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CONFORMABLE, REINFORCED, SOFT BASE DENTURE

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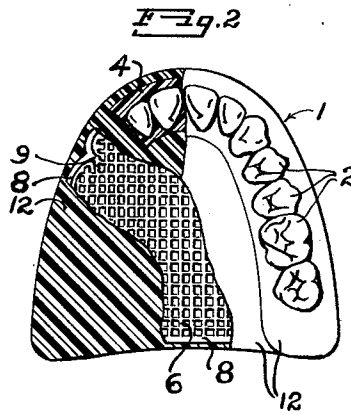
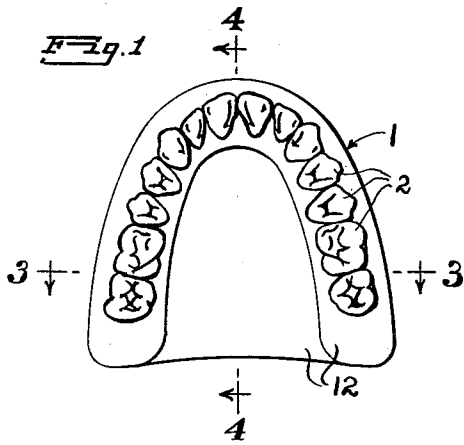


Fig. 3

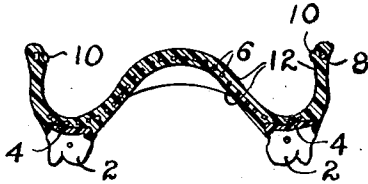


Fig. 4

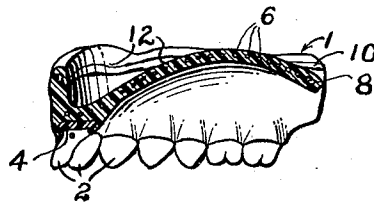


Fig. 6

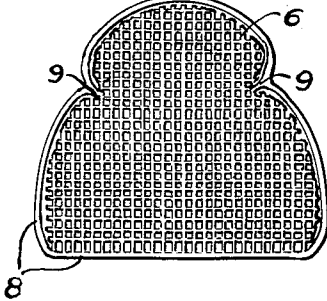


Fig. 5

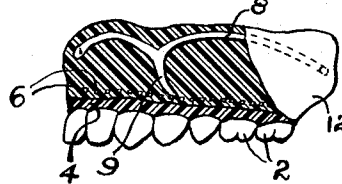


Fig. 7

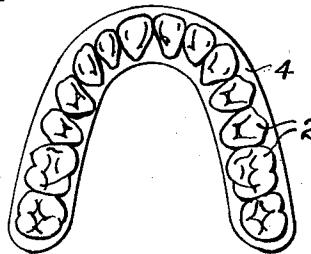
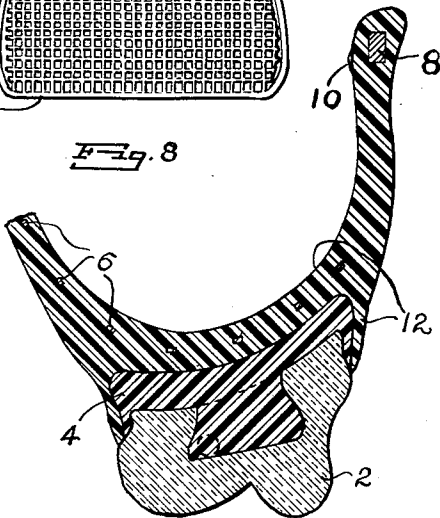


Fig. 8



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CONFORMABLE, REINFORCED, SOFT BASE DENTURE

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This invention relates to artificial dentures and more particularly to reinforced dentures, with such portions of the denture that come in contact with the mouth being hard at normal "bench cooled" temperature; however, when the denture material is warmed to mouth temperature or higher, it becomes comparatively soft and pliable, and is therefore conformable to the irregularities natural to the gum tissues and/or palate tissues of the mouth, thereby making the denture very comfortable to the wearer.

Even small irregularities in the denture material, which for purposes of differentiation, will hereafter be referred to as the soft denture material, are nullified by the flexibility of the material at body temperature, to conform to the shape of the natural gum and palate tissue.

