Dec. 14, 1926. 1,610,987

R. M. WITHYCOMBE

INTERCHANGEABLE RESILIENT TOOTH

Filed Nov. 5, 1924

FIG. 1

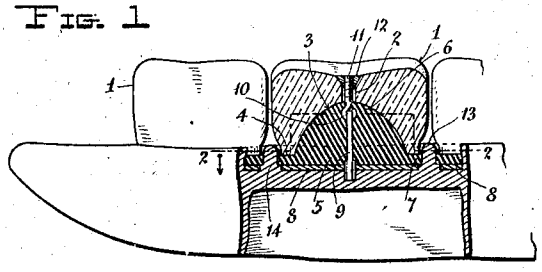



FIG. 2

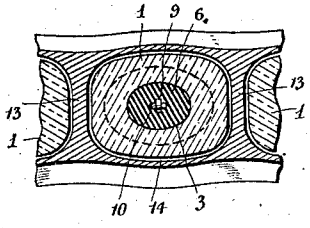



FIG. 3

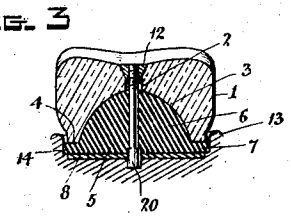



FIG. 4

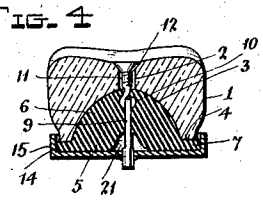



FIG. 5

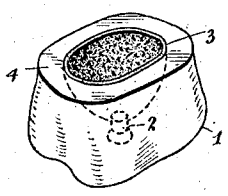
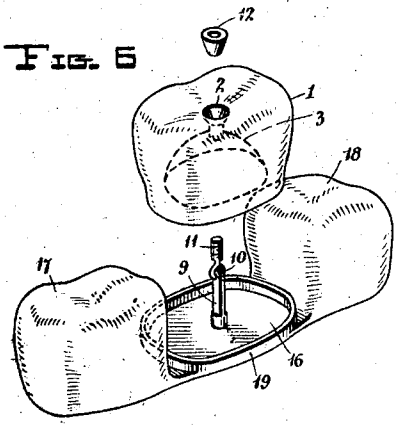



FIG. 6

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Patented Dec. 14, 1926. 1,610,987

# UNITED STATES PATENT OFFICE.

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## INTERCHANGEABLE RESILIENT TOOTH.

Application filed November 5, 1924. Serial No. 747,926.

This invention relates to artificial dentures and proposes the construction of a novel and improved interchangeable resilient tooth.

The principal object of the invention is the provision of a tooth and cushioning means therefor, so co-relatively arranged that the pressure of the tooth in yielding, is concentrated in a zone adjacent the central portion of the tooth and not at the periphery, whereby it is possible to make the peripheral edge of the cushioning means relatively thin so as to expose a minimum area of the same in the outer surface of the denture, this being a desideratum on account of the necessity for covering the exposed surface of the cushioning material, both for appearance sake and for the purpose of creating a fluid-excluding seal between the said cushioning material and the base of the denture in which it is invested, whether it be the socket walls of a vulcanite plate or the metallic flange or collar of a metal bridge. If the peripheral section of the cushioning material were relatively thick, a deep and cumbersome base or investment would be necessary to conceal it. But, it being thin, as in the present invention, a less massive base will suffice, giving the wearer a greater degree of comfort than he would otherwise enjoy, by occupying less space in the mouth and at the same time requiring less material in its fabrication.

Other objects of the invention will appear as the following description of a preferred embodiment thereof proceeds.

In the drawings:—

Figure 1 is a section showing my improved interchangeable resilient tooth in section, embedded in a vulcanite plate.

Figure 2 is a transverse section taken along the line 2—2 of Figure 1.

Figure 3 is a sectional view showing a slightly modified form of tooth.

Figure 4 is a sectional view of the tooth shown in Figure 1 having the base plate thereof slightly modified to form a collar.

Figure 5 is a perspective view of the porcelain element.

Figure 6 is an exposed view indicating the application of my improved resilient tooth to a metal bridge.

