Aug. 29, 1950 E. E. WARREN 2,520,265

METHOD AND MEANS FOR MAKING ARTIFICIAL DENTURES

Filed Oct. 10, 1947

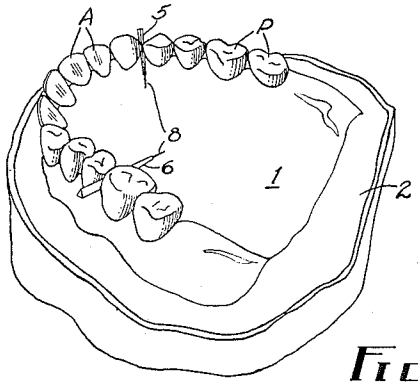


FIG. 1

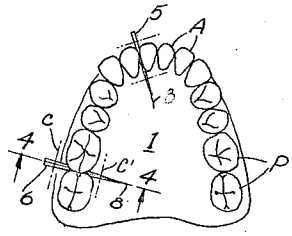


FIG. 2

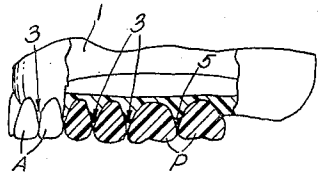


FIG. 3

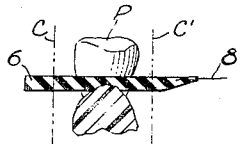


FIG. 4

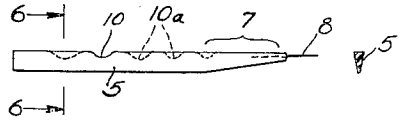


FIG. 5

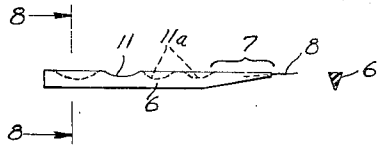


FIG. 6 FIG. 7 FIG. 8

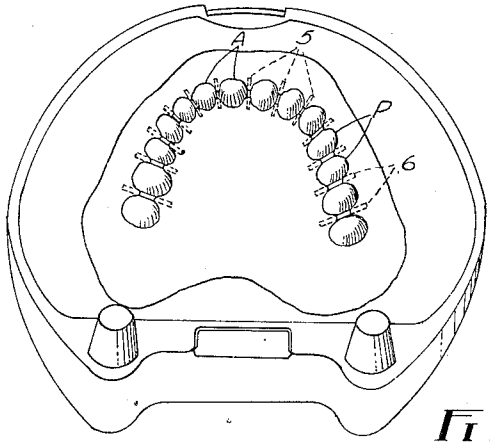


FIG. 9

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METHOD AND MEANS FOR MAKING ARTIFICIAL DENTURES

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6 Claims. (Cl. 18—34.1)

1

"Dentures" as herein used means artificial dentures. "Teeth" means artificial teeth.

Dentures of the type wherein the teeth are molded in a body or base of hard rubber or synthetic resin are, so far as I know, always molded without provision of interproximal spaces. Since natural interproximal spaces are closed at the occlusal plane by the contact points of the teeth, such spaces, if formed in the temporary wax base plate in which the artificial teeth are arranged and embedded to form the "set-up," would ordinarily constitute undercuts from which it would be extremely difficult to remove the investment material without danger of damaging or dislocating or marring parts of the denture, because the investment material adheres tenaciously to the teeth. There are other reasons or excuses for not forming (e. g. carving) interproximal spaces in the dentures. For example, the base plate material in the interproximal spaces is urged as lending lateral strength or dislocation-resistance to the individual teeth and facilitating cleaning of the dentures by the user. Actually it is practically impossible by the use of carving tools including the smallest dental burrs available to form clean and complete interproximal spaces; and if it were possible it would be prohibitively costly. Consequently the patient or user is made acutely conscious by tongue-feel of the fact that the teeth are unnatural, and tends to displace the dentures by attempting to force saliva and air through the imperforate wall formed around the plate by the teeth and intervening plate material, either by pressure or suction. Moreover, the lack of interproximal spaces affects the speech and makes the dentures appear to be artificial on casual observation at close range, whereas the opposite is desired by the user.

