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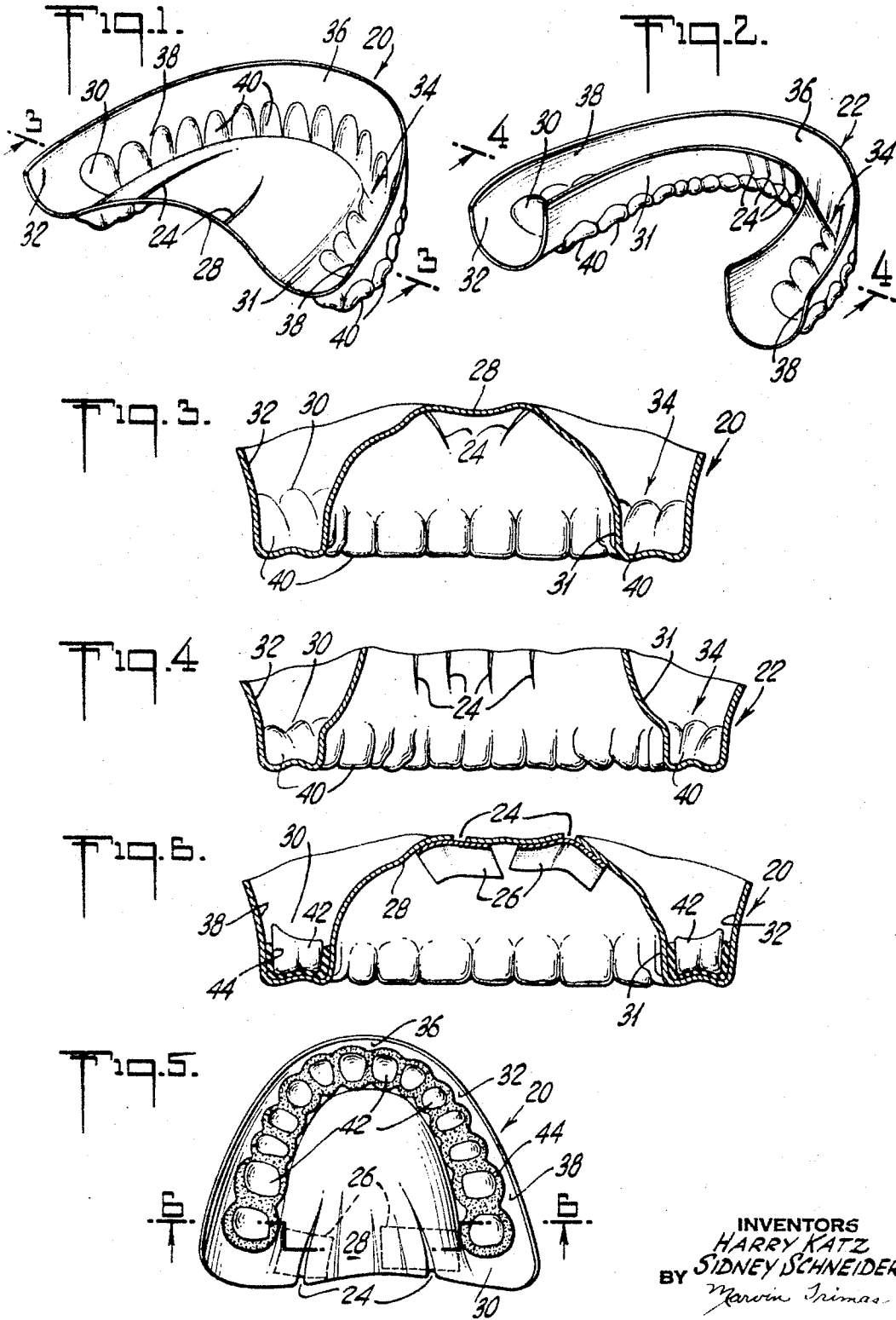
S. SCHNEIDER ET AL

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ARTICLE AND METHOD FOR FORMING A DENTURE