Referring now in detail to the several figures, and adverting, in the first place, to that modification of the invention in which no collar is used between the exposed surface of the cushioning material and the vulcanite investment, the numeral 1 represents the porcelain or refractory element of the tooth which is preferably of the tubular type, being provided with a bore 2 opening upon the occlusal surface. The under side of the porcelain element is hollowed out to form a displacement chamber 3, said displacement chamber being preferably relatively wide so as to leave a narrow peripheral margin 4 to the porcelain element. The displacement chamber is designed for the reception of the cushioning member 5. The latter is, by preference, made of soft vulcanizable rubber having a massive central portion 6 which extends into the displacement chamber, and a relatively thin peripheral portion 7 upon which the margin of the porcelain element rests. The cushioning member 5 rests upon a base plate 8 from which arises a post 9 secured to the base plate in any suitable manner as by soldering. In the form of my invention shown in Figures 1 and 4 the post is made in two parts having the hook and eye connection indicated by the numeral 10. The upper section 11 of the post passes through the bore 2 in the tooth and threadedly engages a nut 12 which seats within a countersunk depression forming the outer end of said bore.

The cushioning member 5 is made substantially to fill the displacement chamber 3 so that when pressure is brought upon the occlusal surface of the tooth in a direction to cause either longitudinal movement of the porcelain element or tilting of the same, the pressure will be transmitted through the porcelain member directly to that part of the cushioning member which fills the displacement chamber and not primarily to the peripheral edge 7 upon which the margin of the porcelain element rests. In this way said marginal portion is relieved for the most part from compressive stress, so that it may be made relatively thin, as indicated in the figures, without sacrificing any of the resiliency of the cushion and at the same time making possible the advantageous construction presently to be described. In order to obtain a maximum of resiliency I may provide a vacant space within the mass of soft rubber as shown at 21 in Fig. 4, into which the rubber is forced when subjected to pressure. In the preferred form of my invention the wall of

the displacement chamber has a lining of metallic fillings which are baked into the porcelain, and to which the soft rubber adheres tenaciously when vulcanized thus ensuring asepsis. The base plate 8 is also preferably made from an alloy of one of the royal metals which coheres with rubber under similar conditions. In the assembling of the tooth the cushioning rubber is placed upon the base plate and surrounding the post 10, the porcelain element slipped in place over said post and the nut 12 screwed to its final position. The tooth is then subjected to vulcanizing temperature which causes the cushioning member to adhere to the porcelain element and base plate by an inseparable bond uniting the several elements of the tooth into a unitary structure. At this time the tooth presents the appearance of a porcelain element having a metal base plate and a thin band of the cushioning element exposed between said base plate and porcelain element, and flush with the lateral surface of said porcelain element.

When the tooth is to be used in a vulcanite plate it is simply embedded in the vulcanite as shown in Figure 1 and the latter subjected to vulcanization. Fortunately for the invention, vulcanite shrinks slightly upon cooling as does also the porcelain element of the tooth and the base plate, so that the wall of vulcanite 13 which form the socket in which the tooth is embedded spaces itself slightly from the porcelain element, permitting the free exercise of the resilient properties of the tooth. However, in the act of vulcanization the exposed peripheral edge of the cushioning member becomes vulcanized integrally with the vulcanite plate so that upon shrinking of the latter, the peripheral portion of the cushioning member is pulled outwardly a slight extent as shown at 14 in Figure 1. The union between said peripheral edge and the vulcanite forms an impervious seal isolating the embedded portions of the tooth from access of the saliva thereby rendering the tooth as truly sanitary as is a natural tooth. The slight space between the vulcanite wall and porcelain element of the tooth to which the saliva is accessible corresponds to the gingival trough of the natural tooth.

Both for the sake of appearance and for the formation of this impervious seal, it is essential that the tooth be embedded sufficiently deep in the vulcanite to permit the wall 13 to extend above the peripheral portion of the cushioning member. If said peripheral portion be thick, a relatively deep and cumbersome plate of vulcanite is necessitated. If, however, the peripheral portion of the cushioning member be thin as in the present case a shallow embedment of the tooth is sufficient, permitting the vulcanite plate to be made comparatively thin, thereby occupying less space within the mouth of the wearer and being correspondingly more comfortable. In addition to this, less material is required for making the plate of vulcanite or other substance, this feature alone creating, in the long run, a considerable saving.

Should the tooth become broken through accident or the cushioning member lose its resiliency through long use, replacement of the tooth is made possible by unscrewing the nut 12 and applying sufficient longitudinal draught to the tooth to break the bond between the porcelain element and cushioning member or between the latter and the base plate. The porcelain element, and the cushioning member may then be removed, new rubber put in place, a new porcelain member applied to it, the nut 12 screwed down and the plate with the new tooth revulcanized.

