Sept. 3, 1963 C. MINTZ 3,102,337

DENTAL PROCESS AND PRODUCTS

Filed Jan. 12, 1960 2 Sheets-Sheet 1

Fig. 1.

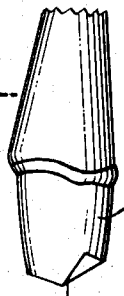


Fig. 2.

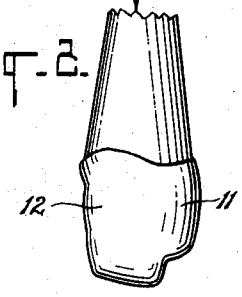


Fig. 3.

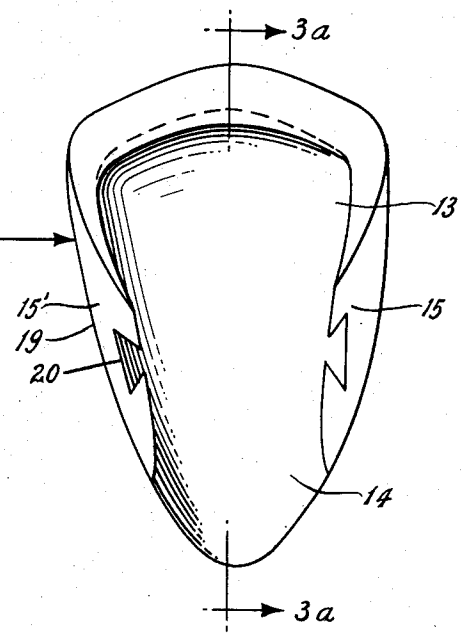


Fig. 3a.

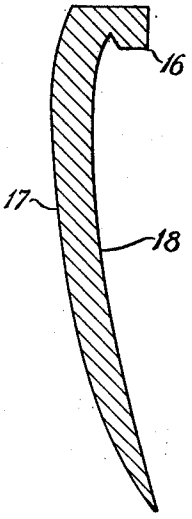


Fig. 5.

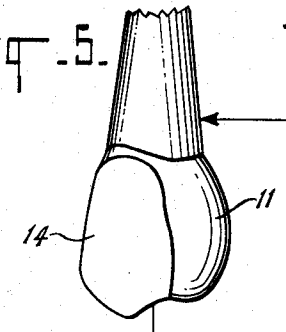


Fig. 4.

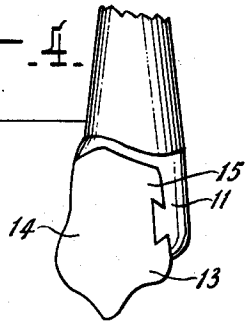
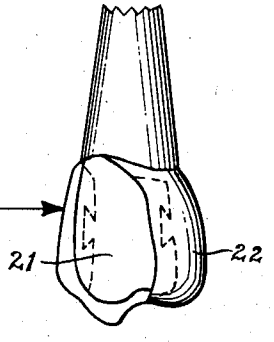


Fig. 6.

LEACH

Fig. 7.



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DENTAL PROCESS AND PRODUCTS

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Fig. 8.

INVEST

Fig. 9.

ELIMINATE WAX FROM MOLD BY MELTING

Fig. 10.

CAST IN METAL

Fig. 11.

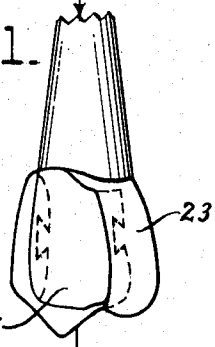


Fig. 12.

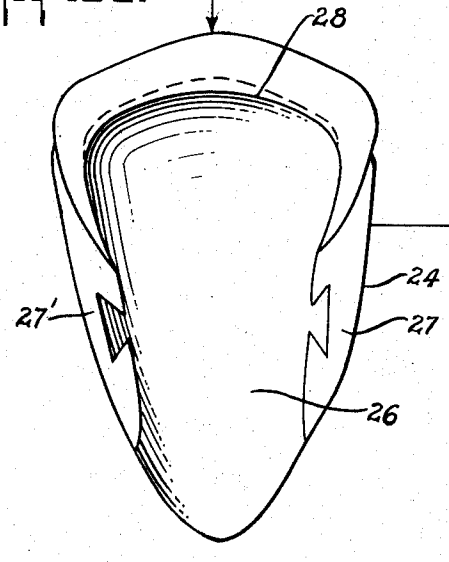


Fig. 15.

