INTERCHANGEABLE POSTERIOR TOOTH CONSTRUCTION

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This invention relates to artificial teeth, having particular reference to artificial teeth of the interchangeable type which are adapted to be replaceably mounted in operative position in a cast metal restoration or denture base in a facile manner, enabling a broken or defective tooth to be replaced in a denture or restoration by a new or structurally intact tooth.

Such interchangeable artificial teeth are most generally used in removable and other dentures or restorations employed in replacement of natural anterior teeth, although the same are sometimes employed in the construction of posterior teeth. However, in posterior teeth, to provide the interfitting post and slot construction characteristic of so-called interchangeable teeth, it is necessary to employ porcelain tooth or crown bodies which form but a part of each complete tooth-forming structure. Thus, the usual interchangeable posterior crown of the prior art comprises a tooth body which is deeply recessed or undercut on its gingival side to provide in each tooth crown a flat slotted surface for the reception of a complementary post-carrying molded base section of the denture or restoration. Such an interchangeable posterior tooth crown, because of its configuration and deep recessing, presents regions in each porcelain crown body which are thin in cross section and, therefore, structurally weak, so that the same are subject to breakage when in the mouth and under the stresses and strains of food mastication.

In lieu of such incomplete porcelain crowns, it is also customary in the art to provide full or complete crowns of the so-called "tube" type. In the latter type of crown, the porcelain body of each is formed with a centrally disposed bore or opening extending from the gingival surface of the crown vertically to the occlusal or cusp surface thereof, and receiving a pin or stud forming an integral part of the cast metal base of the associated restoration. While this "tube" type of crown provides an all-porcelain body, the central opening therein contributes to the structural weakness of the tooth body and, furthermore, the construction does not lend itself to replaceable interchangeability.

Accordingly, the present invention has for certain of its principal objects to provide a full crown, interchangeable, porcelain, bicuspid and molar tooth-forming body for use in or on removable posterior metal base restorations; to provide a full cusped posterior crown having its side or proximal surfaces formed with base-receiving grooves by which the crowns are adapted to be slidably mounted on parallel receiving ribs integrally formed with and projecting from an associated cast metal base, or other suitable dental materials, of a denture or restoration; to provide an artificial posterior tooth crown for removable attachment with spaced base ribs, and one wherein the configuration of the grooves in the opposite proximal or side surfaces of each tooth are formed by an accurately controlled grinding operation, so that grooves of a plurality of such teeth will be identical in configuration and precisely spaced for perfect interchangeability with respect to each other in each tooth or crown of a given mold or type; to provide an artificial posterior tooth crown which possesses high mechanical strength and resistance to breakage when in use, and to provide an interchangeable posterior tooth or crown which may be varied in height through grinding off material originally present in the body of the tooth or crown in operations adapting the latter to the articulation or bite of individual users, such adaptation being accomplished without loss in the firmly joined retention of the tooth or crown with an associated base or mounting.

Other objects and advantages of the invention will appear more fully hereinafter, it being understood that the present invention consists substantially in the combination, construction, location and relative arrangement of parts as described in detail hereinafter, as shown in the accompanying drawing and as finally pointed out in the appended claims.

In the accompanying drawing, which is illustrative of a single but preferred form of the present invention:

Fig. 1 is a fragmentary side elevational view, showing a group of anterior and posterior teeth of a lower jaw having an edentulous space in which is positioned a partial removable posterior denture or restoration formed in accordance with the present invention;

Fig. 2 is a top plan view of the teeth and removable denture illustrated in Fig. 1;

Fig. 3 is a horizontal sectional view taken through the teeth and denture on the plane indicated by the line 3—3 of Fig. 1;

Fig. 4 is a vertical longitudinal sectional view on the line 4—4 of Fig. 3;

Fig. 5 is a vertical transverse sectional view on the line 5—5 of Fig. 1;

Fig. 6 is a detail vertical longitudinal sectional view taken through a single tooth or crown formed in accordance with the present invention, and when removed from association with a denture backing or mounting of the type shown in Fig. 4;

Fig. 7 is a detail horizontal sectional view taken on the line 7—7 of Fig. 6;

Fig. 8 is a detail perspective view of the denture backing or mounting and disclosing its teeth-receiving sockets and ribbed walls thereof;

Fig. 9 is an enlarged fragmentary horizontal sectional view in which is developed the preferred configuration of the rib-receiving grooves of the teeth.

