July 2, 1968 A. B. VAN HANDEL 3,391,231

METHOD OF FABRICATING DENTURES HAVING HYDRAULIC CUSHIONING MEANS

Original Filed Oct. 21, 1964

Fig. 1

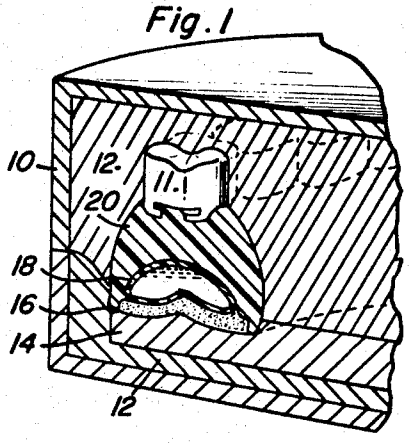


Fig. 2

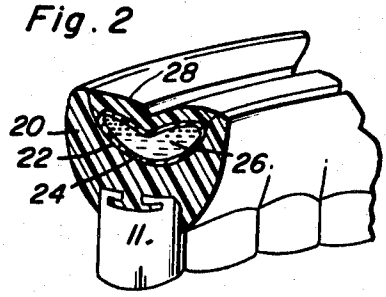


Fig. 3

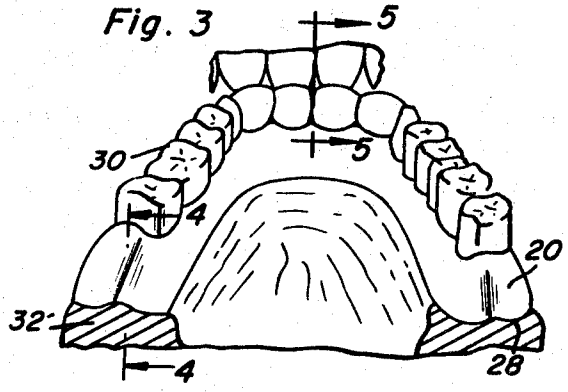


Fig. 4

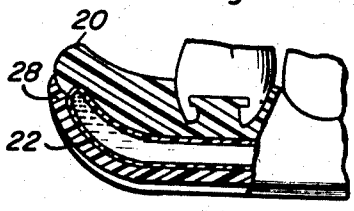


Fig. 5

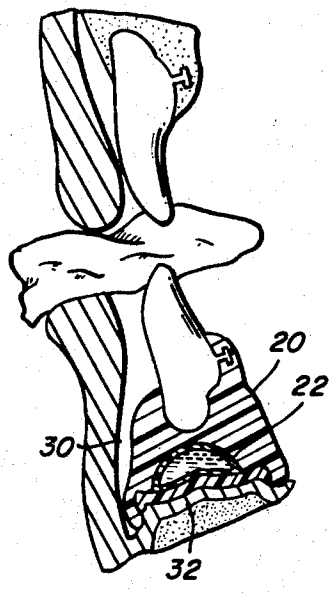


Fig. 6

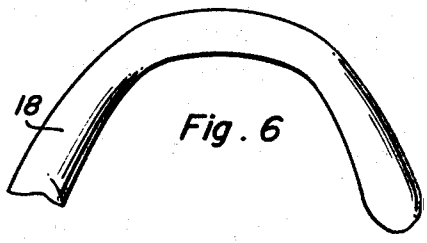
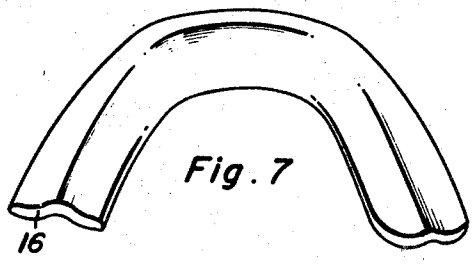


Fig. 7



Ambrose B. Van Handel

INVENTOR.

KENDRICK, SUBKOW AND STOLZY

BY

ATTORNEY.

