March 26, 1946. F. M. BUTLER 2,397,407

ARTIFICIAL TOOTH

Filed Feb. 17, 1942

Fig. 1

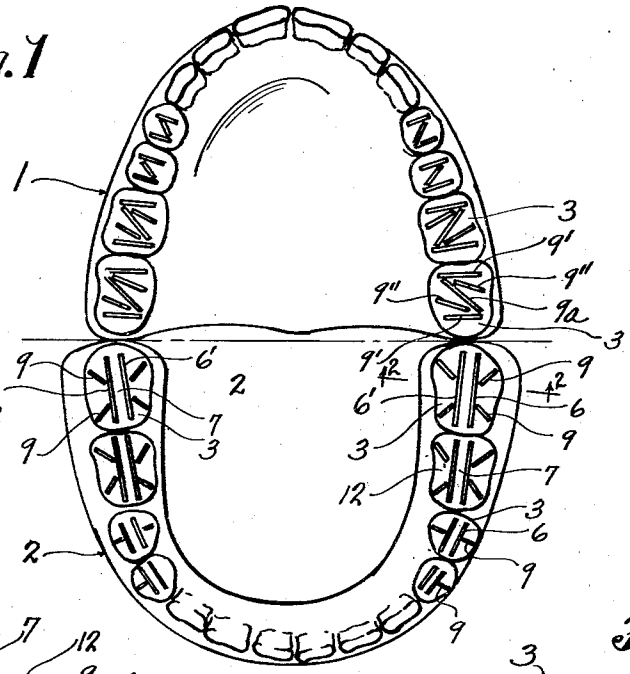


Fig. 2

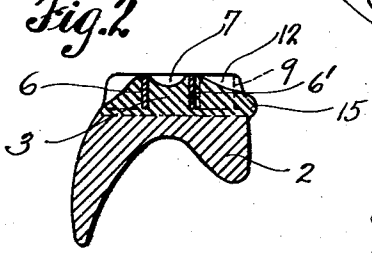


Fig. 3

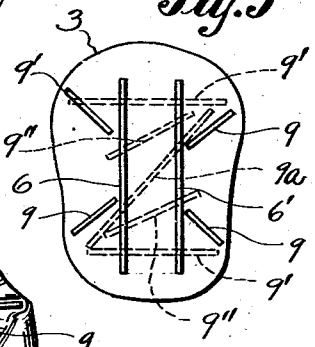


Fig. 4

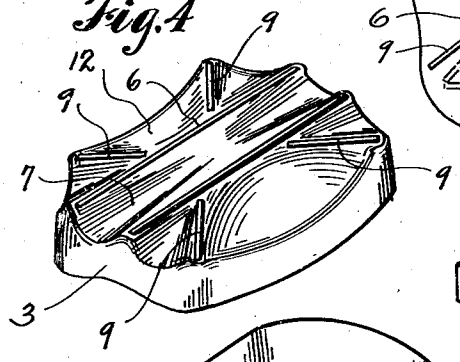
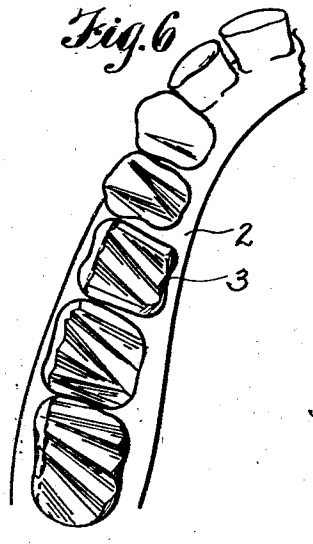


Fig. 6



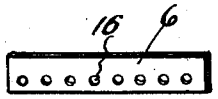
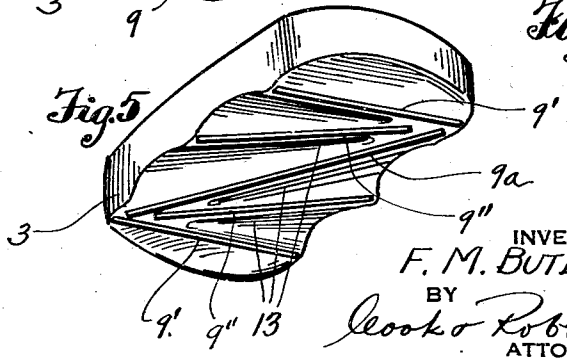