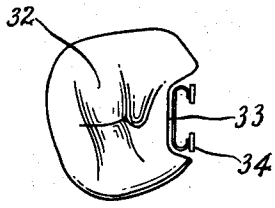


Fig. 14.

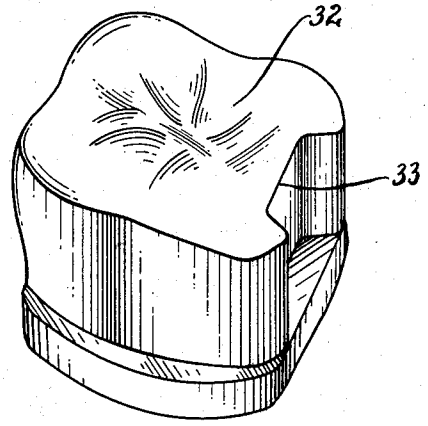
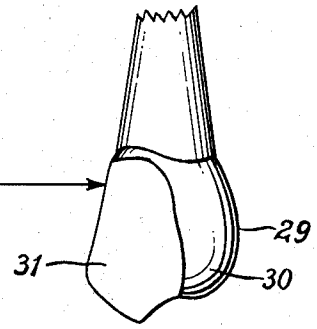


Fig. 13.



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3,102,337

DENTAL PROCESS AND PRODUCTS

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Filed Jan. 12, 1960, Ser. No. 1,927
14 Claims. (Cl. 32—12)

The present invention relates to dentistry, and particularly to a novel method and means useful therein for the manufacture of dental crowns, bridges, pontics and the like, including attachments for the same, as hereinafter described and claimed.

The method which is generally employed in dentistry for the construction of a veneer crown involves a series of tedious and time-consuming steps with attendant non-uniformity of results. In the art of constructing such a crown, one must first lubricate a die of the tooth stump and then apply wax completely around all surfaces of the tooth. The wax is carved to conform with the desired shape of the crown. After the simulated tooth surface has been fully shaped in the wax, a window is curved in the frontal surface to provide a necessary void for subsequent reception of the veneer on the remainder of the crown.

The next step is the insertion, through the window, and proper positioning, of a number of retaining mushrooms, balls, hooks or loops on the inner surfaces of the wax pattern, to which the veneer can be attached. The wax pattern is finally removed, invested so as to form a mold, and gold is cast into the mold to conform with it.

After removal of the casting containing the gold backing and loops disposed therein, a plastic facing is processed to the loops to form the completed crown.

It is apparent that this procedure as presently used in dental practice requires a very long and tedious carving technique with skillful carving of the window and the application of the retention loops in the wax pattern so as to properly process the plastic veneer. Such technique, requiring care and skill at every stage, does not readily lend itself to uniformly successful results. Furthermore, the metallic loops may show through the translucent plastic veneer and adversely affect the shading of the plastic veneer.

Even with the obvious and apparent disadvantages associated with the foregoing method for construction of dental crowns, such method has been employed for many years and improvement thereof constitutes a long standing problem in the art.

A second problem lies in the present method of attachment of a bridge or pontic to a crown. The usual practice is to attach a clasp projecting from the bridge to the crown or to grind a slot in the crown in which is soldered a female attachment which is fitted with a male attachment carrying the bridge or pontic. The grinding operation is a delicate one so as not to puncture the gold wall and is limited to the preparation of side walls which are perpendicular to the base.

It is an object of the present invention to provide a simplified, more economical and more efficient method for preparation of dental crowns, bridges, pontics, and attachments for the same.

Another object of the invention is to diminish the time-consuming carving operation involved in the preparation of veneer-receiving voids or windows.

Also an object of the present invention is a method for the preparation of wax patterns for veneered dental crowns, bridges, pontics and the like, in which a veneer-retaining void or window of standardized shape and size is employed.

A further object of the present invention is an improved method for attachment of a bridge or pontic to a crown involving a pre-formed void on the crown for insertion

of a male attachment, and thereby facilitate the use of precision rests and clasps.