Filed May 2, 1967

2 Sheets-Sheet 1



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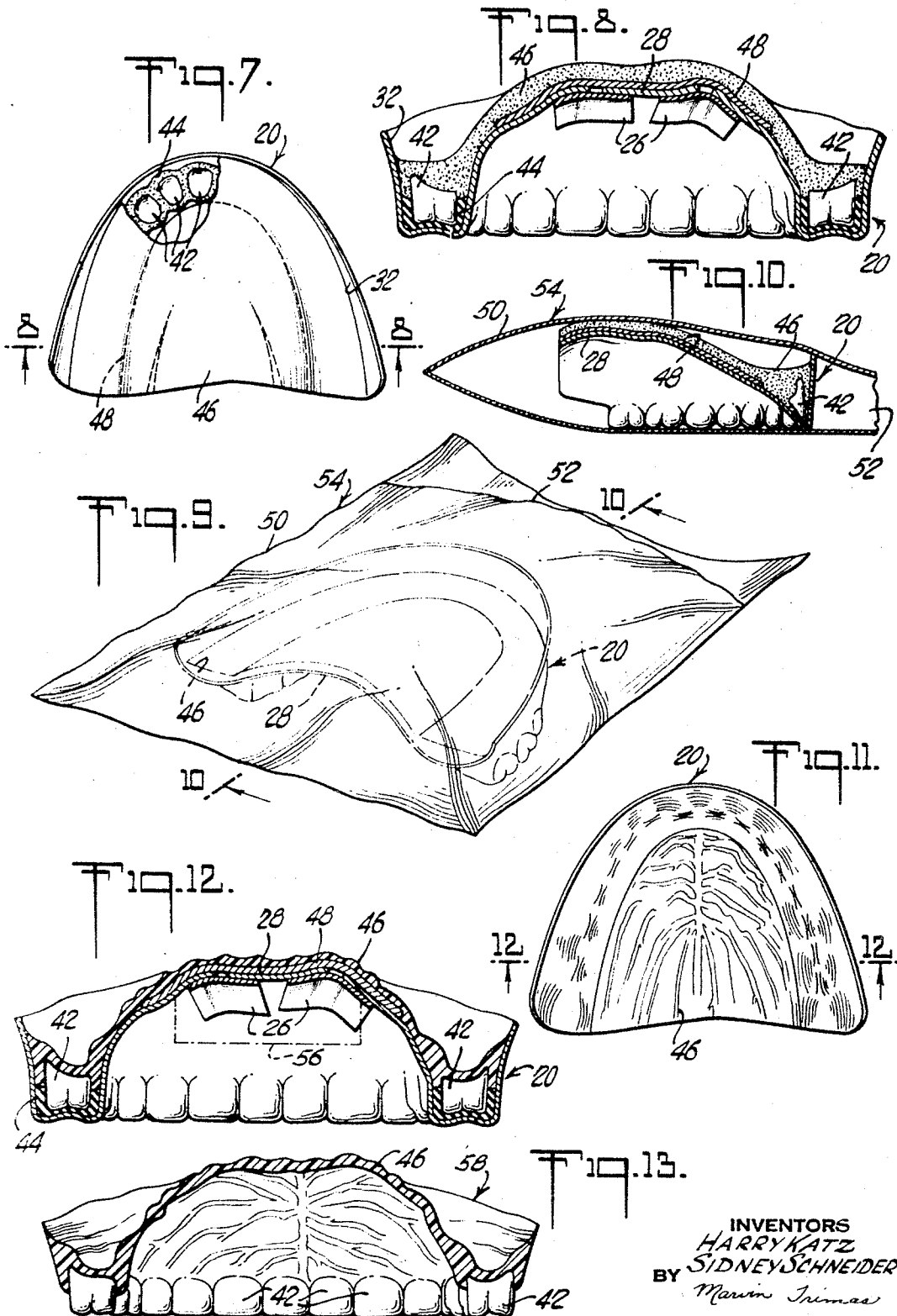
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3,460,252 ARTICLE AND METHOD FOR FORMING A DENTURE

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12 Claims

ABSTRACT OF THE DISCLOSURE

An article and method for forming a denture including a pre-formed tray having a set of teeth therein. A moldable resin is poured into the tray having a set of false teeth therein, and the tray is placed into an envelope. The user places the envelope into his mouth and by applying pressure to the resin through the envelope, a final denture is formed.

The art of making dentures for individuals who require false teeth has been carried on for many years. The process requires many hours of tedious work by a skilled technician in order to make a denture which is tailored to an individual's mouth. The time elapsed between the first visit to a dentist and the fitting of a finished denture is on the average four to six weeks.