United States Patent Office

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METHOD OF FABRICATING DENTURES HAVING HYDRAULIC CUSHIONING MEANS

Ambrose B. Van Handel, Northridge, Calif., assignor to Weston Chemical Corporation, New York, N.Y., a corporation of New Jersey

Original application Oct. 21, 1964, Ser. No. 405,462, now Patent No. 3,339,283, dated Sept. 5, 1967. Divided and this application Sept. 11, 1967, Ser. No. 666,725

10 Claims. (Cl. 264—18)

ABSTRACT OF THE DISCLOSURE

Method of fabricating an artificial denture by forming a relatively rigid denture carrier with a void forming means therein, removing the void forming means, securing a hydraulic cushioning means in the void formed by removal of the void forming means, and covering the hydraulic cushioning means with a semi-soft cushion adapted to overlie and conform to the gum ridge of the denture wearer.

This application is a division of my prior copending application Ser. No. 405,462, filed Oct. 21, 1964, now U.S. Patent No. 3,339,283.

This invention relates to a method of providing a denture which equalizes the pressures exerted upon the gums of the wearer during mastication.

Ordinarily, the lower denture is by far the hardest to make comfortable for the patient, especially where the patient's lower gum ridge has resorbed. Therefore, instead of a firm, hard ridge to support a denture, the patient often times has a knife-edge ridge upon which to support a denture. With a knife-edge ridge of this nature, considerable pain occurs when pressure is applied to the ridge. This problem is further amplified by the fact that the forces necessarily exerted in biting or chewing are of a very high order, and accordingly so is the impact and shock to the gum. This is particularly true when the pressure exerted upon the gum ridge is localized over a relatively small area.

In many prior art dentures the forces of mastication are transmitted by a relatively rigid denture directly to the wearer's gums. In prior art dentures which attempted to overcome this problem by utilizing a resilient layer adjacent the wearer's gum, the discomfort was not substantially alleviated because the denture failed to equalize the pressure exerted upon the gum during mastication. As a result of this discomfort or pain, it is extremely uncomfortable for the denture wearer to bite down, as he or she normally would, to masticate food.

It is therefore a primary object to set forth a method to provide an improved denture which overcomes the discomfort heretofore associated with the wearing of dentures.

It is another object of this invention to set forth a method to provide a denture which will substantially reduce or eliminate the shock, or impact and pressure upon the wearer's gums due to the forces of biting and chewing.

It is still a further object of this invention to set forth a method of providing an artificial denture, either full or partial, with a hydraulic cushioning means.

It is still a further object of this invention to set forth a method whereby many existing dentures may be modified in accordance with the teachings of this invention.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawing in which like reference characters designate like parts in the several views thereof, in which:

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FIGURE 1 is a sectional view of a portion of a dental flask with a portion of the lower denture embodying the present invention in an intermediate stage of fabrication;

FIGURE 2 is a perspective of the portion of the denture of FIGURE 1 after placement of the hydraulic cushioning means;

FIGURE 3 is a perspective, looking down from the distal end, of a lower denture embodying the present invention in place in a wearer's mouth;

FIGURE 4 is a sectional view of a portion of the distal end of denture of FIGURE 3 taken along the line 4—4 of FIGURE 3;

FIGURE 5 is an enlarged sectional view of a portion of the mouth of a person wearing the denture of FIGURE 3 taken along line 5—5 of FIGURE 3;

FIGURE 6 is a perspective view of the spacer means utilized in placing the hydraulic cushion of the present invention; and

FIGURE 7 is a perspective view of the configuration of the base wax utilized in the present invention.

While a removable full lower denture is illustrated and described hereinafter, it is understood that this embodiment is shown for illustrative purposes only. This invention is also suitable for use with removable partial dentures.

Referring to FIGURE 1, a conventional sectional dental flask indicated generally at 10 with teeth 11 invested in stone 12 and including a gum ridge model 14 is prepared by methods well known in the art.

Although not shown, it is understood that the area between the gum ridge model 14 and the lower surface of the invested teeth 11 will be void of any material due to the melting out of temporary set-up or trial denture carrier which is generally fabricated of a relatively low melting point wax. Within the void so formed, a denture embodying the present invention is formed by placing a strip of a relatively low melting point base wax 16 in contiguous relationship with the gum ridge model. The base wax 16 stops short of extending across the entire width of the gum ridge portion of the model 14. Although not shown in FIGURE 1, the base wax 16 extends substantially to the distal ends of the denture for reasons which will be explained. The overall shape of the base wax is best seen in FIGURE 7. A horseshoe shaped spacer 18 is placed upon the base wax 16. The spacer 18 is best seen in FIGURE 6 where it will be noted that the ends of the spacer 18 are preferably rounded, and the cross sectional shape of the spacer 18 is generally oval or kidney shaped for reasons which will become apparent. The spacer 18 is formed of a relatively rigid inert plastic such as neoprene for example. The spacer 18 would be provided in a number of sizes so as to properly overlie the configuration of the gum ridge. Normally three sizes, namely, small, medium and large, would be sufficient to properly fit persons requiring dentures.