Another object is a preformed dental veneer or insert adapted to form a temporary part of a wax pattern.

Yet another object of the present invention is elimination of the need for and use of metal loops, balls or mushrooms for retaining the veneer, thereby eliminating any possibility that these loops or the like may show through the veneer and affording the preparation of a more esthetic veneered crown or the like.

Also an object of the instant invention is a resilient veneer adapted to exactly mate with a window provided in a metal replica of a tooth, said window being of a predetermined size and shape identical to that of the veneer.

A principal feature of the present invention relates to forming a tooth-simulating pattern composed of a normally solid water-soluble material on a surface of a mount of waxy material. The water-soluble portion encompasses an opening or window for later insertion of means for supporting or attaching artificial tooth structure. The waxy material with the water-soluble portion is shaped so as to form a consolidated pattern of a desired tooth. The water-soluble pattern is leached away from the waxy material with an aqueous solvent to form an opening for insertion of means for supporting the artificial tooth structure after casting of the desired tooth pattern in metal. In this opening, there can be inserted a facing veneer for example or a female attachment from a pontic or bridge.

A preferred embodiment of the present invention relates to a process for the preparation of a veneered tooth replica which comprises super-imposing a preformed pattern of the water-soluble material on the frontal surface of a mount formed of waxy material, said water-soluble pattern having the shape and perspective of a tooth facing and encompassing a window having locking means extending therefrom, embedding said locking means in said waxy material, shaping said waxy material and preformed water-soluble window pattern to form the desired finished tooth having said water-soluble pattern as the frontal surface thereof, and leaching said water-soluble preformed window pattern and the locking means thereon away from said waxy material with the aqueous solvent, said window-containing pattern having means for mating with said locking means recessed therein.

The invention further contemplates investing said window-containing pattern in a mold, reproducing, in said mold, a metal replica of said window-containing wax pattern, recovering said metal replica from said mold, and inserting, in said window-containing metal replica, means for attachment of artificial tooth structure such as a resilient veneer having the same size and shape as the aforesaid pre-formed water-soluble pattern.

By virtue of the fact that the instant locking means is integral with and constitutes an extension of the facing, there are no metallic projections in the form of retaining loops or hooks to show through or shadow the final veneer.

Also within the ambit of the present invention is an insert for waxed dental patterns comprising a water-soluble pre-formed veneer window pattern having the shape and perspective of a tooth facing and preferably having locking means extending outwardly therefrom and adapted to be imbedded within a waxed dental pattern.

Various other preferred embodiments will be apparent in the following description.

The invention will be described further in connection with the accompanying drawings which are to be considered as exemplary of the invention and which do not constitute limitations thereof.

In the drawings, which constitute a schematic presentation of the instant process:

FIG. 1 is a perspective view of a die or model of a tooth stump which is to be crowned,

FIG. 2 illustrates the die of FIG. 1 to which a preliminary layer of wax has been applied,

FIG. 3 is a rear perspective view of a pre-formed water-soluble veneer window pattern in accordance with the present invention,

FIG. 3–A is a cross-section in elevation of the water-soluble pre-formed veneer window pattern of FIG. 3 along the line A—A thereof,

FIG. 4 illustrates the waxed die of FIG. 2 to which the veneer window pattern of FIG. 3 has been applied,

FIG. 5 illustrates the application of the remainder of the necessary wax to form a consolidated pattern,

FIG. 6 indicates, in schematic fashion, the leaching of the water-soluble window pattern from the consolidated pattern of FIG. 5,

FIG. 7 indicates the structure of the wax pattern after removal of the water-soluble window pattern therefrom,

FIGS. 8–10 indicate, in schematic fashion, the procedural steps of investing the wax pattern of FIG. 7, eliminating the wax from the mold, and casting gold into the mold respectively which techniques are known,

FIG. 11 illustrates the cast gold crown,

FIG. 12 illustrates a plastic veneer window insert for the cast gold crown of FIG. 11,

FIG. 13 illustrates the final veneered crown,

FIG. 14 illustrates the structure of the wax pattern and cast crown serving as an abutment retainer for attachment of a bridge or pontic,

FIG. 15 is a plan view showing the female attachment inserted therein.

In FIG. 1, character **10**, refers to a die or model of a stump to be crowned, the die being prepared in the usual manner from an impression of the actual stump to be crowned. In the course of the present process, the lie is lubricated in the customary manner to facilitate release from the pattern to be prepared thereon.