In the drawings, as illustrated in Figs. 1 through 5 thereof, there has been shown the ridge R of the lower right side of the human jaw. In this instance the same has been illustrated as retaining a group of adjacent natural anterior teeth A and posterior teeth B, there being an edentulous space C present between the natural posterior teeth as the latter have been here indicated. Occupying the space C is a removable artificial denture or partial restoration D.

The latter in this instance comprises a cast metal base 10 which may be formed from such conventional materials as alloys composed of or containing the precious metals, stainless chrome-containing metals, or other equivalent moldable materials applicable to dental methods, techniques and fabrication. As shown, the metallic denture base 10 constitutes a backing or mounting which conforms to the configuration of and fits over the jaw ridge R in the region of the space C, the base having a concave gingival surface 11 and its ends formed with resilient clasps 12 and 13 which receive and grip, respectively, the associated cuspid tooth 14 of the anterior group A and the molar 15 of the posterior group B, holding the denture base in a firm but removable manner in the mouth in spanning the space C. Between the clasps 12 and 13,
the base is formed with one or more "tooth-receiving" sockets 15 having distal surfaces 16 which, as shown in Fig. 4, are formed with a vertical slot in their vertical transverse cross section and flat and horizontal, as shown in Fig. 4, in their longitudinal cross section.

The sockets are formed advantageously with relatively low height, shallow or narrow, longitudinally extending buccal and lingual flanges 17 and 18, respectively, and deep depressions transversely extending divisional and end walls 19 and 20, respectively. The end walls 20 may be somewhat deeper than the divisional wall 19, and as here depicted are so formed, since the end walls carry the clasps 12 and 13. In this instance the walls 19 and 20 have their socket-deepening surfaces formed with tooth retaining, vertical, angular ribs 21.

A denture base or mounting so formed receives the interchangeable, side grooved, posterior teeth 22 of the present invention. Each of these teeth comprises a crown-forming body contoured to the shape of natural bicuspids or molars, and are produced from customary materials and methods employed in the manufacture of present artificial teeth. Thus the teeth may be composed of heat-treated ceramic materials and known in the art as porcelain teeth, or the same may be of the type formed from a synthetic resin composition and known as "plastic" teeth. Preferably, I produce the base in the form of a porcelain tooth which during its process of oven heat treatment, following molding thereof, is subjected to lower negative pressures, whereby to insure high strength in the finished product.

In accordance with the present invention, these artificial teeth or crowns are standardized in their construction, so that if one or more thereof should when in use become broken or structurally impaired from any cause, the defective tooth or crown may be removed from the base 10 and another identical tooth or crown replaced in the denture in place thereof, in a quick, labor saving and costless manner.

This end is obtained in a partial cast metal restoration of the type disclosed in the drawings, by forming the body of each of the teeth 22 to present a buccal or front surface 23, a cusp or occlusal surface 24, side or proximal surfaces 25 which merge into the buccal surface 23 and a root or lingual surface 26. Each tooth is further formed to include a gingival or lab surface 27 which adjoins and possesses a matching contour with the distal surfaces 16 of the denture base sockets.

In each side or proximal surface 25 thereof, each tooth is provided with a vertical slot 28 which extends from the mesial surface 27 of each tooth body in an angular outwardly diverging direction toward its cusp or occlusal surface 24, the grooves at the occlusal end of the tooth body terminating short of and in spaced relation from the surface 24, as best shown in Fig. 6. The grooves or slots 28 are each preferably of uniform cross-sectional area throughout the length thereof and progressively decrease in transverse width from the open side of each groove toward its closed bottom, each groove or slot being devoid of undercutts or wells for trapping and locally enlarging adjacent portions of the cast metal base as are sometimes employed in or suggested by prior art constructions in permanently locking the teeth to the buckings.

As a result of their side groove formation, the teeth or crowns may be readily inserted over the retaining ribs 21 of the base and slidelibly fitted in a firm and secure manner within the sockets 15, a dental cement being preferably applied to the grooving surfaces of the crowns and the base in operatively retaining the parts in an operatively secured order. The groove construction thus presented is in the process of manufacturing the teeth accurately gauged as measured across the body of each tooth between the groove bottoms, so that close dimensional control is provided for the same interchangeability in posterior teeth as has been heretofore accorded to anterior teeth. The solid non-tubular construction of my improved teeth provide for maximum strength and enable the teeth to be ground along their lap or gingival surfaces 27 to an extremely low height and yet securely retained in the denture base. Also, due to the shape of the outer portions of the grooves considerable latitude is granted a technician in grinding away the body material at the sides or proximal surfaces of such teeth without interfering with the remaining grooving of the grooves.