I have discovered a method and apparatus whereby smooth and natural interproximal spaces may be provided on artificial dentures without departing disadvantageously from accepted practice or technic used in their formation; without disproportionate cost, and without actual sacrifice of strength or utility, thus indicating the principal objects of the present invention. Otherwise stated the primary object is to provide a new and efficient method and apparatus for forming interproximal spaces on artificial dentures so that all the defining surfaces of the interproximal spaces will be natural in form, smooth, clean and polished and will not tend to collect or retain food or stain.

Briefly, I provide interproximal spaces on the usual wax set-up and fill or approximately fill

2

those spaces with strips of readily flexible and elastic barrier material, the physical characteristics of which are such that the barrier material will not fuse, weld or adhere strongly to the base plate material used to form the finished denture or to the teeth embedded thereby in the molding process, but which can easily be separated cleanly from the molded denture along with the surrounding investment material, leaving the smooth, clean and polished surfaces referred to above and without requiring any subsequent operations to be performed by hand. Typical forms of the apparatus and the preferred procedure in practicing the method hereof are illustrated in the accompanying drawing wherein:

Fig. 1 is a perspective view of a maxillary wax set-up on the usual cast model of the oral cavity region to be fitted, the view showing two of the elastic barrier strips hereof in place between respective mutually adjacent artificial teeth;

Fig. 2 is a palatal view of the wax set-up and two barrier strips in place;

Figs. 3 and 4 are sectional views taken respectively lengthwise and crosswise of a row of posterior teeth on the set-up;

Figs. 5 and 7 are side elevations of preferred forms of strips designed for use respectively to form or determine interproximal spaces for anterior and posterior teeth;

Figs. 6 and 8 are transverse sectional views as indicated on Figs. 5 and 7 respectively; and

Fig. 9 is a palatal view of one half of a typical molding flask showing a set of maxillary teeth and a full complement of the elastic strips embedded in investment material contained in the flask ready for placement of raw plastic in the cavity of the mold.

The method hereof will be described in connection with only the pertinent steps in making a typical denture from modern plastic or synthetic resin which, under processing heat and pressure, will not weld to rubber, thus excluding hard rubber. Acrylate is an example of synthetic resin plastic now in common use.

In Figs. 1 to 4, the anterior teeth are designated A and the posterior teeth P. The molded wax body 1 temporarily embedding the root portions of the teeth as usual overlies and is worked to proper form on the usual artificial stone model or case 2 which, after appropriate treatment (e. g. foil overlay, etc., not shown), forms part of the mold cavity for the plastic base plate. After the teeth have been found to be properly arranged or set in the wax, the wax is cut or molded to form the desired or appropriate con-

tours. In accordance with the present method, interproximal spaces 3, Fig. 3, are formed on the set-up as with a narrow spatula, either by cutting away or molding of the wax during or after formation of other gingival margin areas on the wax.

The barrier strips are elastic rubber which may be natural or synthetic. The barrier strips are preferably of two types, indicated 5 and 6, designed respectively for forming the anterior and posterior spaces. The strips, as shown particularly by Figs 4 to 8, are elongated pieces of elastic rubber of cuneiform or wedge-shaped cross section and tapering gradually as at 7 nearly to a point to form one extremity. Both ends could be thus pointed. The gradual taper assists in initially inserting the ends of the strips into the interproximal spaces on the wax set-up, some of which spaces are extremely narrow. An additional refinement is to embed protruding filaments 8 of flexible material (e. g. synthetic fibers or silk) into the points 7 to assist in inserting them. The flexibility of the points or inserts is desirable if not necessary because the spaces are frequently curved on short radii in general conformance with the interproximal gingival margin.