Fig. 7

Fig. 5



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UNITED STATES PATENT OFFICE

2,397,407

ARTIFICIAL TOOTH

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Application February 17, 1942, Serial No. 431,193

3 Claims. (Cl. 32—8)

This invention relates to artificial teeth and has reference more particularly to the construction of false teeth as used in artificial dentures which are in the form of the whole plate, partial plate or bridgework.

For a better understanding of the present invention, it will here be explained that for many years dentists have recognized that artificial or "false" teeth, in the form of the whole denture or plate, were relatively low in efficiency for the mastication of food, as compared with the degree of efficiency of the full set of natural teeth of the average person. Where, in some instances, individuals have claimed better efficiency from use of false teeth, it is usually the case that the condition of their natural teeth had been poor over a long period of years and therefore the comparison was made on the basis of a poor set of natural teeth, and consequently was not a fair comparison.

The low efficiency of the average set of false teeth is due to various conditions. First, it is to be considered that, until very recent years, false teeth were made to resemble as nearly as possible, the natural teeth which they were to replace. This would seem to be the natural thing to do. However, in the provision of false teeth, the manufacturer failed to give due consideration to the fact that the user of false teeth, due to the insecure manner of attachment thereof, and due to the fact that the denture rests upon tender gum tissue, is able to exert only relatively low pressure for the mastication of food as compared with the very high pressures possible when the natural teeth, which are securely set in the bony structure of the jaw, are employed. The comparative pressures range from ten to sixty-five pounds for false teeth, and from one hundred to three hundred pounds for natural teeth. This would indicate that the average set of false teeth, from the standpoint of food mastication, has only about twenty per cent of the efficiency of natural teeth. This twenty per cent average efficiency of artificial teeth is a well recognized fact by most of the dental profession and by many who wear such teeth.

Since it is impossible to increase the maximum pressure in action upon the artificial teeth due to their bearing surfaces being upon tender gum tissues instead of in bony tissues as are the natural teeth, and also due to unstable attachment or placement of the artificial teeth, it should be evident to the most casual observer that any increase in efficiency must necessarily come through the improvement of the cutting edge of the artificial teeth.

During the past few years, much has been undertaken, and also accomplished, toward the improvement of anterior teeth, particularly with respect to durability, form, coloring, and translucency, but not much attention has been given to the improvement of posterior teeth, which, in fact, are of greater importance to the mastication of food. Furthermore, it must be remembered that since artificial teeth have no provision for being fixed permanently to the dental arch, any improvement made in dentures to increase grinding or crushing efficiency of the teeth, must be made in consideration of the plate being quite easily movable, and the posterior teeth must be so designed that there will be the least possible likelihood of any interlocking, or interference between teeth of the opposite dentures; yet at the same time the design should be such as to produce as nearly as possible, the same masticating efficiency as is produced by the natural teeth.

In view of the foregoing, it has been the principal object of this invention to improve artificial dentures, bridge work and partial plates; especially to improve the design and construction of the molars and bicuspids of artificial dentures of the whole plate type or partial plates, to provide substantially the same grinding and cutting efficiency as that of natural teeth for food mastication.

It is also an object of the invention to improve the cutting and grinding efficiency and at the same time provide what may be termed "self-cleaning" of the occlusal surfaces of the teeth.

Still another object of the invention is to provide improvements in tooth design that will hold the cheek tissues and tongue away from the biting surfaces of the teeth.

Still further objects of the present invention reside in the details of construction of the individual teeth, and in the construction and relationship of teeth of opposing dentures that insures their greatest efficiency and least possible likelihood of detrimental interference that would result in interlocking, and incident chipping of teeth or displacement of plates from position in the mouth.

