May 3, 1960 W. J. PREIS 2,934,823

DENTURE AND METHOD OF MAKING SAME

Filed Jan. 20, 1956

FIG. 1.

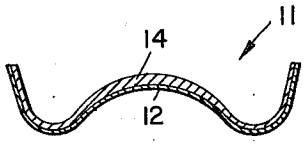


FIG. 2.

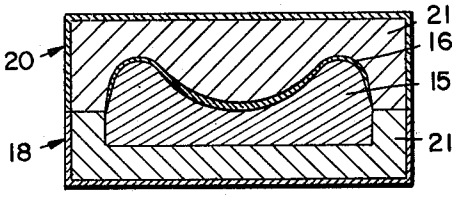


FIG. 3.

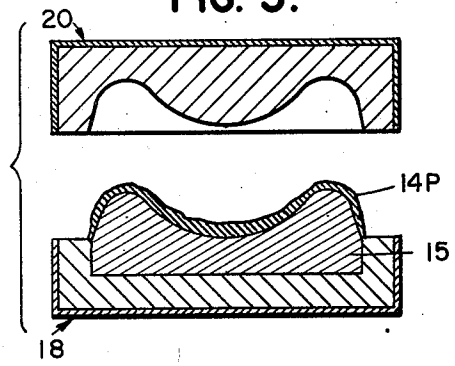


FIG. 4.

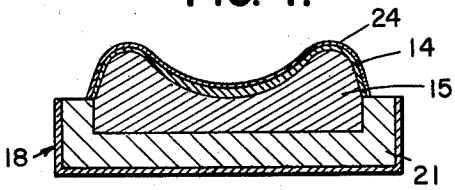


FIG. 5.

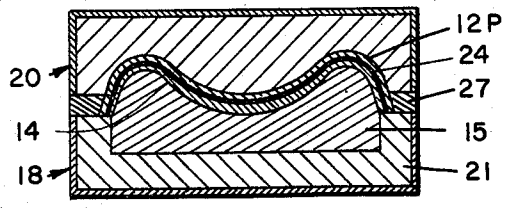


FIG. 6.

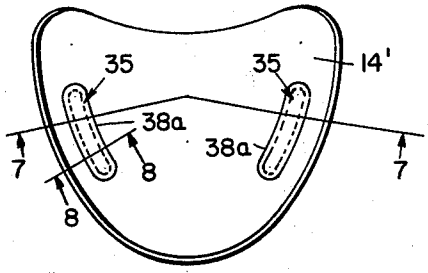


FIG. 7.

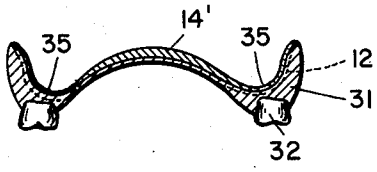


FIG. 8.

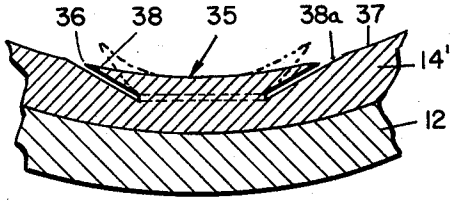


FIG. 9.

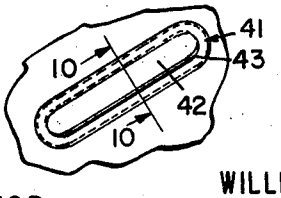
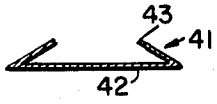


FIG. 10.



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DENTURE AND METHOD OF MAKING SAME

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11 Claims. (Cl. 32—2)

This invention has to do with artificial dentures.

An object of the invention is to provide a novel and improved denture or a denture base embodying a thin, relatively soft resilient lining having improved characteristics over present similar articles.

Another object is to provide a denture or a denture base having a resilient lining of plastic firmly bonded to the harder main base portion in which the lining inherently tends to remain in the required shape and configuration. In this connection, due to the way dentures having inner plastic linings of a resilient plastic are made conventionally by the application and investment of a cured sheet of plastic in the final step of making the denture wherein this sheet becomes bonded to the base dental acrylic material, the lining tends to draw away from the acrylic base and return to its flat shape under the influence of plastic memory.

A further object is to provide a denture having an improved retention means for holding the denture in place in the mouth. I am aware that various types of vacuum cups have been incorporated in dentures for this purpose, but so far as I know, these have been unsatisfactory because they irritate and cause soreness of the mouth tissues.

It is a particular object, therefore, to provide a novel form of vacuum or suction denture-retaining means formed in the inner lining of the denture base which does not irritate the mouth and yet serves to accomplish the purpose of giving positive retention of the denture.

A further object is to provide a novel method of making a resiliently lined denture base or denture to provide a product which meets the various objects mentioned above.