After lubrication of the die **10**, it is entirely covered with a preliminary layer of wax **11**, as illustrated in FIG. 2. The preliminary layer of wax **11**, completely covers the lubricated tooth die **10**, but is a relatively thin coat, part thereof **12** forming the exposed frontal surface of the waxed die, i.e., the part which is to be veneered.

After the preliminary waxing step illustrated in FIG. 2, the waxed die is ready for application thereto of a pre-formed water-soluble veneer window. A suitable pre-formed window pattern is illustrated in FIGS. 3 and 3–A, and is shown applied to the preliminarily waxed die **11** in FIG. 4.

The pattern, indicated generally by character **13**, is comprised of a window portion **14**, which corresponds to the visible part of the final veneer, and a remaining portion or portions consisting of lateral dovetail wings **15** and **15'** and rearwardly depending lip **16**, which together constitute the supporting and retaining means for the window portion **14** in the consolidated pattern of the desired finished tooth replica, as referred to hereinafter.

The window portion **14** is thicker than and protrudes forward or outward from the lateral dovetails. The thus raised window section is convex on its outer face **17** (not clearly visible in FIG. 3, but fully visible in FIG. 3–A), and is concave on its rear face **18**. For the most part, these two faces are substantially parallel, thus providing, for a major part of its length, a window of substantially uniform thickness. The lower portion of the window section, however, tapers smoothly to a knife edge.

The forward or outer face **17** of the window section **14** is formed such that it has substantially the shape and periphery of the desired visible veneered portion of the final crown, i.e., the appearance of a natural tooth.

The outer faces **19** of the dovetail wings **15** are recessed behind the forward face **17** of the window portion **14** as a result of both tapering and curvature of the water-soluble insert pattern. (A stepped or relief type structure may also be used of course.) Each trapezoidal wing **15** extends from the window portion **14** at the lateral edges thereof, towards the base **20**.

The water-soluble pattern is disposed on the preliminary wax layer and the rearwardly depending lip **16** is embedded therein, as illustrated in FIG. 4. The remainder of the necessary wax is then applied to the pattern, and the wax is then carved to final shape, uniting with the exposed front surface of the water-soluble window to form a smoothly contoured consolidated pattern of the desired final veneered tooth replica, as illustrated by FIG. 5.

As is apparent from FIG. 5 the dovetail wings **15** of the water-soluble insert are covered by and embedded in the final wax layer which, of course, is carved to be flush with the forward or convex surface **17** of the window portion.

The next step comprises leaching the water-soluble pre-formed veneer window from the consolidated pattern to form the final wax pattern, which, of course, then contains a void or cavity **21** corresponding to the configuration of the removed water-soluble pattern.

This leaching step is shown schematically on the drawing as FIG. 6. Any appropriate solvent such as distilled water may be employed, as will be referred to hereinafter. In some instances it may be desirable to deliberately syringe out the void **21** with solvent to insure complete removal of the entire water-soluble insert, and particularly the portions thereof which are embedded in and covered by the wax.

The final wax pattern formed after the pre-formed water-soluble veneer window pattern has been washed out of the wax pattern as illustrated in FIG. 7, wherein it is referred to generally by the character **22**. This final wax pattern is then invested in a conventional molding compound in the usual manner, as referred to schematically in FIG. 8 of the drawing. The wax is then destroyed or eliminated from the mold in accordance with customary practice, e.g., by melting, as referred to in FIG. 9, and the wax pattern is then reproduced in the mold by casting in gold (FIG. 10) to form a gold replica of the window-containing final wax pattern of FIG. 7, this gold replica being referred to generally by the character **23** in FIG. 11. The gold crown is released from the dovetail wing components of the mold by acid pickling and heat which breaks down the inventment.

The crown is then completed by inserting or forming a plastic or porcelain window veneer denoted generally by character **24** in FIG. 12 into the void **25** in the crown corresponding to the water-soluble insert which was leached out of the consolidated pattern before the wax moiety thereof was molded. The window veneer, illustrated in FIG. 12, is identical in size and shape to the water soluble pattern **13** of FIG. 3, possessing a corresponding window portion **26**, dovetail wings **27** and **27'**, and rearwardly extending, depending lip **28**.