The grooves or slots 28 may be disposed as practical conditions dictate with respect to a plane passing vertically through the true center or median line of each tooth body. As here shown, however, the centers of the grooves are placed so that they are disposed more toward the lingual sides 26 of said bodies than the buccal sides 23 thereof. As shown in Fig. 9 the bottom of each groove may be provided if desired with a narrow, coextensive and restricted recess 30 with corresponding formation on the part of the interfitting base ribs, whereby to minimize relative motion between the teeth and the socketed mountings therewith.

It will be understood, of course, that the present invention is susceptible of various changes and modifications which may be made from time to time without departing from the real spirit and general principles thereof, as well as specifically, as indicated in the appended claims.

1. A removable dental restoration, comprising: a cast metal base having a gingival surface contoured for seating application in an edentulous space in the human jaw; clasps formed with the ends of said base for removably anchoring the same on spaced natural teeth disposed immediately adjacent to said spaced natural teeth, said base including a transversely convex distal surface disposed between short vertical buccal and lingual flanges and transverse proximal flanges, said flanges forming in conjunction with said distal surface a crown-receiving socket; a replaceable porcelain posterior crown having a body formed with gingival, occlusal, buccal, lingual and proximal surfaces, said body being adapted for replacement in said socket and having the proximal surfaces thereof formed with longitudinally extending grooves of uniform cross-sectional area throughout their lengths, said grooves extending from the gingival surfaces of the crown body toward cusped occlusal surfaces thereof; and ribs of a configuration arranged to slidably receive the grooved proximal surfaces of the crown body, said ribs projecting inwardly and outwardly from the proximal flanges of the base, the crown body grooves having ground surfaces disposed relatively a predetermined distance to render said crown body replaceable in said base by a like crown body.

2. A removable dental restoration, comprising: a cast base having gingival surfaces molded to the configuration of the gingival region of the human jaw to which the base is applicable, the opposite or distal surfaces of the base providing relatively low vertically projecting buccal and lingual flanges which merge at the sides of the base into relatively higher integral proximal flanges, said flanges defining a tooth-receiving and mounting socket; a replaceable, imperforate, tooth body disposed in and joined solely with said base through engagement with the adjacent wall surfaces of said socket, proximal surfaces of said tooth body being each formed with a groove extending from the gingival surface of the body outwardly to the occlusal surfaces thereof, said grooves terminating short of said occlusal surfaces; and ribs integrally formed with the proximal flanges of said base and projecting therefrom for reception in the grooves of said tooth body, said grooves having their wall surfaces ground to standardized configuration and spacing, whereby to provide between the grooves a web of definite width, and to thereby render said tooth body replaceable in said base socket by another tooth body having a correspondingly standardized groove formation.

3. A dental restoration as defined in and by claim 2, and wherein the flanges of said base define a plurality of
adjoining sockets, each of which being adapted for the reception of one of said tooth bodies.

4. A dental restoration as defined in and by claim 2, and wherein the rib-receiving grooves of the proximal faces of said tooth body terminate at the sides thereof outwardly and longitudinally thereof in relative wide and shallow depressions, the latter providing for grinding the material composing said proximal faces without changing the shape or dimensional characteristics of said grooves.

5. An interchangeable artificial posterior tooth for incorporation in a cast denture base, said tooth comprising a solid imperforate body having its opposite side or proximal surfaces formed with rib-receiving grooves, the latter extending centrally and longitudinally of the proximal surfaces of said body from the gingival surfaces thereof to positions adjacent to but spaced from the occlusal surfaces of said body; said grooves terminating at the opposite sides thereof in outwardly and longitudinally disposed relatively wide and shallow depressions by which the proximal surfaces of the tooth body may be ground to remove material therefrom without affecting the shape and dimensions of said grooves.

6. An interchangeble tooth as defined in and by claim 5, and wherein the tooth body is formed with an uninterrupted, arcuate, base-engaging, gingival surface, the latter being devoid of apertures and held in rigid union with an associated base by socket flanges contacting the outer surfaces only of said tooth body.

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