The denture is so designed and processed, that the entire denture will hold its shape by means of mesh metal casting, which mesh metal casting, however, is of such construction as to allow a limited flexibility, as is necessary to conform to the shape of the gums upon the application of pressure to the teeth, as by chewing.

The teeth of the denture are set and bonded to a "hard" denture material, which hard denture material is bonded to the soft denture material, however, the hard, reinforced denture material is yieldable to a limited extent, so as to enable an individual tooth to yield very slightly. Only sufficient hard denture material is used to form a base for the teeth.

An object of this invention is to provide a denture, the portions of which, when in contact with the mouth, become sufficiently pliable, by body heat, to conform to the mouth, and is, therefore, very comfortable to the wearer.

Another object of the invention is to provide a denture which holds its shape by means of a cast metal mesh, but even the so-called hard or rigid portions of the denture retain a degree of flexibility so it will yield to the mouth of the wearer at points of, or at times of stress.

Still another object of this invention is to provide, in an artificial denture, the combination of "hard" denture material, "soft" denture material, and reinforcing material which will allow the teeth and "plate" to fit and to yield in a manner more closely approaching natural teeth than has heretofore been possible.

With these objects in mind and others which will become manifest as the description proceeds, reference is to be had to the accompanying drawings, in which like reference characters designate like parts in the several views thereof, in which:

FIG. 1 is a plan view of a denture, as viewed from the under side of the upper plate, showing the teeth positioned therein;

FIG. 2 is a view similar to FIG. 1, with parts broken away and shown in section, to illustrate the details of construction;

FIG. 3, is a sectional view taken on the line 3-3 of FIG. 1, looking in the direction indicated by the arrows;

FIG. 4 is a sectional view taken on the line 4-4 of FIG. 1, looking in the direction indicated by the arrows;

FIG. 5 is an elevational view of an upper plate of a denture, the outer portion thereof having the soft denture material removed therefrom, with other portions being shown in section to illustrate the details of construction;

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FIG. 6 is a plan view of the mesh reinforcing member for the denture, and showing the lingual bar cast integral therewith;

FIG. 7 is a plan view of the under side of the upper denture, showing the teeth set in hard denture material, and before the cast reinforcing mesh and the soft denture material are applied thereto; and

FIG. 8 is a greatly enlarged, fragmentary sectional view similar to the showing in FIG. 3, but particularly showing the relative positioning of the hard denture material, the cast reinforcing mesh, the lingual bar and the soft denture material.

With more detailed reference to the drawing, the numeral 1 designates generally a denture, in the present instance and for purposes of illustration, an upper denture. The denture is comprised of several sub-assemblies or elements, which, when put together in the manner hereinafter set out, will result in a denture which approaches the function and feel of natural teeth.

The teeth 2 are of the type usually used in mechanical dentistry, and are each provided with a recess, or other bonding element therein, in such manner as to enable the securing or bonding thereof in the denture material, such as a hard acrylic, as indicated at 4.

An impression is made of each portion of the mouth of the patient in which a denture is to be fitted, in the usual manner, and which process is well known in the art of mechanical dentistry, whereupon a cast of plaster or a dental stone model is made of the impressions so as to produce a simulation of the portions of the mouth, to enable the proper setting up of the teeth in wax dentures, and the articulation thereof, whether one or both dentures are to be made. After such steps have been taken, these casts are utilized in a manner well understood in the art of dentistry, for making a wax denture model in which the teeth are set preparatory to the articulation thereof on an articulator, and the usual "try-in" is made in the patient's mouth.

After the correct positioning of the teeth has been established, the wax denture model containing the teeth, is invested in denture stone or plaster in a manner well known in the art of mechanical dentistry, after which the wax around the teeth is removed in the usual manner, as by application of heat, by boiling, which creates a cavity around the base of the teeth, with the upper portions of the teeth being invested in the dental plaster or dental stone in the flask. With the wax removed, the cavities formed by the removal thereof are packed with uncured, hard denture material so as to anchor the ends of the teeth therein. The hard denture material, such as acrylic resin, is processed in the manner prescribed for the proper curing of such material.