The cast gold crown may receive three types of veneers. One type is a pre-processed facing of plastic, or porcelain. A second type is to process the plastic into the window and a third method is to process porcelain into the window.

With regard to the use of a pre-processed plastic facing, it is sufficiently resilient to permit adequate distortion of the dovetail wings **27** and the rearwardly extending, depending lip **28** to enable them to enter and mate with their corresponding undercut portions of the cavity **25**.

To insert the veneer into the void provided in the crown **23**, a thin layer of adhesive cement is applied to the entire rear surface of the veneer, and to the front surfaces of the dovetail wings **27**. Similarly, a thin layer of cement is applied to the entire veneer cavity **25** in the metal crown **23**. The cement is colored for correct shading of the veneer and to stop light transmission to gold.

The veneer is then forced into the cavity, insertion of the dovetail wings and the retaining lip being aided by

temporary distortion of these resilient members and also by the lubricating qualities of the cement before it sets. (It will be appreciated, of course, that the undercut nature of the dovetail wings **27** and **27'** and the retaining lip **28** is somewhat emphasized in the drawings for the sake of clarity of illustration.) Similarly, a pre-processed porcelain facing may be cemented to form the completed crown in like manner.

In processing the plastic into the window of the gold crown, a wax facing is applied and carved to the desired shape. The product is then invested in a conventional plastic molding compound to form a counter mold and the wax is melted away in the usual manner. The plastic material for the facing in the form of a dough or gel is placed in the mold and pressed to shape against the crown and the facing plastic is then cured while in the mold. The crown with the plastic facing is then removed by breaking the plastic mold.

The application of porcelain facing into the window is basically similar. The porcelain in the form of a powder is mixed with water, shaped to conform with the pre-carved window in the pre-shaped gold crown, and the porcelain is then cured while in place against the gold crown. There is no need for undercuts in the gold crown in this case since the porcelain is fused directly to the gold.

The completed veneered crown, ready to be cemented to a tooth stump, is illustrated generally by character **29** in FIG. 13. It comprises two visible parts, the gold body **30** and the exposed front surface of the veneer **31**. The veneer is mechanically locked in place by means of the dovetail wings **27** and **27'** and depending lip **28** which, of course, are not visible in the finished crown **29** illustrated in FIG. 13.

The instant veneer may be prepared from any resilient material otherwise suitable for the preparation of dental veneers, the previously employed acrylic materials such as polymethylmethacrylate being particularly preferred. These veneers may be colored or pigmented in the usual manner, and may be provided in a spectrum of standardized sizes, shades, and shapes (within the scope of the present invention).

Veneers in accordance with the present invention may be provided either separately or in combination with a water-soluble pre-formed pattern thereof, each size and shape of veneer being duplicated by such a pre-formed pattern.

The pre-formed patterns are prepared of a solid material which is soluble or dispersible in an aqueous solvent, so as to permit the solvent to preferentially leach the preformed window insert from consolidated or insert-containing pattern of the final veneered crown. Preferably, the insert material is one which is substantially stable under ambient conditions, i.e., is not deliquescent or efflorescent, and which is soluble or dispersible in a cold aqueous solvent (room temperature or below) so as to minimize detrimental action on the wax, e.g., solublization or distortation thereof. Thus, the pre-formed pattern may be prepared from gelatin, water-soluble glue, polyvinyl alcohol, and the like.

Aqueous solvents suitable for use in accordance with the present invention are water, aqueous solutions of wetting and surface active agents, dilute aqueous solutions of acids and bases, and aqueous solutions of organic solvents such as ethanol which are non-wax dissolving selective solvents. Distilled water is, however, the preferred solvent.

The wax employed may be any water insoluble wax or similar material such as those wax materials commonly employed for the preparation of dental patterns, e.g., petroleum-derived high molecular weight paraffins.

The process and products of the present invention may be employed in conjunction with the preparation of replicas of veneered teeth for a wide variety of purposes such as crowns, pontics, bridges, and the like. For example, for the preparation of pontics, pre-formed wax patterns of tooth bodies may be provided which have an enlarged frontal void suitable for receiving a variety of shapes and sizes of pre-formed water-soluble veneer insert patterns. A veneer pattern of the desired shape and size is applied to the frontal void of the wax pattern, and, to complete the wax pattern, it is then merely necessary to cover the dovetail wings and any remaining interstices with the necessary wax, smooth the added wax to contour, and then leach the water soluble insert from the consolidated pattern.