Other objects of the invention are to be found in the provision of teeth wherein metal bars are embedded in the grinding surfaces of opposed teeth in such manner as to coact in the grinding and cutting of food, but which, in their relationship in opposed teeth, cross each other to avoid possible interference.

It will be mentioned here, as explanatory matter, that when an object is intended to act under pressure against another object to penetrate it or change its form, there are four main factors that determine the effectiveness of the operation: First, the amount of pressure to be applied; second, the degree of hardness of the operative member or its ability to stand up under the required activity; third, the sharpness or efficiency of design of the operating point or face of the object used; and, fourth, the degree of penetration or degree of change of form desired.

In accomplishing the various objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawing, wherein—

Fig. 1 is a view showing in plan view the teeth of upper and lower artificial dentures, constructed in accordance with the present invention.

Fig. 2 is an enlarged cross section on line 2—2 in Fig. 1.

Fig. 3 is a plan view of a tooth, showing the position of bars embedded therein and, in dotted lines, indicating the relationship thereto of the bars of teeth of the opposite denture.

Fig. 4 is an enlarged perspective view of the biting surface of a lower plate molar.

Fig. 5 is a similar view of an upper plate molar.

Fig. 6 is a plan view of a denture of an alternative form, not employing the metal inserts.

Fig. 7 is a perspective view of a metal bar adapted to be embedded in the tooth.

Referring more in detail to the drawing—

In Fig. 1, I have illustrated in plan view, upper and lower plate dentures, having teeth set therein which are made in accordance with the details and objects of the present invention. In this drawing, the upper plate is designated in its entirety by reference character 1, and the lower plate by numeral 2. The base plates for these dentures may be moulded in the usual manner, and may be of any of the materials now in general use, or others that are suitable for the purpose, and the teeth which are set in the plate may be of porcelain, or a moulded material, such as that from which the present day "acrilic" dentures are made, or it may be any other plastic which is satisfactory from the standpoint of durability, color and its capability of being moulded to desired shapes.

In the present instance, I have indicated that the teeth, designated by numeral 3, are of a material different from that from which the plates are made, and in Fig. 2, it is indicated that the teeth are embedded in, or otherwise united with the plate. It is to be understood that I am not particularly concerned with the methods employed in molding the plates or the teeth, nor am I especially concerned with the exact manner in which the teeth are secured in the plates, so long as they are satisfactorily mounted. However, I prefer that the teeth shall be permanently united with the plates, so as to avoid any possibility of their displacement therefrom in use.

One of the features of this invention resides in the embedding or inlaying of metal bars in the grinding surfaces of the teeth to increase their life, durability and efficiency. Another feature resides in the relationship of these inlayed bars as applied to opposed teeth of the upper and lower plates. The present preferred manner of disposing the bars in the teeth of the upper and lower dentures is shown in Fig. 1, while in Figs. 2 and 3, I have indicated the grooving of the grinding surfaces for the self-cleaning action of the surfaces.

Referring now more particularly to Fig. 1: It is to be observed that the molars and bicuspids at opposite sides of the lower plate are similarly equipped with two spaced cutting bars 6 and 6' which extend in the direction of the underlying ridge and directly thereabove. These bars, as noted in Fig. 2, are set on edge, flush with the grinding surface of the tooth, and between the exposed edges, the tooth surface is downwardly troughed or grooved, as at 7, for clearance, and the groove is open at both ends for the escape of masticated food.

Automatic clearance of the masticated food from the groove 7 can be facilitated by gradually deepening the groove from the center of the tooth surface toward the opposite ends of the groove.

At the inside and outside of the two parallel bars 6—6' of the bicuspids of the lower plate, are transversely directed bars 9, also set on edge, as are the bars 6—6'. In the forward bicuspid, however, only one of such bars 9 is used, and it is set in the outside portion of the grinding surface of the tooth, perpendicular to the bar 6. In the second bicuspid, two of such bars 9 are used, one being set at the inside and one at the outside of the tooth and perpendicular to bars 6 and 6'. In each of the two rear molars, two bars 9—9 are used, both at inside and outside of each tooth, and these bars 9—9 are in diverging relationship, with their inner ends relatively close together, and their outer ends directed respectively toward the front and rear edges of the teeth.