Upon the completion of the processing or curing of the hard denture material around the teeth, the excess of such material is cut away until a relatively thin ribbon of this material remains at the base of each tooth. When this process is completed, the partial assembly is laid aside until other work is ready to be combined therewith.

Prior to the processing and curing of the denture described above, a metal mesh reinforcement member 6 is made to conform to the particular portion of the denture it is to reinforce, and is incorporated into the partially processed denture in a manner well known in the art, as by the cast mesh technique, as will be brought out more in detail hereinafter.

A wax grid model is utilized with a peripheral bar of wax material surrounding this in such manner that when the model of wax material is invested in a plaster or stone material, and with the wax removed in the manner well known in the art of dentistry, a replica of the wax grid model is cast into metal, which cast metal grid with

a metal peripheral bar will later be imbedded into the soft gum material of the denture, as will be brought out more fully hereinafter. The peripheral bar is so positioned that a certain portion of the mesh is integrated therewith, so in the casting of this peripheral bar 8, it will be integrally formed with the cast metal mesh. The mesh 6 and the peripheral bar 8 are conformed to the particular portion of the mouth, while in wax, and before it is encased, the wax model thereof is invested in dental stone or plaster and processed to remove the wax, and then the metal is cast in the void formed in the invested dental stone or plaster from which the wax has been removed in a manner well known in the art of dental casting, so that the cast metal mesh 6 and the peripheral bar 8 are removed from the investment in the dental stone or plaster, when cooled and are finished in the usual manner. The mesh is relatively thin, so as to occupy a minimum of space, while providing maximum strength to the denture into which it is incorporated during the assembly of the denture. In the forming of the peripheral bar 8 and the cast metal mesh 6, a reinforcing bar 9 extends from the peripheral bar 8 to the mesh 6 in such manner as to interconnect therewith intermediate the labial and buccal portions of the denture, thereby giving greater strength to the denture. The reinforcing bar 9 is curved, or is at an acute angle with respect to the cast metal mesh, which gives greater resiliency than if it were perpendicular thereto. The cast metal mesh is made integral with reinforcing bar 9, which cast metal mesh is resilient and forms a reinforcing member which is adapted to be placed between the base material to which the teeth are bonded and the normal surface with which the gum surface comes in contact.

Assembly

The lingual face of the periphery of the stone model is scraped or scored lingually of the reinforcing bar 8. The scraping or scoring of the stone model in this manner forms a minute groove, so when the denture is made of soft denture material 12, a slight ridge 10, one thousandth to three thousandths of an inch in height, will be formed lingually of the peripheral bar 8, which ridge serves as a retention seal to insure the denture fitting snugly to the gums, and to insure the retention of the denture in the correct position in the mouth.

With the stone cast prepared and articulated, the cast metal mesh sub-assembly, as shown in FIG. 6, is placed on the stone cast, and the hard denture sub-assembly, as shown in FIG. 7, the palate portion of which has been removed, in the case of an upper denture, is placed thereupon and articulated, so that a minimum clearance is established between the lower face of the hard denture sub-assembly and the upper face of the stone cast, which clearance is about two millimeters. This clearance provides sufficient void, so when filled with soft denture material 12, a proper bonding will be provided between the cast metal mesh and the hard denture material 4. The soft denture material, as well as the cast metal mesh, provides a certain degree of flexibility between the teeth and the gum tissue, with the soft denture material 12 forming a cushion between the teeth and the gum tissue.

After the clearance has been established, a wax case of the soft denture material 8 is made with the cast metal mesh and hard denture portion containing the teeth, and is articulated. In making the wax case of the denture, it is preferable to cover all parts of the peripheral bar 8, the cast metal mesh 6, and hard denture material 4 with wax, so that the wax will present the desired contact with the teeth at the dentine line, so no hard denture material will be exposed to view or be in contact with the gum or mouth tissue. The wax case is then carved in the usual manner so as to present a denture of the artistic character and of the thickness required for the particular patient.