Another object is to provide a method or process which makes it possible to provide the dentist with a stable base having a resilient liner for use in the subsequent fittings required before the final denture is made up. In this connection it is a purpose of the invention to provide a resiliently lined base which subsequently becomes a part of the ultimate denture for use in place of the temporary wax or hard shellac base plates which are commonly used in the many preliminary steps of making a denture. Such customary temporary bases are objectionable, since if made of soft material, they are readily deformed before being returned to the laboratory with the result that it becomes extremely difficult to make a proper fitting denture. On the other hand, if a hard temporary base is used, this must be loosely fitted to the model to clear undercut areas and permit withdrawal from the model, and, therefore, is not accurate.

These and other objects will be apparent from the drawing and the following description. Referring to the drawing:

Fig. 1 is a sectional view through a base having a soft or resilient liner as formed by my method;

Fig. 2 is a sectional view of a dental flask with a model therein covered with a wax pattern;

Fig. 3 is a sectional view through the dental flask showing the application of the plastic liner to the model;

Fig. 4 is a view in section of the lining covered with a bonding material;

Fig. 5 is a sectional view showing the flask closed with the hard base material in place therein;

Fig. 6 is an inside view of a denture embodying the base of Fig. 1 and having suction-retention means;

Fig. 7 is a sectional view on line 7—7 of Fig. 6;

Fig. 8 is a greatly enlarged cross-sectional view through one of the suction-retention means as in the plane of line 8—8 of Fig. 6;

Fig. 9 is an enlarged fragmentary perspective view of the surface of the model showing a die thereon for forming the suction-retention means in the inner lining; and

Fig. 10 is a section on line 10—10 of Fig. 9.

More particularly describing the invention, as previously indicated, it is my purpose to provide a denture base embodying a resilient or soft lining which can be used in place of a conventional temporary base for obtaining the proper fit and locating the teeth for the bite register and which ultimately becomes part of the final denture. This base, generally designated **11**, shown in Fig. 1 in cross section, is for an upper denture or full plate and it comprises a base layer **12** which may be of the presently much used dental acrylic resin-type plastic. Bonded to this is a lining layer of a relatively softer and resilient plastic **14**. This may be of various plastic substances; however, I prefer to use a vinyl-type plastic and, by way of example, a plastic of the type known in the trade as Plastisol or that known as Organosol is suitable.

In my process of making the base **11**, I first provide a model **15** (Fig. 2) of the mouth. Over this I form a wax layer **16** of the thickness of the desired inner lining. The wax is molded to the model and may taper to rather thin, marginal portions. The model **15** with the wax layer **16** is invested in a dental flask having a lower section **18** and an upper section **20**, the model being placed in the lower flask section. A common metallic investment material **21** is used. After this has hardened, the flask is separated and the wax boiled out in the usual manner. Subsequently the flask halves are dehydrated in any usual way, as, for example, by the application of dry heat of about 250° F. for a period of two or three hours.

The cavity-defining surfaces of the mold are coated with a suitable mold release fluid and the mold filled with an excess of the uncured plastic (designated **14P**, Fig. 3). The flask is then closed and the plastic cured at an elevated temperature. In the case of the examples given, this may be accomplished in dry heat for about two and one-half hours at about 350° F. In this connection it may be pointed out that it is a feature of my process that I choose a material for the lining which must be cured at a temperature substantially higher than that required to cure the material of the base layer.

After the flask has cooled the cured liner may be removed and trimmed as necessary. Also, the surface which does not lie against the model should be sanded or otherwise treated after which it is covered with a suitable bonding agent **24** (Fig. 4) such as being painted with acrylic monomer and this covered with coarse acrylic polymer. The thickness of the bonding agent is exaggerated in the drawing. The bonding agent is then cured or partially cured by subjecting the same to suitable heat for the requisite period of time which, in the case of the substances used, would be about thirty minutes at 275° F. This is done with the upper flask section removed. The step of curing, or partially curing

the bonding agent may not be necessary, depending upon the materials used.

Subsequently the acrylic denture material, designated 12P, Fig. 5, is placed over the liner and the flask closed. The flask sections are spaced apart by a shim 27 (Fig. 5) or by other means a suitable distance, depending on the desired thickness of the acrylic overlay or body desired. This acrylic denture material is then cured against the resilient liner, as in a water bath for approximately three hours at about 158° F., or in dry heat for an hour at 275° F. After cooling, the base, consisting of a liner and the acrylic overlay or base layer firmly bonded together, is removed and finished and polished, producing the base as shown in Fig. 1.

The completed base 11 is then used by the dentist and technicians in place of the conventional temporary bases such as are ordinarily used for setting the bite rim and for fit. The base may be polished for the patient's comfort. The dentist and technician thus use this base having a resilient liner in the customary way of denture construction and proceed to the point where the denture is ready for packing. The exposed surface of the acrylic or base layer 12 is then sanded so that it is clean and ready for the mold. The base is then returned to the flask, being applied over the model and the plastic packed in the usual way. Subsequently the flask is closed and the entire denture completed by the curing of the newly added or packed material. Subsequently the denture is finished and polished in the usual manner.