The strips 5 for the anterior interproximal spaces may be made with a more elongated cross sectional height and less divergence between the sides than the strips 6 for the posterior spaces. Additionally, further in view of the variation in size of the interproximal spaces, the strips are preferably of gradiently increasing dimensions from one end to the other (see Fig. 2), being variably positioned to select the portion of each strip which best fits each space. Arcuate indentations (one or more) may be formed as at 10 or 10*a* on the strips 5 generally to fit the anterior gingival margins defining the base portions of the interproximal spaces, and one or more arcuate but wider indentations is or are formed as at 11 or 11*a* on the strips 6 with the view to fitting as nearly as possible the differing interproximal marginal areas at the respective regions mentioned.

The principal advantages of using elastic strips as barrier material are that, once inserted, the pointed end and the wider shank may be grasped as between the thumbs and index fingers of respective hands or by forceps or tweezers and the strips then stretched to reduce their cross sectional dimensions, thus enabling easy selective placement in the most ideal position without dragging the strips against the teeth and thereby tending to dislocate them from set position in the relatively soft and fragile wax. When the tension is released, assuming proper selective placement, the relaxed strip expands in cross section and very neatly fills the interproximal space.

After the complement of strips 5 and 6 has been placed, it is recommended that the free ends of the strips be severed and removed (e. g. by scissors) as along the lines C and C', Figs. 2 and 4, better to place the investment, to enable inspection of the molded wax; remodeling thereof where necessary and, later in order to facilitate removal of the investment material from around the teeth and molded base plate.

Fig. 9 as indicated above shows the root portions of the teeth protruding from the hardened investment material forming the lingual side of the mold cavity after the wax has been removed. It will be noted that the ends of the strips 5 and 6 are embedded in said material, but that the portions of the strips which lie in the interproximal spaces are exposed. From this point on the usual technique is followed in completing the denture. The raw plastic material is packed and pressed over the artificial teeth and investment when the male part of the flask containing the model is closed under pressure against the invested case. The case is then conventionally cured as in a curing tank. For further discussion of the technique generally in relation to acrylic resin denture materials reference is made to The American Textbook of Prosthetic Dentistry (L. Pierce Anthony D.D.S., editor), 7th edition, pages 470 thru 472. When, after curing of the case, the investment surrounding the normally exposed parts of the teeth is fractured and removed during deflasking, the strips are withdrawn with the fragments; the strips being pulled apart when necessary due to having been bonded in opposing fragments of the investment material. The barrier material leaves all the interproximal-space-defining surfaces smooth, clean and polished, requiring no further operation as with burrs or other tools.

I claim:

1. In the described and indicated process of making artificial dentures by molding plastic base material around the teeth, the method of providing interproximal spaces on such dentures comprising forming the spaces in the wax set-up and inserting elastic strips in the spaces, which strips are of a material which will not weld to the plastic base material used.

2. The method according to claim 1 wherein the plastic is a synthetic resin on the order of acrylate, and the strips are rubber.

3. As a barrier for use in forming interproximal spaces on dentures in dental laboratory technique as described, an elongated elastic strip of wedged shaped cross section provided with a sufficiently narrow flexible approximately pointed end portion for enabling relatively easy insertion into said spaces on a wax setup, the strip for the greater part of its length being stretchable lengthwise so as temporarily to reduce its cross section for easy placement between the teeth on the setup and whereby the strips will more nearly fill said spaces when relaxed after stretching.

4. A barrier strip according to claim 3, having a leader filament embedded in and projecting lengthwise from its narrow end.

5. A barrier strip according to claim 3, having a curved indentation along the base portion of its wedge shape adapted approximately to fit a gingival margin defining an interproximal space.

6. As a means for forming interproximal spaces in dentures and for use in connection with setting up of the teeth in and on a readily sculptured base to be supplanted by permanent denture base material, a barrier strip of flexible elastic hence stretchable material said strip being of elongated form, wedge-shaped in cross-section and tapered longitudinally toward one end for easy insertion between the teeth on such base.

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The following references are of record in the file of this patent:

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