Initially the individual must see a dentist who places an alginate gel or similar moldable plastic in a metal tray from which an impression is made of the patient's gums and roof of the mouth or palate if an upper denture is required. The impression is sent to a dental technician who makes a plaster cast of the gums and palate and places the cast in an articulator. A wax base plate is poured on and false teeth are positioned in the wax. The wax denture is returned to the dentist who tries it on the patient. The dentist makes corrections and returns the trial denture to the technician. The technician then begins the long laborious task of making a denture which requires many steps well known in the art and takes many hours and requires expensive, specialized tools.

The technician uses plaster of paris and resins which tend to stick together, and the plaster must be carefully cleaned from between the false teeth or they can be scratched. The finished mold must be sanded and polished and a great deal of dust is produced in the laboratory creating a very unsatisfactory environment.

Our invention dispenses with the use of plaster as a molding material and the inherent difficulties concomitant therewith. For example, the process of mixing the plaster solution, pouring, flasking and heating are eliminated entirely including the arduous task of removing the plaster from the finished denture which can ruin an otherwise completed denture if one is not careful.

The present invention seeks to overcome the obvious expensive and arduous task of making a denture and to dispense if desired with the services of a dentist and technician. Any unskilled person can make a satisfactory denture by utilizing the principles of our invention. Basically, our invention contemplates using a moldable resin which is poured into an adjustable and flexible tray having false teeth placed therein and formed to fit into an average size mouth. The tray containing the resin is placed in an envelope. The user places the envelope containing the tray in his mouth and by exerting oral muscular pressure upon the resinous mass, a denture is formed which is identical to the contour of the gums and palate. The latter procedure requires approximately two hours including curing time as compared with fifteen hours including curing time by a skilled technician and

not including time lost by sending the denture between the technician and dentist for adjustment.

It is an object of this invention to enable an unskilled person to form his own dentures and more specifically to form a denture requiring few steps.

It is a further object of this invention to provide a tray which is adjustable to fit a person's mouth.

It is still a further object of this invention to utilize materials which are compatible and do not stick together.

It is another object of this invention to enable a person to make a denture that will require little time to fabricate.

It is still another object of this invention to enable a denture to be made without using plaster as an element in the mold.

It is still a further object to provide a method for forming a denture in which the oral tissue does not contact any injurious substance used in making the denture.

It is yet another object of this invention to maintain teeth properly spaced and held together in a tray by using a silicone rubber or other suitable binder.

It is an additional object of this invention to provide an envelope which permits harmful vapors to escape from the oral cavity and precludes the oral tissues from coming into contact with the resin or vapors.

It is still another object of this invention to provide a method for making a denture which requires few parts and is simple to fabricate and inexpensive to manufacture.

Additional objects will become apparent to those skilled in the art from reading the ensuing specification, drawing and claims in which we have disclosed a preferred embodiment of our invention.

The attached drawings illustrate a preferred embodiment of our invention in which:

FIG. 1 is a perspective showing an upper tray;

FIG. 2 is a perspective showing a lower tray;

FIG. 3 is a section taken along the line 3—3 in FIG. 1;

FIG. 4 is a section taken along the line 4—4 of FIG. 2;

FIG. 5 is a view showing the tray having severed portions thereon;

FIG. 6 is a view showing the tray in elevation and partly in section taken along the line 6—6 in FIG. 5;

FIG. 7 is a top view of a tray having resin therein and a cutaway showing false teeth embedded in said resin;

FIG. 8 is a view taken along the line 8—8 in FIG. 7;

FIG. 9 is a perspective showing a tray in an envelope.

FIG. 10 is a view taken along the line 10—10 in FIG. 9;

FIG. 11 is a top view of a finished denture within a tray;

FIG. 12 is a view taken along line 12—12 in FIG. 11, and

FIG. 13 is a side elevation partly in section showing false teeth molded within a denture which has cured.

Referring to FIGS. 1-4, there is shown a tray 20 which is preferably formed of a thin flexible plastic in the family of polyethylene or polypropylene polymers or copolymers. The tray can be vacuum formed from a sheet of material. The tray could also be formed by any other known method such as injection or blow molding. The tray 20 is used for making an upper denture and the tray 22 is used for making a lower denture.

Reference will now only be made to the upper tray 20 and since the tray 22 is similar like parts will be referred to with like numbers.

The tray 20 has weakened lines 24 conveniently placed thereon preferably in the form of triangular lines; however, any configuration can be used. The weakened lines are to be severed which permits the tray to be modified in size. Thus, the tray can be adapted to any size mouth by cutting the weakened lines and squeezing or spreading the tray.