The waxed case of the soft denture is of a shape to

conform generally to the oral cavity of the patient to whom the denture is to be fitted, as shown in FIGS. 3, 4, and 8, whereupon, the wax denture is tried in the patient's mouth so as to verify the occlusion of the denture. The wax case is then invested in plaster or dental stone in the usual manner, preparatory to processing. With the wax removed from the cavity in the usual manner, the cast metal mesh and peripheral bar assembly, shown in FIG. 6, is removed and the case is now ready for a trial pack with soft denture material in the cavity surrounding the teeth. The stone cast is coated with a separation material, such as foil, cello sheet or a liquid separation material, whereupon the cavity is partially filled with soft denture material and this material evenly distributed. The cast metal mesh and peripheral bar assembly, as shown in FIG. 6, is placed in position on top of the stone cast, and the cast metal mesh and peripheral bar are pressed lightly into the soft denture material 12, by pressing the complementary portions of the flask together, thereby positioning the cast metal mesh and peripheral bar in the soft denture material. The complementary portions of the flask are then reversed, whereupon, the complementary stone cast is removed from the denture, which leaves a surface of the mesh and peripheral bar exposed. Sufficient soft denture material 12 is then added to provide an even covering of the desired thickness to the exposed area of the cast metal mesh and the peripheral bar. The stone cast is then coated with a separation material, such as foil, cello sheet, or a liquid separation material, and the complementary portions of the flask are then put together with sufficient pressure being applied to cause the excess soft denture material to be expelled from the cavity, in the usual manner. The excess soft denture material is then trimmed from the flask and the denture is then processed by heat, or in such other manner as is indicated by the particular material used. The cured denture is then removed from the flask and the plaster or stone that surrounds the denture is removed and the denture articulated. The denture is then finished and polished in the usual manner, ready for use by the patient.

The soft denture material most favorable to the particular denture process described herein is one that, when cooled at bench temperature, is hard to the touch. However, when this soft denture material is brought to body or mouth temperature within the mouth, approximately 98.6 degrees F., this material becomes pliable and yields to conform to the irregularities of the mouth tissue, but which material will not dissolve. In this manner small irregularities in the mouth will be compensated for by the flexibility of the soft denture material, and the flexibility of the cast metal will allow the denture to conform generally to the mouth.

By having a denture constructed of the material, and in the manner set out above, a denture will be produced which is sufficiently yieldable to conform to slight irregularities of the gums and/or palate, thereby breakage of the denture, due to pressure within the mouth is almost eliminated, as each tooth acts as an individual unit and seeks its own opposition in the forces encountered in the mouth, and in so doing, the wearer is relieved of trying to compensate for the natural function, which is missing in rigid dentures.

The peripheral bar 8 in the denture, as indicated in FIGS. 2 through 6 and 8, is cast integral along the posterior edge of the cast metal mesh, however, it conforms to the contour of the denture.

The denture is formed in such way that the lingual or peripheral bar 8 will be around the peripheral edge of the denture and will interconnect with reinforcement bar 9, which interconnects with the cast metal mesh 6, so as to reinforce the entire denture, which reinforcing structure is embedded substantially medially of the soft denture material and intermediate the hard denture material and the face of the gum. The ridge 10 which is formed lingually of the peripheral bar 8, provides a

gripping action between the denture and the gum. The ridge 10 however, is only about one thousandths to three thousandths of an inch in height, and will be depressed into the denture material by the pressure of the gum thereagainst, which will give the wearer the assurance of a snug fit, and will also prevent movement of the denture relative to the gum, while chewing.

It is to be pointed out that the soft denture material surrounds the portions of the gum which are exposed to the denture, which results in a very comfortable denture, which denture conforms to the mouth, yet is sufficiently pliable to adjust to irregularities in the mouth and/or gum tissue, which adjustment is not possible with a hard, rigid denture or with a hard, rigid denture which is merely lined with soft denture material.

It is preferable to make the denture material a living pink, fresh gum color, of a thickness sufficient to embed the reinforcing mesh and peripheral bar, so as to give greatest comfort to the wearer.

The forming of the cast mesh metal is not considered new in the art of mechanical dentistry, however, the utilization of such reinforcement, in the manner described herein, enables the use of soft denture material, which results in a denture which is comfortable, and which approaches in feel and use, the action of natural teeth.

While the hard denture material has been shown and described somewhat specifically as being a hard acrylic or the like, it is to be understood that such other material may be adapted or substituted that has the qualities whereby teeth may be securely attached thereto, with a minimum thickness of base material, and whereby the material has a limited flexibility to permit limited yielding of the individual tooth. Such material could include hard vulcanite rubber, synthetic rubber, various plastics and resins, and certain metals.

The soft denture material described herein may be of a soft vulcanite rubber, a plastic compound in general use under various trademark names. Which plastic may be in powder form and which may be mixed with a solvent. A solvent which acts as a setting agent may be used, wherein the resultant mass or jelly is utilized to fill the portions of the cavity which are to be of the soft denture material, which is elastic and compressible to a degree at mouth temperature. No claim is made to a specific compound from which the pliable portion of the denture is made, as it is the end result of combining the soft portion of the denture with a perforate metal reinforcing element and a hard denture base in which the teeth are secured, and to the soft denture material being pliable to conform to irregularities of the mouth of the individual by whom the denture is to be used, that is considered new.

While a specific manner of packing the soft denture material into the cavities it is to occupy has been described, it is to be further understood that such other materials and means as are adaptable for use in this particular field of endeavor, such as resinous plastics, natural and synthetic elastomers and the like may be used.

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 and such processes employed as to produce a denture as described and as set forth in the appended claims.

Having thus described the invention, what is claimed as new and desired to secure by Letters Patent is:

1. In an artificial denture, the combination of a base of hard denture material contoured to fit the adjacent surface of the gum on which it is to be fitted, denture teeth bonded to said hard denture material, a resilient metal mesh reinforcing member contoured to fit the palate portion of the mouth and to extend outward between the hard denture base material and the normal

face surface of the denture in contact with the gum tissue, a metal peripheral bar secured integral with said metal mesh reinforcing member in at least two places and spaced away from said base of hard denture material, a soft denture material interposed between said base of hard denture material and said resilient metal mesh reinforcing member and bonded to said base of hard denture material and said resilient metal mesh reinforcing member, further soft denture material covering said resilient metal mesh reinforcing member and said peripheral bar and said hard denture material base so as to complementarily fit at least one of the gum portions of the mouth in which it is to be worn.

2. In an artificial denture, the combination of a base of hard denture material contoured to be of substantially horse shoe shape to fit the adjacent face surface of the gum on which it is to be fitted, denture teeth bonded to said hard denture material, a perforate reinforcing member contoured to fit the palate portion of the mouth and to extend outward between the hard denture base material and the normal face surface of the denture portion in contact with the gum tissue, a metal peripheral bar formed integral with said perforate metal reinforcing member at least two points, a soft denture material interposed between said hard denture base and said perforate metal reinforcing member and said peripheral bar and bonded to said hard denture base material and said metal reinforcing member and said peripheral bar, further soft denture material covering said hard denture base and both sides of said perforate metal reinforcing member and said peripheral bar so as to complementarily fit the palate and upper gum portion of the mouth in which it is to be worn.

3. A denture as defined in claim 2, wherein a reinforcing bar extends between and is secured to said peripheral bar and said perforate metal reinforcing member intermediate the forward and rearward portions of said denture.

4. A denture as set forth in claim 3, wherein said reinforcing bar is disposed at an acute angle to said peripheral bar.

5. In an artificial denture, the combination of a resilient base of material contoured to be substantially of horse shoe shape to fit the adjacent face surface of the gum on which it is to be fitted, denture teeth secured to said contoured base, a resilient cast metal mesh reinforcing member positioned between said base and the normal face surface of the denture portion in contact with the gum tissue, a peripheral bar, which peripheral bar integrally connects with a portion of said resilient cast metal mesh reinforcing member and is spaced from said base and being positioned to at least partially surround the gum ridge, said resilient cast metal mesh reinforcing member being contoured to fit the particular portion of the mouth to which it is to be adjusted, soft denture material positioned between said resilient cast metal mesh reinforcing member and said contoured base, said soft denture material also covering said base and extending to the normal dentine line of said teeth and covering said mesh metal reinforcing member and said peripheral bar on both sides thereof and extending around said gum tissue to form a complementary socket with said gum, said soft denture material being cured to be hard at normal bench temperature but to be yieldably resilient at body temperature to the extent that if irregularities exist between gum tissue and soft denture material, said soft denture material will compress to compensate such irregularities.

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