper size is pressed over the pin *a''*, the metal being preferably thin enough to permit the pin to puncture it, or a suitable hole for the passage of said pin may be previously made by a suitable punch, for example. The sheet metal is then folded about the body A and pressed firmly and closely into the vertical side grooves, *a' a'*; and I prefer to then add an additional fastening medium in the shape of a metal staple, C, of gold wire, for example, such as shown in Fig. 15. The arms or members *c c* of said staple are passed into said grooves *a' a'* over the metal backing, as shown in Figs. 10 to 14, inclusive. Said backing is thus secured to

the porcelain facing or body A by means of the pin *a''*, the interlocking side grooves, *a' a'*, and the staple C while the other processes or methods of completing the denture are being effected.

The metal backing should be carefully bur-nished over the approximate sides of the porcelain body, and over the gum end thereof, and trimmed or cut away, as shown in Fig. 11, so that the teeth will exhibit a porcelain face and cutting or masticating end or surface and be securely held in the metal seat, cup, or base, by which two or more of them may be united together and supported in place.

The porcelain facing or body portion of the tooth having been thus united to its metal base or backing, the teeth should be invested in a suitable mixture—for instance, a mixture of plaster-of-paris with marble-dust, asbestos, or free sand and water to a paste in well-known ways. The tooth is invested with this paste, so as to leave exposed only the metal backing or portions thereof, and after the investment material is set or hard the whole is carefully heated, and gold of about the fineness of ordinary coin-gold—say twenty-two karats—is flowed over the metal portion of the tooth to increase its thickness slightly and unite the staple or fastening C, the metal backing B, and the pin *a''* together. This completes the structure of the tooth *per se*.

When the space in the mouth to be supplied with an artificial bridge-work denture is determined, the proper number and kind of the metal-backed teeth are selected. They may be fitted in position on a plaster cast made from an impression of the mouth, or they may be fitted directly in the mouth, being temporarily fastened to each other, or in position on the cast or in the mouth by means of wax or other suitable material or cement. The entire piece thus temporarily arranged is carefully removed and invested in the material, or some equivalent thereof, before mentioned, so as to leave all the metal portions exposed, and after the investment material has hardened the wax is melted away in any desired manner—as with boiling water, for example—and all the teeth are then united firmly together by soldering in any of the well-known or suitable ways. Enough of the solder, which may be gold solder, is employed to permit the proper shape to be given to the denture and secure the requisite strength thereof.

The object in first flowing coin-gold or an equivalent therefor over the pure gold or platina or equivalent metal backing is to impart strength and give shape to the completed work, so that in the subsequent stages of the work, in uniting the teeth and parts of the denture together with the metal solder having a lower melting-point than that previously used, the original shape and form of the metal backing or socket is not changed. This preliminary step may, however, be omitted, the porcelain teeth, with their backings B, being directly fitted in position and temporarily

united by wax or cement and then invested and soldered, as before described; but the work so completed is in many instances inferior to that produced by the methods previously described.

In some cases it is desirable to disconnect the porcelain portions of the teeth from their metal sockets—as, for instance, to avoid cracking or injuring said porcelain portions in soldering the metal sockets or backings together. In that event the backings or sockets, after being properly fitted to the porcelain portions, are disconnected (the pins *a*<sup>3</sup> being cut off, if desired,) and the metal portions are soldered together, as before. The skeleton bridge having thus been formed, the porcelain bodies are set into their sockets or bases and united thereto by the employment of a suitable cement between the two—oxychloride of zinc, for example. It may be desirable in such cases to form pits or retaining-shoulders on the backs and lower or basal ends of the porcelain bodies, to afford a firm hold for the cement; and this may be done in any desirable way—as during the baking of the porcelain body, or in any other way, many of which are already known in the art. It is also desirable to roughen the metal socket or seat, which may be done by means of a suitable tool. In case, also, where the porcelain tooth may be broken or destroyed during the making or use of the denture, it may be readily replaced by a new porcelain portion cemented in place in its socket or backing.

It will be understood, of course, that the porcelain body or portion A may be of sufficient extent, and be so shaped as to form the porcelain portion of several teeth with a single metal socket or shell; but such use will in most cases be attended with disadvantages. It will also be understood that in making my improved denture (from what I have already said) the porcelain and metal portions may be united together either before or after soldering the metallic backings or sockets together.