In the lower molars, as so equipped with the cutting bars, V-shaped clearance grooves are formed between the bars, and these grooves, as designated at 12 in Fig. 2, gradually increase in depth and width, toward the inside and outside surface of the teeth. Thus it will be understood that the biting and grinding pressure against the food being masticated, will have the effect of moving the food as it is cut and ground, outwardly and inwardly along the grooves to give the desired self-cleaning action of the teeth.

The two molars and two bicuspids at both sides of the upper plate, likewise, have spaced cutting bars embedded therein; these bars being designated by reference numeral 9', and it is to be observed that these particular bars are so set in the surfaces of the teeth that, when the teeth of the upper and lower plates are brought together, they will be crossed, substantially at right angles with the bars 6—6' of the teeth of the lower plate. Each molar and bicuspid of the upper set is also provided in its grinding surface with a bar 9*a* placed diagonally of the tooth; together the bars 9' and 9*a* of each tooth form the letter Z. In the two molars of the upper plate, at each side, additional bars 9'' are set in the tooth surface to bisect the angles formed by the diagonal bar 9*a* and the transverse bars 9'.

In Fig. 3 I have shown, in an enlarged view, the relationship of these bars of the upper and lower teeth, and it is to be observed that they cross each other in such manner as to avoid any possibility of an interlock that would tend to or result in displacement of the plate from the ridge.

In the grinding surfaces of the upper teeth, I have also formed grooves between the cutting bars, and these grooves, as noted at 13 in Fig. 5, are gradually increased in width and depth toward the inside and outside of the tooth to effect the self-cleaning action.

In Fig. 6, I have shown, as an alternative construction, a denture having the surfaces of the teeth grooves and ridged to accomplish the results of the plates just described. In the teeth of this denture, the metal bars have been omitted, and in lieu thereof ridges are formed and brought to sharp cutting edges which produce substantially the same results as the bars 9—9', as used in the structure of Fig. 3.

In Fig. 6, it is to be observed that the grooves between ridges are gradually increased in depth and width toward the sides of the teeth, and thus provide the self-cleaning action as previously mentioned.

It is to be understood that, in the provision of upper and lower plates, according to the disclosure of Fig. 6, the ridging of opposed teeth of upper and lower plates would be such as to cross each other, and thus avoid possibility of any interlocking of teeth. Also, it is to be understood that the direction of grooving and the number of groves in the teeth would be determined to some extent on the particular tooth.

As an additional feature, each lower tooth is formed at the lower inside edge with an extended, rounded shoulder or projection 15, beyond the plate and cutting surface adapted to engage with the tongue, and at the outside edge of the upper teeth to engage with the cheek to keep the tissues thereof from between the teeth, the desirability of this being apparent.

To insure the solid anchoring of the metal bars as used in the teeth, it is desirable that they be perforated, as at 16 in Fig. 7, or that the edge that is to be embedded be serrated or otherwise made of irregular form to afford better anchorage in the material of the tooth body.

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

1. An artificial tooth of the character described comprising a molded tooth body and a metallic bar of ribbon form embedded in the body and having an edge thereof exposed at the occlusal surface of the tooth to facilitate the cutting and mastication of food.

2. An artificial tooth of the character described comprising a molded body formed with food clearance grooves in the occlusal surface opening to the sides of the tooth and metallic bars of ribbon-like form embedded edgewise in the body with edges thereof exposed to facilitate cutting and mastication of food and defining the food clearance grooves between them.

3. An artificial tooth of the character described, comprising a tooth body, a plurality of flat metal bars embedded edgewise in the occlusal surface of the body and having edge portions thereof exposed at the surface to facilitate the cutting and mastication of food; said bars being straight and defining food clearance grooves between them in the occlusal surface, and opening to the sides of the tooth and gradually increased in width and depth.

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