The upper portion of the flask 10 containing the teeth 11 is packed with a plastic such as an acrylic which, upon curing, forms a tough rigid carrier 20 for the teeth 11. The flask 10 is closed, expressing the excess plastic or acrylic material.

Then flask 10 is opened, and the lower portion of the flask 10 with the gum ridge model is removed, thus exposing the base wax 16. The base wax 16 is stripped out and then the spacer 18 is also stripped out of the

carrier 20. It is thus seen that the base wax 16 and the spacer 18 cooperate to form a pattern for a hollowed out dome-shaped groove or void which extends into the carrier 20, along substantially the entire length and width of the gum ridge of the denture.

The upper portion of the void formed by the removal of the spacer 18 is utilized for the placement of a hydraulic cushioning means generally indicated at 22. The hydraulic cushioning means 22 includes a sealed bag 24 formed of a suitable resilient plastic such as a silastic rubber produced by Dow-Corning for example, which is substantially filled with a viscous fluid 26 such as a liquid uncatalyzed cold cure silicone rubber produced by Dow-Corning and marketed under the trademark of Silastic 390. Any suitable relatively viscous liquid which does not react with the bag 24 could be utilized. A horseshoe-shaped plastic bag 24 filled with such a liquid 26 will have a viscosity comparable to the pressure-bearing ability of the mucous membrane of the mouth.

The hydraulic cushion 22 is made in a plurality of sizes to correspond to the size and shape of the spacer 18 which it replaces in the completed denture. Accordingly, the sealed hydraulic cushion 22 would have the same external appearance as the spacer 18 as seen in FIGURE 6. The hydraulic cushion 22 may be adhesively secured to the carrier 20 if desired, although it is not generally necessary. The placement of the hydraulic cushioning means is normally performed with the teeth 11 and their associated carrier 20 still invested in the upper portion of the flask 10.

The exposed portion of the bag 24 as well as the remainder of the surface of the carrier 20 adjacent the void formed by the removal of the base wax 16 is coated with a suitable primer. The primer aids in securing a semi-soft plastic cushion 28 beneath the hydraulic cushion 22. The primer should be selected on the basis of its compatibility with the material used to form the cushion in situ.

The remainder of the void formed in the carrier 20 by the removal of the base wax 16 is packed with an uncured plastic material which upon curing remains relatively soft but nonabsorbent. A silicone rubber such as Silastic 390 produced by Dow-Corning is preferred. A compatible primer for use with this cold cure silicone rubber would be Dow-Corning's Silastic 390 Primer.

After packing with the catalyzed silicone rubber the flask is closed thus expressing any excess sicilone rubber cushioning material 28 and forming a semi-soft cushion which conforms to the contour of the gum ridge model 14. Sufficient time is allowed for the curing of the silicone rubber after which the flask 10 is removed and the stone 12 is carefully chipped away from the completed denture. The cushion 28 will accordingly have substantially the same configuration as the base wax 16 which it replaces.

The completed denture indicated generally at 30 in FIGURE 3 is shown in place on the wearer's gum 32. A sectional view adjacent one the distal ends of the denture 30 is shown to further relate the placement of the hydraulic cushion means 22 and the semi-soft silicone rubber cushion 28.

In FIGURE 4 it is seen that the hydraulic cushion 22 extends substantially to the distal end of the carrier 20 for reasons which will become clear. The semi-soft cushion 28 preferably extends beyond the hydraulic cushion 22, thereby effectively sealing the hydraulic cushion 22 within the carrier 20.