It is frequenly preferred to maintain the peripheral portion of the cushioning member at all times separated from the vulcanite plate. To satisfy the demand for a tooth having this adaptability I have designed a form of invention shown in Figure 4 in which the base plate is turned up at its periphery to form a collar 15, the latter projecting above the exposed edge of the cushioning member, and the diameter of the collar being such as to allow for the exercise of the tilting function of the tooth. The collar may then be embedded in the vulcanite and the latter subjected to the process of vulcanization in the usual manner.

An adaptation of the invention to the use of metallic bridge work is illustrated in Figure 6 in which the reference character 16 represents a shallow socket corresponding in function to that of the base plate and collar shown in Figure 4, said socket being supported by adjacent crowns 17 and 18. The post 10 is appropriately soldered to the bottom plate of this socket. A suitable quanity of vulcanizable rubber is then placed within the displacement chamber 3, and the porcelain element 1 slipped over the post and screwed in place by the nut 12, in the manner previously described, until the lower edge of the porcelain element is below the flanged wall 19 of the socket 16. The bridge is then subjected to vulcanizing heat.

Figure 3 shows a form of the invention in which the swivel post is replaced by a rigid post 20. In this case slight tilting movement of the porcelain element under compression is permitted solely by virtue of the loose fit of said post within the bore 2 of the porcelain element. Other features of this form of the invention may be identical with those of the previously described modifications.

It is to be understood that the invention contemplates the manufacture of the com-

plete tooth as shown in Figures 1 and 4 and also the manufacture of the porcelain element shown in Figure 5 and the post as shown either in Figures 1 or 3, permitting the dentist to complete the invention by inserting the rubber cushioning member and performing the vulcanizing operation.

The invention also contemplates the permissibility of numerous alterations or changes in the details of construction as shown, restricted only by the expressed limitations imposed by the claims.

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

1. An artificial tooth including means forming a socket, a porcelain element, a cushioning member supporting said porcelain element and being integrally united both to the wall of said socket and to said porcelain element.

2. An artificial tooth including a base plate, a post fixed relatively to said base plate, a porcelain element mounted upon said post and movable with respect thereto, said porcelain element having a displacement chamber on its under side leaving a peripheral margin, and a cushioning member between said porcelain member and base plate, said cushioning member having an enlarged portion filling said displacement chamber and bearing the major part of the pressure upon said element, and a thin peripheral portion supporting the margin of said porcelain element.

3. An artificial tooth including a base plate, a post fixed relatively to said base plate, a porcelain element mounted upon said post and removable with respect thereto, said porcelain element having a displacement chamber on its under side leaving a peripheral margin, and a cushioning member between said porcelain member and base plate, said cushioning member having an enlarged portion filling said displacement chamber and bearing the major part of the pressure upon said element, and a thin peripheral portion supporting the margin of said porcelain element, said cushioning member being united to said base plate and porcelain element.

4. An artificial tooth including means forming a socket, a post fixed relatively to said socket forming means, a porcelain element mounted upon said post and movable with respect thereto, said element having a displacement chamber on its under side leaving a peripheral margin, a cushioning member between said porcelain element and socket forming means, said cushioning member having an enlarged portion filling said displacement chamber and bearing the major part of the pressure upon said element, and a relatively thin peripheral portion supporting said margin, the peripheral edge of said cushioning member being united to the wall of said socket.

5. An artificial tooth including means forming a socket, a post fixed relatively to said socket forming means, a porcelain element mounted upon said post and movable with respect thereto, said element having a displacement chamber on its under side leaving a peripheral margin, a cushioning member between said porcelain element and socket forming means, said cushioning member having an enlarged portion filling said displacement chamber and bearing the major part of the pressure upon said filling, and a relatively thin peripheral portion supporting said margin, the peripheral edge of said cushioning member being united to the wall of said socket and to said porcelain element.

6. In an artificial tooth, a base plate, a post having swivelly connected sections, one section being fixed to said base plate and the other oscillatable in a plurality of planes, the joint between said section being constructed to prevent complete rotation of said oscillatable section, the latter being threaded, and a nut cooperating with said threaded section for retaining a porcelain element upon said post.

7. In an artificial tooth, a base plate, a post section swivelly connected to said base plate, and oscillatable in a plurality of planes, the connection between said post section and base plate being constructed to prevent complete rotation of said post section, the latter being threaded, and a nut cooperating with said threaded post section for retaining a porcelain element upon said post.

In testimony whereof I have hereunto set my hand.

ROBERT MORSE WITHYCOMBE.