United States Patent

Weinkle

[15] **3,644,996**

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[54] PREFABRICATED DENTURE CONSTRUCTION AND METHOD

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[52] **U.S. Cl.** **32/2**

[51] **Int. Cl.** **A61c 13/00**

[58] **Field of Search** 32/2, 8; 18/5.7

[56] **References Cited**

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2,165,597	7/1939	Widoe, Sr.	32/2
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2,685,133	8/1954	Greene et al.	32/2
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3,251,909	5/1966	Pickands et al.	32/2
3,335,495	8/1967	Wichner	32/2
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[57] **ABSTRACT**

Denture bases in a plurality of standard sizes are mass produced and stocked by dentists in order to fit and tailor a set of artificial dentures to an individual patient during a single visit. The standard denture bases are made by use of reusable mold assemblies which include cavity-forming bodies made of an elastically deformable material.

1 Claim, 6 Drawing Figures

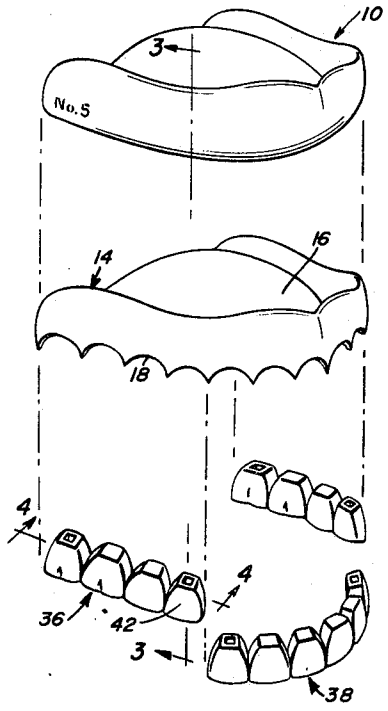

Fig. 1

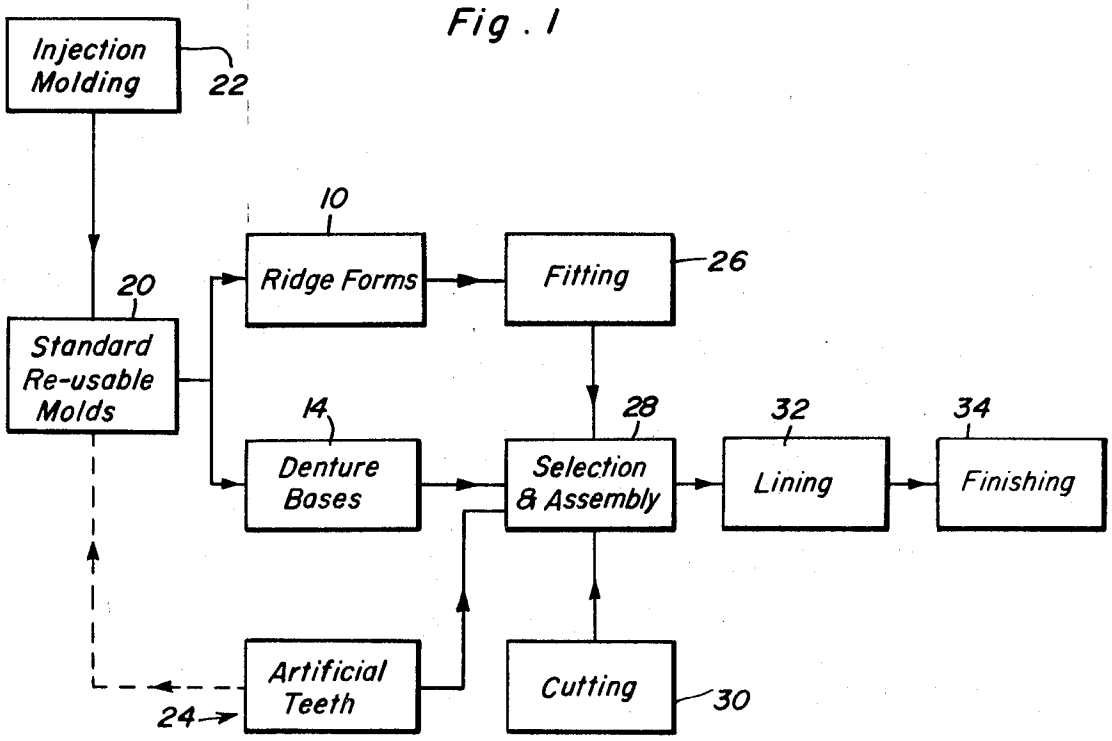

Fig. 5

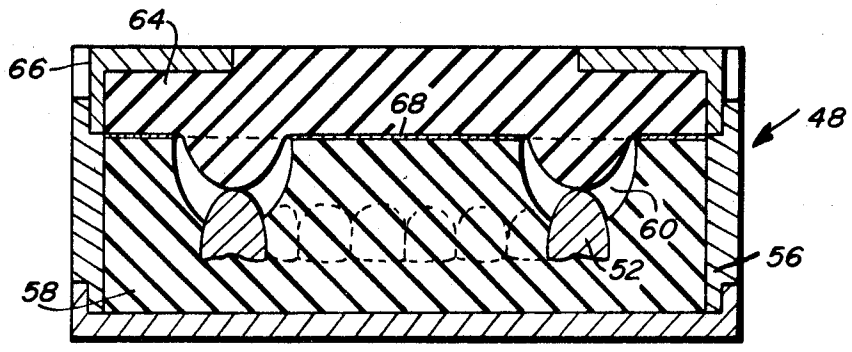

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Fig . 2

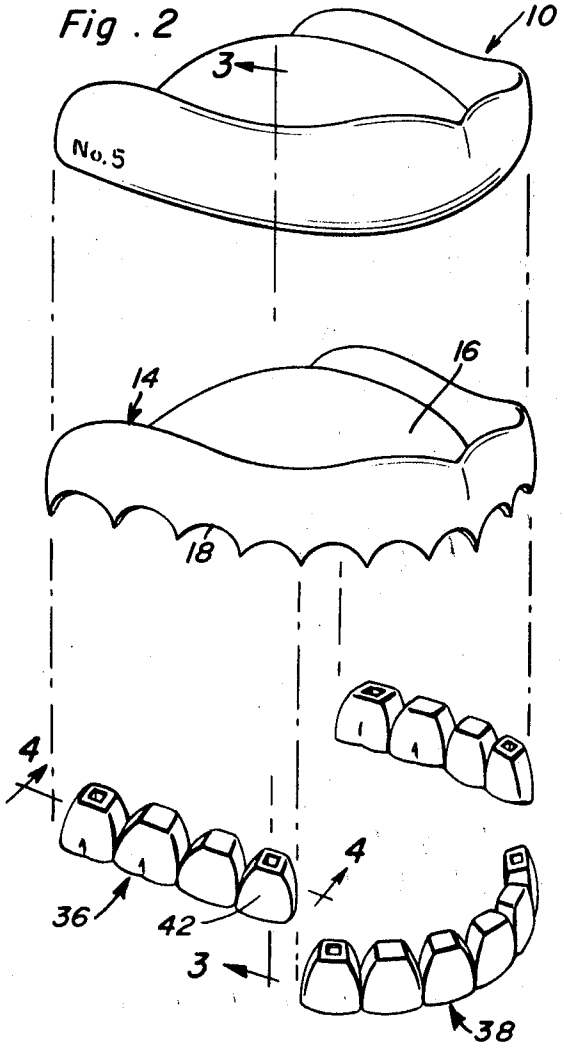


Fig . 3

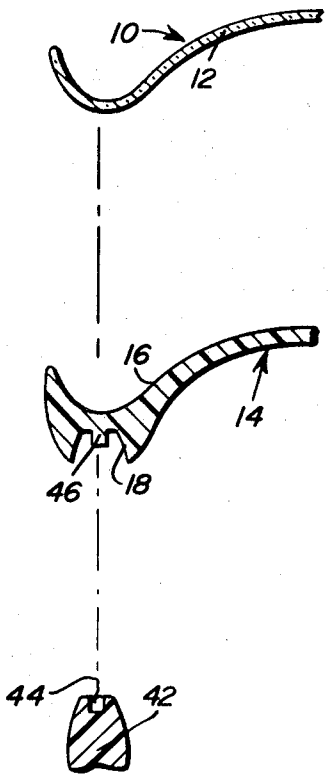


Fig . 4

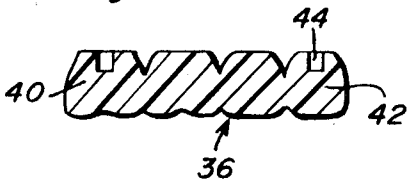
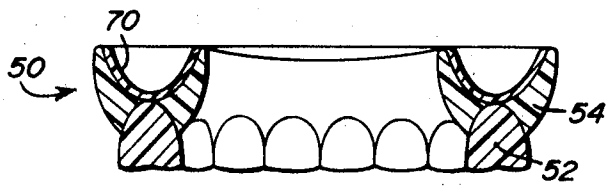


Fig . 6



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PREFABRICATED DENTURE CONSTRUCTION AND METHOD

This invention relates to the manufacture and fitting of artificial dentures.

The method of making and fitting artificial dentures in general use today, is relatively time-consuming as well as expensive. Thus, for persons of low income in need of artificial dentures, an excessive economic burden is involved while for others, present methods are objectionable because of the inconvenience of time delays and discomforts incident thereto. Present methods of making and fitting artificial dentures usually involve many visits to the dentist's office in order to obtain impressions from which models are made, waiting periods between removal of teeth and fitting of dentures, custom manufacture of the dentures in a dental laboratory after a selection of artificial teeth size and color is made as well as tryouts, adjustments and finishing of the dentures. Fabrication of the dentures themselves in a dental lab usually involves waxing of models mounted on an articulator which simulates movement of the patient's jaws, positioning of artificial teeth in order to approximate occlusal relationships, and casting the dentures in plaster molds made from the waxed up models.

The use of standard size dentures capable of being lined with a moldable material so that it may be tailored to an individual's mouth, has been proposed, for example, in U.S. Pat. Nos. 2,685,133 and 3,335,495. While the methods disclosed in these patents represent an attempt to reduce the time involved in making and fitting artificial dentures by eliminating custom fabricating methods in present use, the techniques disclosed in these patents have not been adopted for several reasons.

While U.S. Pat. No. 2,685,133 to Greene et al. discloses the concept of fabricating standard size dentures, the value of making standard size dentures is lost unless they can be mass produced. Present known methods for making dentures are unsuitable since the plaster molds made in dental laboratories are not reusable and are destroyed or ruptured upon removal of the denture from the mold.

U.S. Pat. No. 3,335,495 to Wichner is limited to the assembly of artificial teeth with the denture base utilizing an intermediate blank for this purpose. While it is desirable to interchangeably assemble artificial teeth with denture bases in order to increase the number of denture combinations from which a selection may be made in order to fit an individual patient, from the standpoint of cost and structural durability the use of an additional intermediate blank is unsatisfactory.

It is therefore an important object of the present invention to provide a method for making and fitting artificial dentures utilizing standard size denture bases but avoiding the drawbacks associated with the disclosures in U.S. Pat. Nos. 2,685,133 and 3,335,495 aforementioned. Further, in accordance with the foregoing object, the present invention represents the first practical basis upon which artificial dentures may be fitted to individual patients by selection from standard size denture bases, utilizing the services of qualified practitioners in the dental profession.

In accordance with the present invention, standard size denture bases are capable of being mass produced by casting thereof in reusable molds. Toward this end, a sectional mold assembly is utilized made of an elastically deformable material within which the mold cavities are formed. Thus, removal of the cured denture base from the mold merely causes temporary deformation thereof without permanent distortion or rupture. A plurality of acrylic denture bases in different standard sizes may therefore be produced economically and stocked by each dentist employing the techniques of the present invention. A denture base may then be selected and fitted to an individual patient as described for example in U.S. Pat. No. 2,685,133 to Greene et al. aforementioned. Also, a separate selection may be made of the artificial teeth both to the size and color by the dentist to suit the patient being fitted. In rare cases, the selected denture base may be cut or relieved in order to accommodate the patient's mouth. The denture base

may then be tailored to the patient's mouth by lining thereof with the same acrylic denture base material in its plastic state. Thus, after the molded lining material has set, the excess is removed and the denture finished. The foregoing procedure may be carried out during a single visit to the dentist. Aside from the economy incident to the mass production of standard size denture bases as compared to custom fabrication in accordance with present methods, the present invention involves a considerable savings in time and less discomfort for the patient by making the denture base moldable lining technique feasible.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIG. 1 is a block diagram diagrammatically illustrating the method of the present invention.

FIG. 2 is a perspective view of the parts utilized in fitting and assembling a preformed denture in accordance with the present invention.

FIG. 3 is a partial sectional view taken substantially through a plane indicated by section line 3—3 in FIG. 2.

FIG. 4 is an enlarged partial sectional view taken substantially through a plane indicated by section line 4—4 in FIG. 2.

FIG. 5 is a sectional view through a sectional mold constructed in accordance with the present invention for casting a preformed, standard size denture.

FIG. 6 is a sectional view through a completed denture constructed and fitted in accordance with the present invention.

Referring now to the drawings in detail, FIGS. 2 and 3 illustrate typical parts which will be stocked in standard sizes by a dentist in order to practice the present invention. These parts include disposable ridge forms adapted to be inserted into a patient's mouth in order to occupy the space normally occupied by an artificial denture, such as the upper ridge form **10**. It will of course be appreciated that there will also be standard size ridge forms adapted to fit the lower jaw. The ridge forms are made of a relatively inexpensive, thin, transparent plastic material **12**. These ridge forms are stocked in standard sizes, there being up to 10 sizes in order to accommodate something like 90 percent of all persons. Thus, with a set of corresponding standard size denture bases corresponding to the ridge forms, the standard size denture base dimensionally closest to a patient may be determined, such as the denture base **14** shown in FIGS. 2 and 3. The denture base is made of the same acrylic plastic as artificial denture bases heretofore custom made in accordance with present methods but differs therefrom in that the inner surface **16** of the denture base will not exactly conform to the tissue surfaces of the patient being fitted. Further, in one embodiment of the invention, the standard size denture base **14** is provided with a plurality of sockets **18** adapted to receive artificial teeth to be assembled with the denture base.

At the present time, it is contemplated that there will be 10 standard size upper and lower ridge forms and corresponding standard size upper and lower denture bases. Also, artificial teeth of standard size and color will be stocked by the dentist so that a selection may be made in accordance with the size and color of teeth removed from a patient. The entire procedure in making and fitting dentures from the standard sized parts aforementioned is diagrammed in FIG. 1. As shown, the present invention contemplates mass production of the standard size ridge forms **10** and denture bases **14** from reusable molds **20** employing an injection molding process **22**. FIG. 1 also diagrams the stock of artificial teeth **24** which may either be cast with the denture bases or embedded in the molds in order to directly bond the same to the denture bases as an alternative to subsequent bonding of the artificial teeth within the sockets **18** of the denture bases as shown in FIGS. 2 and 3. FIG. 1 also denotes the fitting step **26** by means of which the standard size denture base dimensionally closest to

the jaw of the patient is determined so that a proper selection and assembly may be made as denoted by reference numeral **28**. If necessary, the denture base may be cut in order to accommodate certain patients as denoted by reference numeral **30**. The assembled denture is then lined on the inner surface by moldable lining material as denoted by reference numeral **32** in FIG. **1** in order to tailor the denture to the jaw of the patient. After curing of the acrylic lining, any excess is removed and rough spots polished as indicated by the finishing station **34** in FIG. **1**.