Referring now to FIGURE 5, the pressure equalizing effect of the hydraulic cushion 22 is illustrated with the wearer biting into a relatively solid piece of food. It will be apparent that in accord with the principles of hydraulics the forces exerted upon one portion of the hydraulic cushion 22 will be equalized throughout the entire cushion before being transmitted through the cushion 28 to the gum 32 of the person wearing the denture 30. Accordingly, the pressure exerted upon the gum ridge will be distributed over substantially the entire gum ridge. It is thus seen that this invention provides a method of producing an improved denture which greatly minimizes the discomfort associated with the impact and pressure exerted upon the wearer's gums during biting and chewing.

The method for relining or rebuilding old dentures is the same as for new dentures, except that the neoprene spacer 18 is not used to form a void for the placement of the hydraulic cushion. Instead, the hydraulic cushion is sealed directly to the underpart of the lower denture, which was previously hollowed out, by means such as abrading, to receive the hydraulic cushion. The semi-soft silicone rubber is secured directly to the old denture and the hydraulic cushion.

While the invention has been illustrated and described in some detail in one embodiment thereof, it is to be understood that different materials may be used to produce a denture as set forth in the appended claims.

I claim:

1. The method of fabricating an artificial denture which comprises the steps of molding a relatively rigid denture carrier with a void forming means therein, removing said void forming means, securing a hydraulic cushioning means in the void formed by the removal of said void forming means and covering said hydraulic cushioning means with a semi-soft cushion adapted to overlie and conform to the gum ridge of the denture wearer's mouth.

2. The method of repairing or rebuilding an artificial denture which comprises the steps of providing the denture carrier with means to receive a hydraulic cushioning means, in overlying relationship to the denture wearer's gum ridge, positioning said hydraulic cushioning means to said denture carrier in the void so formed and covering said hydraulic cushioning means with a semi-soft cushion, said semi-soft cushion sealing said hydraulic cushion to said denture carrier.

3. The method of fabricating an artificial denture which comprises the steps of molding a relatively rigid denture carrier with a void forming means therein, removing said void forming means, securing a first soft cushioning means in the void formed by the removal of said void forming means and covering said first soft cushioning means with a second semi-soft cushion adapted to overlie and conform to the gum ridge of the denture wearer's mouth.

4. The method of claim 1 wherein said hydraulic cushioning means is substantially filled with a liquid having a viscosity comparable to the pressure-bearing ability of the mucous membrane of a human's mouth.

5. The method of claim 1 wherein said void forming means is a horseshoe shaped spacer, and said hydraulic cushioning means has a horseshoe shaped configuration corresponding to the shape of said void forming means.

6. The method of claim 2 wherein said semi-soft cushion is formed in situ.

7. The method of fabricating an artificial denture, said method comprising molding a relatively rigid denture carrier including a void forming means contained within said denture in a dental flask, removing said void forming means from said relatively rigid denture, positioning a soft cushioning means within the void formed by the removal of said void forming means so as to overlie the gum line of the denture wearer, securing a semi-soft cushioning means in overlying relation to said soft cushioning means, bonding said semi-soft cushioning means to said relatively rigid denture and said soft cushioning means, and forming the outer surface of said semi-soft cushioning means to a configuration which conforms to the gum line of the denture wearer.

8. The method of claim 7 wherein said soft cushioning means is a hydraulic cushion which is substantially filled with a liquid having a viscosity comparable to the pressure-bearing ability of the mucous membrane of a

human's mouth, and said soft cushioning means is positioned within said void so as to bear against the denture wearer's gum ridge.

9. The method of claim **8** wherein said semi-soft cushioning means is formed in situ within said dental flask by placing an uncured plastic material in a shaped cavity within said flask in overlying relation to said soft cushioning means, and curing said plastic material to form a bond with said relatively rigid denture.

10. The method of claim **9** wherein said relatively

rigid denture and said soft cushioning means is coated with a compatible primer prior to the placing of said uncured plastic material within said shaped cavity within said dental flask.

No references cited.

JAMES A. SEIDLECK, *Primary Examiner.*

A. KOECKERT, *Assistant Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,391,231 July 2, 1968

Ambrose B. Van Handel

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

In the heading to the printed specification, lines 4 to 6, "Northridge, Calif., assignor to Weston Chemical Corporation, New York, N. Y., a corporation of New Jersey" should read -- 8653 Louise Ave., Northridge, Calif. 91324 --.

Signed and sealed this 16th day of December 1969.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents