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ATTACHMENT FOR NATURAL TEETH AND METHOD OF FORMING THE SAME.

No. 822,582.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN P. CARMICHAEL, a citizen of the United States, residing at Milwaukee, county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Attachments for Natural Teeth and Methods of Forming the Same, of which the following is a specification.

My invention relates to improvements in attachments for natural teeth and methods of forming the same, and pertains especially to that class of attachments which are secured to the tooth by means of an artificial post adjusted to the root-canal.

The object of my invention is to provide a device capable of being used for taking impressions of a tooth-cavity, and also serving as a post for the attachment of crowns and caps, in which the attaching-post conforms to the contour of root canal or cavity to which it is applied. Also to provide a method of forming and applying such post whereby the same is first applied to the tooth in a malleable form, then shaped in conformity with the cavity in which it is to be anchored, and then removed, stiffened, and permanently secured to the portion to be artificially added to the tooth preparatory to being finally secured in position.

In the following description reference is had to the accompanying drawings, in which—

Figure 1 is a detail view showing the metal of the post in sheet form. Fig. 2 is a view of the post as prepared by rolling up the metallic sheet diagonally. Fig. 3 shows two of the posts telescoped. Fig. 4 shows one of the posts as it appears after being expanded and shaped to the root-canal. Fig. 5 is an enlarged sectional view of one of the posts. Fig. 6 is a top view showing one of the posts secured to the front piece of a crown. Fig. 7 shows a crown-front secured to a post and applied to a tooth, the latter being shown in section. Fig. 8 shows a complete crown secured to a tooth by a double post, one of the posts being expanded into a cap for the end of the tooth, the tooth and the outer post being shown in section and a part of the inner post being broken out in section. Fig. 9 is a top view showing the application of my invention to a cap, two posts being employed for separate root-canals. Fig. 10 is a side view of the same, showing the tooth in sec-

tion; and Figs. 11 and 12 illustrate the application of my invention to partial crown and inlay work, respectively.

Like parts are identified by the same reference characters throughout the several views.

In the practice of my improved process I first prepare a rectangular piece of sheet metal, Fig. 1, of a character adapted for the purpose (such as sheet platinum or gold) and beginning at one corner roll up the sheet into the form of a hollow cone and then trim off the exposed corners and angular edges to form a tapering hollow post 1, as shown in Fig. 2. In some cases, especially with large posts, it is often advisable to telescope two or more of them together, as indicated in Fig. 3. The post thus formed is much stronger at the small end than at the large end, being formed of a greater number of folds.

The posts are of a size which permits their insertion in the root-canal 2, to which they are to be applied. When so inserted, the walls of the post are expanded and shaped in conformity with the contour of the root-canal by means of suitable tools inserted in the post-cavity after which the post is removed and partially stiffened by the application of solder, which is inserted or flowed into the post-cavity and heated until the solder passes between the folds of the material composing the post by capillary attraction, as shown at 3 in Fig. 5, this process being facilitated by the angular winding of the metal sheet, so as to expose spiral edges 4 within the post, as shown in Fig. 5. As the number of concentric walls increases toward the lower end of the post, with the spiral edges of such walls exposed, the solder readily enters between these walls when melted. In the construction shown in Fig. 3 the walls of the post are stiffened with solder without shaping the post; but the same results are accomplished in a post which has been first shaped to the contour of the root-canal, the solder being readily entered between the metal surfaces by capillary attraction, even though such surfaces appear to be in absolute contact. The solder tends to flow toward the point of greatest heat, and in carrying out this step of my method a small quantity of solder is used and the same is flowed principally into the lower end of the post, which is then reinserted in the root-canal and the face of the crown 5 fitted thereto. Ow-

ing to the flexible or malleable character of the upper portion of the post the crown-piece 5 may be readily adjusted into the correct position. It is then secured to the post, preferably by means of arms 6 of a type in common use and which are adapted to be bent into clamping position. The partial stiffening of the post is such as to prevent its collapse and at the same time permit an exact adjustment of the crown-piece and an indentation of the sides of the post by the clamping-arms when the latter are bent inwardly against it. If desired, however, the upper edges of the post may be doubled over the arms, as shown at 7 in Fig. 7.

When the crown is fitted and bound to the post, both are removed from the root of the tooth and additional solder flowed into the folds of the post until the same is sufficiently stiffened for permanent use. The crown may then be completed in permanent form by the application of the usual backing 9, Fig. 8.

Owing to the fact that the post is first shaped into conformity to the root-canal and the crown adjusted and secured thereto when it is in such position, it will (when replaced after the completion of the crown) reënter the root-canal in one position only and will thus restore the crown to the exact position into which it was adjusted when first secured to the post. The post is finally secured in position by cement in the same manner as is done with posts of ordinary type.

Where a number of posts are telescoped together, the outer one may be expanded to its upper end and burnished over the top of the root to form a cap, as shown at 10 in Fig. 8, and may even be doubled over, as at *a*, to form a partial or complete ring.

In Figs. 9 and 10 I have more especially illustrated the application of my invention to caps. In such cases the caps 12 are punched to form apertures through which the posts are inserted preparatory to being inserted in and shaped in conformity to the root-canal. The caps are preferably punched from the upper surface downwardly, so that the metal will form downwardly-projecting reinforcing-lips or flanges 13 around the post. The posts and cap are then adjusted in position and the posts shaped to the root-canals, as above explained. The upper ends of the post are burnished over the upper surface of the cap, as shown at 14, Fig. 9, and the cap and post removed, stiffened, and permanently secured together with solder, substantially as in the case of the crown.

In preparing caps I prefer to stiffen the posts completely in one operation, while in preparing crowns it is preferable to partially stiffen the post before attaching the crown

and complete the operation after the crown is adjusted.

The completed posts may, if desired, be left hollow or filled with solder. Where several posts are telescoped, the lower end becomes substantially solid in any case.

While I have described the posts as stiffened with solder, it will be understood by those familiar with the art that the folds may also be united and stiffened by the so-called "sweating process" or any process of welding or cohesion or the adhesion of an interposed substance, and I do not limit the scope of my invention to any specific means for securing the desired stiffness and stability.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A tapering dental post having a plurality of integral concentric walls increasing in number toward the smaller end.

2. A tapering dental post having spirally-rolled concentric walls increasing in number toward the smaller end stiffened by interposed material.

3. The method of forming dental posts which consists first, in forming a hollow trial post having concentric walls; second, in inserting the trial-post in the cavity to which it is to be applied and shaping it in conformity therewith; and third, stiffening the post by union of the concentric walls.

4. The method of forming dentures which consists first, in preparing a post having concentric walls of malleable sheet metal; second, in inserting the post in the cavity to which it is to be applied and shaping it in conformity with the contour thereof; third, stiffening the post by a partial union of the overlapping portions while leaving the upper portion malleable; fourth, reinserting the post and adjusting an artificial-tooth portion thereto; fifth, removing the post and additionally stiffening the walls; and sixth, permanently securing the post in position.

5. The method of forming dentures, which consists first, in rolling sheet metal angularly to form a hollow post with a spiral inner edge; second, in inserting the post in the cavity to which it is to be applied and shaping it in conformity to the contour thereof; third, securing the post to an artificial-tooth portion, such as a crown or cap; fourth, flowing molten metal between the folds of the post; and fifth, securing the post and its attachment in position.

In testimony whereof I affix my signature in the presence of two witnesses.

JOHN P. CARMICHAEL.

Witnesses:

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