As hereinbefore indicated, a selection of artificial teeth is made by the dentist. The artificial teeth may be cast together with the denture bases or embedded in the molds from which the denture bases are cast for direct bonding to the denture bases. In the latter case, there will be standard combinations of denture base sizes and artificial teeth colors from which the dentist must make a selection both as to size and teeth color. The embodiment illustrated in FIGS. **2**, **3** and **4** however involves assembly of separately cast denture bases **14** and artificial teeth made from acrylic or porcelain material. The artificial teeth may be selected from and assembled as separate groups of integrally connnected teeth including groups of posterior teeth **36** and anterior teeth **38**. Each tooth will fit within one of the sockets **18** while bonding facilities will be provided for the end teeth in each group. The posterior teeth **36** for example, will include an end molar **40** and an end bicuspid **42** having recesses **44** formed therein for receiving projections **46** in those sockets **18** of the denture base corresponding to the end teeth. A suitable adhesive may also be utilized to coat the engaging surfaces of the sockets **18** and the end teeth received therein. Similarly, bonding facilities will be provided for the end teeth associated with the anterior groups **38** such as the cuspids on either side of the incisors.

FIG. **5** illustrates a typical reusable mold assembly **48** within which a standard size lower denture base was cast such as the lower denture **50** shown in FIG. **6**. In this example, the artificial teeth **52** were directly bonded to the denture base **54** by embedding the teeth in the reusable mold assembly prior to introduction of the acrylic plastic mixture into the mold cavity **60**. A conventional dental flask was utilized in connection with the mold assembly including lower and upper flask sections **56** and **66** as shown in FIG. **5**. Bodies of elastically deformable material **58** and **64** cured from a settable mixture known as "RTV" made by Dow-Corning Company was utilized exclusively as the cavity forming material. Standard size plaster models on which master dentures were positioned, were embedded in the mold material **64** and **58** while in a plastic state so as to form the mold cavity **60** between surfaces thereof in the flask sections **56** and **66**. Thus, the plaster model itself is not utilized as part of the mold assembly. A separating medium **68** was utilized between the mold cavity bodies **58** and **64**.

With the artificial teeth **52** embedded in the cured mold cavity body **58** as shown in FIG. **5**, a plastic mixture of the acrylic material was introduced into the mold cavity **60** and cured to a rigid state directly bonding to the artificial teeth. The denture so formed was removed from the mold cavity without rupturing the mold body material despite the undercutting in the mold cavity in view of the elastically deformable property of the mold material. Thus, the mold assembly **48** was reused in order to form a large quantity of the same standard size dentures.

When a denture selection is made, it is tailored to the individual patient by lining a plastic mixture of acrylic on the inner surface such as indicated by reference numeral **70** in FIG. **6**. The lining denture may then be molded directly within the patient's mouth making sure that proper occlusal relationships and requirements are satisfied. After the lining has initially set, the denture may be removed from the patient's mouth and the lining permitted to fully cure. Excess material squeezed out over the ridges of the denture may then be removed by an abrasive tool and rough spots polished in order to complete the denture.

The determination of the denture base size, the selection of artificial teeth, the assembly of the denture, the tailoring of the denture to the individual patient and the finishing thereof may all be performed during a single visit to the dentist. The foregoing procedure is of course made feasible by mass production of the standard size denture bases utilizing reusable molds as hereinbefore described.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

I claim:

1. In a method of making standard size dentures, the steps of: forming a mold cavity between surfaces of a least two elastically deformable mold bodies; placing a settable material into the mold cavity to form a denture base; curing the settable material to a relatively rigid state; reusing the cured material from the mold cavity without rupture of the mold bodies; reusing the mold bodies to form additional denture bases within the mold cavity; casting separate groups of posterior and anterior teeth; and bonding said groups of teeth to the denture bases.

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