Sept. 5, 1967 A. B. VAN HANDEL 3,339,283

DENTURES WITH HYDRAULIC CUSHIONING MEANS

Filed Oct. 21, 1964

Fig. 1

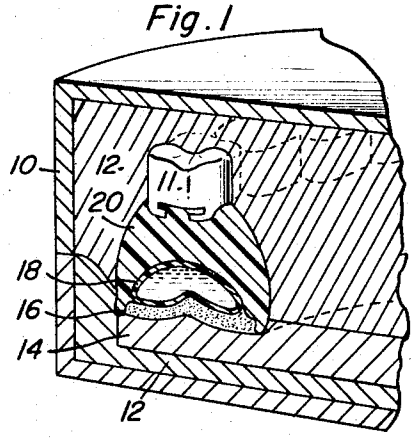


Fig. 2

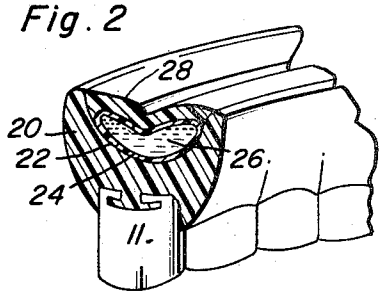


Fig. 3

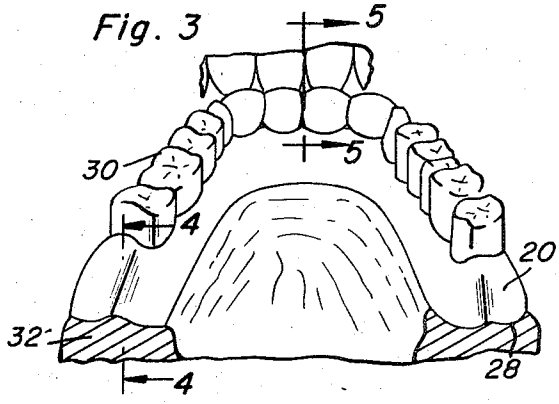


Fig. 4

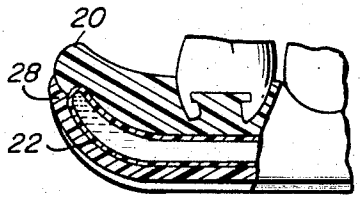
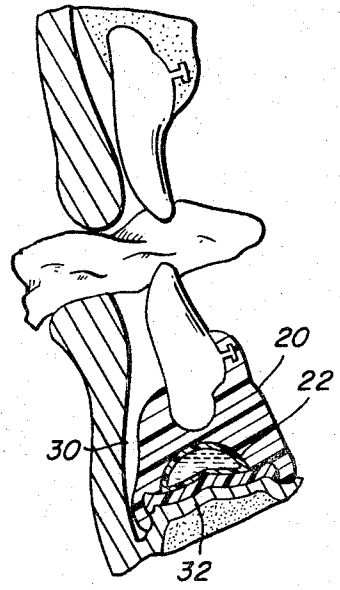


Fig. 5



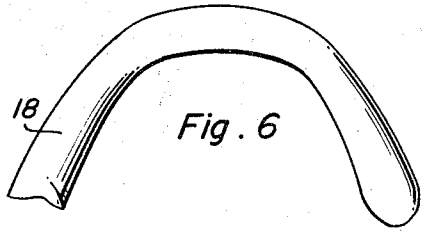


Fig. 6

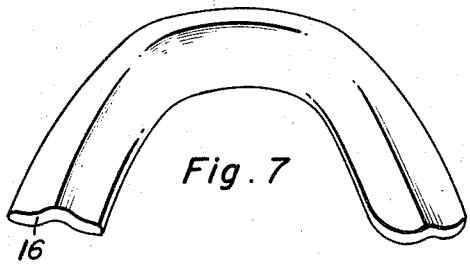


Fig. 7

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DENTURES WITH HYDRAULIC CUSHIONING MEANS

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ABSTRACT OF THE DISCLOSURE

An artificial denture having a hydraulic cushion in the gum engaging groove portion and a non-absorbent cushioning material overlying the hydraulic cushion and sealing it in the groove portion.

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 forces necessarily exerted in biting or chewing are of 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 and means 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 and means 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 another object of this invention to provide a means of equalizing the pressures exerted upon the gums during biting and chewing regardless of any irregularity of the gum, without any undue pressure upon any one particular area thereof.

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 and means 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 drawings in which like reference characters designate like parts in the several views thereof, in which:

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 partial dentures both fixed and removable.

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 the 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 **16** 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 **28** 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 non-absorbent. 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 silicone 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 of 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 and means of producing an improved denture which greatly minimizes the discomfort associated with the impact and pressure exerted upon the wear'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 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.

What is claimed as new is as follows:

1. In a denture construction, a rigid carrier having a groove in the under surface thereof which corresponds generally in configuration to the wear's gum line, a hydraulic cushion positioned in said groove so as to bear against the wearer's gum ridge, and a relatively soft, non-absorbent cushioning material positioned in said groove in overlying relation to said hydraulic cushion, said cushioning material being bonded to said rigid carrier and thereby sealing said hydraulic cushion within the groove in said carrier so as to bear against the wearer's gum ridge the outer surface of said cushioning material having a configuration which conforms to the gum line of the denture wearer.

2. The denture construction of claim **1**, wherein said hydraulic cushion is substantially filled with a viscous liquid whose viscosity is comparable to the pressure-bearing ability of the mucous membrane of a human's mouth.

3. The denture construction of claim **1**, wherein said hydraulic cushioning means is horseshoe shaped.

4. The structure of claim **2** wherein said viscous fluid is an uncured silicone rubber.

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