In attaching the bridge to the mouth I prefer to form one or both ends of the bridge in the shape of a crown, to be fitted and secured to natural tooth-roots in the mouth as follows, although it will of course be understood that the manner of securing the bridge (formed of several of my improved metal-backed or socketed teeth) in the mouth may be greatly varied: I have shown in Figs. 30 and 31 the bridge as fitted for attachment in the mouth at one end by a crown, D, of peculiar shape and construction, forming part of the bridge-denture, and at the other end by a pin or bar, E, fitted to be secured in a recess at one side of a decayed tooth, which is of course to be suitably prepared and filled to secure the end of the denture firmly therein. Said crown D in the example shown, is a cuspid-crown to fit a cuspid-root, F, remaining in the mouth. The crown is made up of the porcelain body A, the metallic backing or socket B, the thickening of metal or solder applied thereto, as before de-

scribed, and a plate, G, soldered to the base of the tooth and forming part thereof, as clearly shown in Figs. 19, 23, and 27. The base of the crown D is grooved, or of an inverted-V shape, as shown, a portion of this basal surface being formed by the lower or base end of the porcelain portion A and the residue by the plate G, from which latter an anchoring pin or post, *g*, projects, to enter and be secured in a socket in the tooth-root. Said tooth-root F is tapered, or of an inverted-V shape, on its end, so as to fit the basal V-groove of the crown D, and said root is preferably prepared in the following manner: The root is cut off and excavated, and a metal band, H, is fitted thereto in well-known ways. The upper end of the band H is tapered from about the center toward the front and rear, and is fitted with a cap, H', of less diameter than the upper end of said band, to give the cap lateral play therein in fitting the denture. The cap H' tapers in conformity with the inclination of the upper end of the band H, and is supported upon a filling of plastic cement, I, (oxychloride of zinc, for example,) in said band, which extends upward from the recess or chamber in the root. While the cement I is still plastic the crown D, with its attached denture, is fitted upon the root, with the pin *g* thereof fitted into a tube, H<sup>2</sup>, forming part of the cap H' and seated in the cement I, said tube having been also filled or partially filled with the cement. The crown is forced down on the root until its V-shaped end nicely and closely fits the correspondingly-shaped end of the root and its attached parts, the surplus cement being removed. As soon as the cement hardens the crown D will be securely fastened upon the root F, while the opposite end of the bridge will likewise have been secured to the root or tooth which is to support it. By the employment of the crown D not only is a secure attachment made for one end of the bridge, but a nice appearance is insured. Very little, if any, of the metal band H will be exposed, and the porcelain facing of the crown will give the denture a natural appearance.

By employing the loosely-fitting cap H' not only the desired shape at the end of the root is secured, but a sufficient amount of play is allowed to secure accurate fitting and alignment of the artificial with the natural denture.

Instead of employing a crown, D, at one end and a bar or pin, E, at the other end of the bridge to anchor or secure it in the mouth, both ends may be attached by the crowns constructed and fitted like that above described. In Figs. 28 and 29 I have shown a molar-crown built up and fitted substantially like the crown D, it being fitted with two pins, *g g*, to suit the larger chamber which would be formed in a molar-root.

Without further elaborating my invention or its advantages in strength, compactness, and the facility it admits of replacing broken parts without removing the denture from the

mouth, I state that I claim herein as of my first invention—

1. The artificial porcelain or body portion of a bridge-tooth having vertical interlocking grooves or recesses in its approximate edges, substantially as described.
2. The artificial porcelain or body portion of a bridge-tooth having vertical interlocking grooves or recesses in its approximate edges, and a groove or recess in its base, substantially as described.
3. The artificial porcelain or body portion of a bridge-tooth having vertical interlocking grooves or recesses in its approximate edges, and a pin projecting from the back thereof, in combination with a metal socket or backing secured to said body portion of the tooth by said grooves and pin, substantially as described.
4. The combination of the body portion of the tooth, the metal backing or socket thereof, and a staple securing said body portion and backing or socket together, substantially as described.
5. The artificial tooth consisting of the porcelain body having interlocking approximate grooves, the metal socket or backing thereof, and the V-shaped basal groove in the end of said tooth, substantially as described.

6. An artificial denture fitted to a natural tooth-root by means of a band secured to said root, a cap-plate adjustable in said band, a pin or pins, and a plastic cement, substantially as described.

7. The hereinbefore-described method of constructing an artificial bridge-tooth, consisting in fitting a body with a metal backing, and in then flowing molten metal over said backing to increase the thickness thereof and secure said backing in place, substantially as described.

8. The hereinbefore-described method of constructing an artificial tooth, consisting in fitting a body with a metallic backing, securing said body and backing together by a metallic fastening, and then flowing molten metal over said metallic parts to solder them together, substantially as described.

In testimony whereof I have hereunto subscribed my name this 3d day of April, A. D. 1886.

J. L. WILLIAMS.

Witnesses:

ELI T. STARR,  
JAS. B. WILLIAMS.