It will now be seen that the present invention encompasses a new concept for the preparation of veneered cast dental replicas wherein there is provided, separately or in combination as a paired or matched set, a resilient dental veneer having undercut locking means extending therefrom (preferably on lateral extremities thereof) adapted to be embedded in and concealed and retained by a body portion of a tooth replica, and a water-soluble pattern or replica of the veneer member. There is provided also a process wherein such a water-soluble pattern is employed in conjunction with waxy material to form a pattern of a veneered dental product, and the water-soluble pattern of the veneer member of the product is leached from the waxy material to form a window-containing wax pattern which may be invested with molding material, eliminated from the mold, and reproduced in metal to form a metal body which is adapted to accept a resilient veneer having the same size and shape as the pre-formed water-soluble pattern originally employed.

The same basic process can be employed for manufacture of crowns or other similar structure to serve as abutment retainers for attachment of a bridge or pontic. As previously indicated, one method employed at the present time is to grind a slot in the crown in which is soldered a female attachment which is fitted with a male attachment carrying the bridge or pontic. There are many obvious difficulties with such procedure which are obviated by the present process.

As part of this aspect of my invention, there is first prepared a waxed stump which could be similar to that in FIG. 2 but is usually on a posterior tooth. The water-soluble pre-formed pattern or insert is added thereto and is of any desired shape to form the type of slot, groove or opening desired. The pattern need not have dovetails unless desired depending upon the type of attachments to be employed for supporting the bridge. The water-soluble pattern is sealed to the wax body by additional wax forming the desired contour of the tooth surface.

The water-soluble insert is then flushed away with an aqueous solvent and the resulting wax pattern with the pre-formed groove is invested and cast, resulting in a gold crown with the pre-formed opening. This procedure has been basically described in connection with FIGS. 4–11 above.

The female precision attachment may then be cemented or soldered in place for the subsequent attachment of the male abutment carrying the bridge or pontic. The groove will be made usually slightly larger so as to accommodate the cement or solder. This product is illustrated by FIGS. 14 and 15. In these figures, character **32** is the occlusal surface of a cast posterior crown which is the same shape as the wax pattern. Character **33** refers to the groove, slot or window formed after dissolving out the water-soluble insert and **34** illustrates a typical female precision attachment which has been cemented or soldered in place.

It is another embodiment of the present invention that the slot or groove can be made slightly smaller than or an exact replica of the female attachment so that no interproximal space remains. To insert the female precision attachment, the gold crown is heated to expand it and, if desired, the female attachment may be cooled, resulting in sufficient difference so that the female attachment may be inserted readily and joined to the crown.

Upon attaining room temperature, the resulting product is the same as if the two materials had been fused. The advantages of this process are evident since the time and expense involved in soldering have been completely eliminated.

Another major advantage of using my process of forming the abutment retainer is that the slot or groove which is preformed can be prepared with undercuts or dovetails, as described previously, using water-soluble patterns having such features. In the prior methods used, dovetails could not be formed in the slots. As a result, my process permits the use of precision rests and is not limited to precision attachments.

While there has been disclosed and described that which is at present considered to be the preferred embodiment of the invention, it will be understood, of course, that many changes, modifications, and/or substitutions may be made therein without departing from the true scope of the invention as defined in the appended claims.

What is claimed is:

1. A process for the preparation of a crown for attachment to a pontic which comprises forming a preformed pattern composed of a normally solid water-soluble material on a portion of a mount formed of waxy material, said water soluble pattern when removed therefrom forming an opening to serve as means of attachment to said pontic, shaping said waxy material to form with the pre-formed water-soluble pattern a consolidated pattern of a crown having a desired contour of the tooth surface, leaching said water-soluble pre-formed portion away from said waxy material with an aqueous solvent to form an opening therein, investing said wax pattern in a mold, reproducing a metal replica of said wax pattern containing said opening, and recovering said metal replica in the form of a crown having said opening for attachment to a pontic.

2. A process in accordance with claim 1 wherein a female precision attachment to said pontic is inserted in said opening in said crown as a support for the pontic.