An adhesive tape 26 can be used to lock the severed portions together when the proper size has been made to fit the mouth of the particular user, or if a portion is removed to make the tray smaller, the tape can be used to fill the void. The weakened lines 24 are preferably placed in the palate portion 28 on the upper tray 20. The palate portion 28 is shaped to conform to the average person's mouth and by simple adjusting after the weakened lines have been severed will fit any mouth. The weakened lines 24 are placed on the inner wall on the lower tray 22.

The upper tray 20 has an outer flexible wall 32 which is generally U-shaped. The palate portion includes an inner flexible wall 31. The inner and outer wall portions are interconnected along the U-shaped bottom portion of the tray.

The lower tray 22 also includes a flexible outer wall 32 and a flexible inner wall 31 which walls are interconnected along the U-shaped bottom portion of the tray.

The gum-receiving portion 30 which lies between the outer and inner walls 31 and 32 comprises a trough 34 which is designed to receive false teeth 42 and a person's gums. The trough 34 is relatively narrow at the forward portion 36 of the tray and gradually increases in width along the side portions 38 of the tray as shown in FIG. 5. Thus, the front teeth which are relatively narrow are snugly held in the tray and the rear teeth which are wider are snugly held in the wider portion of the tray.

Impressed within the trough 34 of the tray 20, as by molding or any other suitable method of indicating, is indicia or cavities in the form of spaced depressed portions 40. The latter indicia 40 indicates to the user the proper placement of the false teeth 42 within the tray 20 prior to making the denture. Each tooth is thus snugly held within a depression and because the trough 34 increases gradually in width, the teeth 42 are supported and cannot readily move out of place. Thus there can be no leaning or turning movement of the teeth and perfect alignment is always insured.

The false teeth 42 are firmly and immovably held within the tray preferably with a rubber 44 of the silicone type to which a catalyst such as dibutyl tin dilaurate has been added. Any other binder material can be used to hold the false teeth together in the mold such as rubber of the non-silicone type, glue, wax or a mechanical means such as a brace can hold the teeth together. The purpose of the silicone rubber 44 or other type binder is to hold the teeth within the tray in proper spaced relation to each other and to avoid coverage by the denture of the teeth resin that would result in an extra cleaning step. Actually a denture can be made without the binder.

When the silicone rubber mix and catalyst are used, the mix is poured or injected into the trough 34 of the trays 20 and 22. The false teeth 42 are then placed into the mix as indicated by the indicia 40 on the walls, and the rubber 40 is allowed to cure whereupon the teeth will be immovably held in the tray. The rubber 44 will not adhere to the tray or false teeth firmly and is easily separated therefrom after the denture has been completed because of the nature of the materials.

The silicone rubber 44 or other binder could be dispensed with by molding pockets or depressions within the tray which firmly grips and maintains the teeth closely adjacent to each other during the molding process. The tray is now ready to receive the denture material 46.

The denture material 46 is a cold curing pigmented mixture consisting of a powder and a liquid. The powder is a polymer preferably of the acrylic family. Certain copolymers can also be used consisting of vinyl resins or styrene. The liquid material is preferably an acrylic monomer or mixture of acrylic monomers such as methyl methacrylate and butyl methacrylate. These materials have been used in the prior art as denture repair materials. The powder and liquid contain small quantities of known catalysts which interact to cause hardening of the mixture within a short time without any external heat source.

The powder and liquid are thoroughly mixed together to form a soft, puttylike, resinous slurry which is poured into the denture forming tray 20. If desired, a shim 48 can be loosely attached to the upper tray in order to control the thickness of the palate portion 28 of the denture which is preferably between 1 to 3 millimeters in thickness. The denture can be made without the shim, however. The resin mixture covers the false teeth up to the binder 44 and the entire interior of the tray 20 circumscribed by the outer wall 32.

Since the gum tissue is sensitive to the resin 46 the resin filled tray is preferably covered with a thin flexible material such as plastic or cloth having a low permeability to the monomer of the denture material. The protective covering can be placed over the gums and palate in the user's mouth or can cover the resinous material in the upper and lower tray 20. A preferred protective covering is a material comprising a polyvinylidene chloride film in the form of an envelope 50 as depicted in FIG. 9. Three sides of the envelope are sealed and one side 52 is open. The tray 20 is inserted into the envelope 50 with the front portion of the tray 20 facing the open end 52 of the envelope to allow vapors to escape outside the mouth cavity while the opposite closed end prevents vapors from entering the mouth cavity.