My process results in providing a denture having a resilient and relatively soft liner which is firmly bonded to the main base material of the denture and has the advantage of providing a liner which, by reason of its having been separately cured originally to the correct shape at an elevated temperature, has no tendency to assume any other shape, since the "plastic memory," so-called, urges it to maintain its proper shape.

In Figs. 6–8 I show a completed denture for the upper part of the mouth. This comprises the inner lining 14', a base 31 and teeth 32. The base 31 has been built up where required over the original base layer 12 of base 11, the outline of which is shown in broken lines in Fig. 7. In the particular denture shown I have provided a pair of denture-retaining sections, indicated by numeral 35. These are defined by a continuous or endless slit 36 which is inclined with respect to the inner surface 37, as best shown in Fig. 8. The slit 36 serves to define a lip 38 which is continuous around the area 38*a* and normally lies flat with the inner surface as best shown in Fig. 8. However, the lip 38 is free to flex upwardly as shown by the broken-line position thereof in Fig. 8 for the purpose of defining a cup-like area in the region 38*a* which serves as a suction or vacuum cup against a person's mouth when the denture is worn and subject to forces tending to draw the same away from contact with the mouth.

It will be appreciated that with the construction shown, since the retention area provided by my construction is normally flat and does not have a projecting rim or the like, the denture may be worn comfortably by the patient without any irritation of the mouth tissues.

The retention sections can be readily formed in the lining 14' of the denture and more particularly in the lining area 14 of the base during the process of making the base member 11. This can be accomplished at the time that the material forming this lining is molded. In doing this, appropriate dies or inserts 41 (Figs. 9 and 10) are used to form each slit. These may be in the form of a plate 42 having a flange 43. The dies may be made of soft metal to facilitate their removal. The dies are mounted on the model with a small quantity of cement. They are subsequently removed from the model with the cured liner and may remain in the liner until the denture is otherwise complete.

The particular type of retention means shown may have other uses. Also it may be embodied in flat sheet material for incorporation into dentures in which it is not originally molded.

While I have shown and described particular forms of my invention and particular steps in my process, I contemplate that various changes and modifications can be made therein without departing from the scope thereof. Also, it will be apparent that while I have shown and described an upper denture, this has been purely by way of example and the invention applies equally to dentures for the lower part of the mouth.

I claim:

1. In a process of making an artificial denture base comprising a hard plastic base layer bonded to a softer, resilient liner layer, the steps of molding the material of the liner layer to the required shape independently of the base layer, subsequently curing the molded liner layer independently of the base layer, subsequently molding the material of the base layer against said liner layer, and curing the material of said base layer against said liner layer.

2. The process set forth in claim 1 wherein the material of the liner layer is of a type having a curing temperature substantially higher than the curing temperature of the material of the base layer.

3. The process set forth in claim 1 wherein the material of said base layer is an acrylic-type resin, and wherein the material of said lining layer is a vinyl-type resin curable at a temperature substantially higher than the curing temperature of the material of said base layer.

4. In a process of making an artificial denture base comprising a hard plastic base layer bonded to a softer, resilient liner layer wherein the material forming the liner layer has a substantially higher curing temperature than the material of said base layer, the steps of molding the material of the liner layer to the required shape independently of the base layer, subsequently curing said molded liner layer material independently of the base layer at an elevated temperature, applying a bonding agent to a surface of said cured lining layer, molding the material of the base layer against the bonding agent-covered side of said lining layer, and curing said material of said base layer at a temperature lower than said elevated temperature thereby to harden the same and to unite the same with said lining layer.

5. The process set forth in claim 4 wherein said bonding agent is at least partially cured prior to molding of the material of the base layer.

6. The process set forth in claim 4 wherein the material of said base is an acrylic-type resin and the material of said lining is a vinyl-type resin.

7. The process set forth in claim 4 wherein the material of said base is an acrylic-type resin, the material of said lining material is a vinyl-type resin and the material of said bonding agent comprises acrylic monomer and acrylic polymer.

8. A molded denture base comprising a relatively hard base layer and a relatively soft lining layer, said layers each being of plastic, the material of said lining layer having a higher curing temperature than the material of said base layer and having been molded to the required shape prior to curing and having been cured separately from said base layer, said base layer having been subsequently molded and cured against said lining layer.

9. A molded denture base as set forth in claim 8 in which the material of said lining layer is a vinyl-type plastic.

10. A molded denture base as set forth in claim 8 in which the material of said lining layer is a vinyl-type resin and in which the material of said base layer is an acrylic-type resin.

11. In a denture, a lining portion of a relatively resilient plastic and a main portion of a relatively hard plastic bonded thereto, said lining portion being char-

acterized by having been molded to its ultimate shape separately from said main portion and cured separately at a temperature higher than that required for the curing of the main portion.

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