The tray 20 and envelope 50 unit, generally denoted by numeral 54 is then placed in the mouth so that the gums are placed within the confines of the walls 32 of the tray 20. The user then exerts pressure on the unit 54 by biting into the resinous mass and pressing against the palate portion 28 of the tray with the tongue. A pad 56 shown in dotted lines in FIG. 12 may be inserted between the tongue and the palate portion 28 of the upper tray in order to obtain a better forming pressure transferred to the resinous denture material. The pad 56 can be a foam rectangular or square cube. The unit 54 is kept in the mouth until the resin mixture feels warm to the senses which entails approximately fifteen (15) minutes. The unit 54 is then carefully removed from the mouth by releasing the previously applied pressure. The denture material has now been molded to precisely the shape of the gums and follows the curvature of the roof of the mouth for the upper denture. The resinous mass is allowed to cure for an additional time of approximately ten to fifteen minutes. The upper and lower dentures can be made at the same time or separately.

The user, thereupon, removes the upper or lower tray 20 or 22 from the envelope 50. The tray because it is flexible is merely bent away from the curved denture and the resin does not adhere to the flexible tray. The rubber 44 is easily peeled away from the false teeth and the tray. The denture is now complete except for smoothing any rough edges which may have formed. The latter is simply accomplished with a piece of sandpaper. When the completed denture 58 is placed over the gums a perfect fit results without having had to resort to the tedious, expensive and time consuming method of the prior art. If desirable the person can use a liner of soft material such as a gel type material between the denture and the gums for even greater adherence of the denture plate to the gums.

We claim:

1. An article for molding in a single operation a completed denture comprising,
 - (a) an outer-flexible wall extending upwardly and forming a U-shaped periphery,
 - (b) an inner flexible wall spaced from said outer wall and extending upwardly,
 - (c) a connecting portion joining said inner and outer walls thereby forming a trough open at one end thereof and closed at said connecting portion,
 - (d) said connecting portion having cavities therein in the form of teeth for indicating the location of false teeth whereby said teeth are properly placed and

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- firmly held within said trough whereupon said article which is adapted to have a moldable substance therein can be inserted into a user's mouth to form a completed denture.
2. An article for molding a denture as defined in claim 1 in which said connecting portion is narrow at the front portion of the U-shaped peripheral wall and gradually increases in size to a wider portion at the rear of the U-shaped peripheral wall.
3. An article for molding a denture as defined in claim 1 in which said cavities comprise a plurality of spaced apart depressions adapted to receive false teeth therein.
4. An article for molding a denture as defined in claim 1 in which said inner and outer walls have a moldable denture forming material therebetween and a thin, flexible protective covering means over said denture forming material adapted to prevent gum tissue from directly contacting said denture forming material.
5. An article for molding a denture as defined in claim 1 in which at least one of said walls has means thereon to enhance severing said wall at a predetermined portion whereby the size of said article can be adjusted to fit said oral cavity.
6. An article for forming a denture as defined in claim 1 including a shim on said inner wall to control the thickness of the denture.
7. An article for molding a denture comprising,
 (a) an outer, flexible, U-shaped upstanding wall,
 (b) an inner, flexible, upstanding wall connected to said outer wall, on one side thereof,
 (c) said upstanding walls forming a trough therebetween for the reception of false teeth,
 (d) at least one of said walls having means thereon to enhance severing the wall in a predetermined place on said wall whereby the walls can be adjusted in size to fit a person's mouth.
8. An article for forming a denture as defined in claim 7 in which an adhesive tape joins the severed portion of

- said wall to maintain the severed portions in a fixed configuration.
9. An article for forming a denture as defined in claim 7 comprising,
 (a) a denture forming material between said inner and outer walls,
 (b) a thin, flexible protective covering means over said denture forming material adapted to prevent gum tissue from directly contacting said denture forming material.
10. An article for forming a denture as defined in claim 9 in which said thin, flexible protective covering means over said denture forming material comprises a closed envelope having an opening therein.
11. A method for molding a denture comprising the steps of:
 (a) placing a moldable resin in a tray having cavities in the form of teeth therein and adapted to be placed in a user's mouth,
 (b) placing protective means between the resin and gum tissue in the user's mouth,
 (c) inserting said tray and resin into the user's mouth,
 (d) applying pressure to said resin through said protective means.
12. A method for molding a denture as defined in claim 11 including placing a pad between the tray and the user's tongue.

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