3. A dental veneer having integral multiple supporting and retaining means for engagement with the body portion of a dental crown which comprises locking means integral therewith and extending laterally and inwardly from two opposing edges thereof behind the forward face of said veneer, said locking means on each of said two edges comprising a recess wider at its base than at its opening and adapted to interlock with a corresponding projecting mating member attached to said crown body portion so as to conceal and retain said veneer locking means therein, and said veneer having an integral depending lip extending rearwardly from an edge of said veneer between said lateral recess-containing edges for attachment to said crown body portion, said veneer being sufficiently resilient to permit engagement of said recesses and lip thereof with mating members in said crown body portion.

4. A dental veneer for engagement with the body portion of a dental crown which comprises locking means integral with said veneer and extending rearwardly behind the forward face of said veneer, said locking means comprising an undercut recess adapted to receive a corresponding undercut mating member attached to said crown body portion and interlock said veneer therewith so as to conceal and retain said veneer locking means therein, said veneer being resilient sufficiently to permit engagement of said veener undercut locking means with said undercut crown mating member.

5. A dental veneer crown which comprises a shell crown having an opening on the frontal surface and a dental veneer covering said opening, said veneer having locking means integral therewith and extending laterally and inwardly from two opposing edges thereof, the forward surface of said locking means being recessed behind the front surface of the opening in said shell crown, said locking means on each of said two edges comprising an undercut recess wider at its base portion than at its opening and interlocking with a corresponding projecting mating member within said shell crown so as to conceal and retain said veener locking means therein, said veneer being sufficiently resilient to permit engagement of said recesses with said mating members in said shell crown.

6. A dental veneer crown which comprises a dental veneer on the frontal surface in engagement with the body portion of a dental crown, said veneer having integral locking means extending rearwardly behind the exposed front surface of said veneer, said locking means comprising an undercut recess in engagement with a corresponding undercut mating member attached to said crown body portion and interlocking said veneer therewith so as to conceal and retain said veneer locking means therein, said veneer being resilient to permit insertion of said veneer undercut locking means into engagement with said undercut crown mating member.

7. A dental venéer crown as set forth in claim 6 wherein said locking means is a dovetail.

8. A dental veneer crown as set forth in claim 6 wherein said locking means is a rearwardly extending, depending lip.

9. A dental veneer crown as set forth in claim 7 wherein the forward surface of said dovetail is recessed behind the exposed front surface of said veneer, said crown body portion having a window covered by said veneer and said dovetail locking means extending through said window and engaging the corresponding mating member in said crown therein.

10. A process which comprises forming a tooth-simulating pattern composed of a normally solid water-soluble material on a surface of a mount formed of water-insoluble waxy material, said water-soluble portion when removed therefrom forming an opening to serve as means for attachment of a veneer, said waxy material forming with said pre-formed water-soluble portion a consolidated pattern of a desired tooth, having said water-soluble pattern on a portion thereof, and leaching said water-soluble pattern away from said waxy material with an aqueous solvent to form a pattern of the desired finished tooth having an opening to serve as means for attachment of a veneer.

11. A process for the preparation of a veneered tooth replica which comprises super-imposing a pre-formed pattern composed of a normally solid water-soluble material on the frontal surface of a mount formed of water-insoluble waxy material, said water-soluble pattern having the shape and perspective of a tooth facing and when removed therefrom forming a window, said water-soluble pattern having lock-forming means integral therewith for forming a locking means in said waxy material, embedding said lock-forming means in said waxy material, shaping said waxy material to form with said pre-formed water-soluble window pattern a consolidated pattern of a desired finished tooth having said water-soluble pattern as the front surface thereof, and leaching said water-soluble pre-formed window pattern and the lock-forming means thereon away from said waxy material with an aqueous solvent to form a window-containing pattern of the desired finished tooth and a locking means recessed therein for attachment of a veneered tooth replica.

12. A process for the preparation of a veneered tooth replica which comprises super-imposing a pre-formed pattern composed of a normally solid water-soluble material on the frontal surface of a mount formed of water-insoluble waxy material, said water-soluble pattern having the shape and perspective of a tooth facing and when removed therefrom forming a window, said water-soluble pattern having lock-forming means integral therewith for forming a locking means in said waxy material, embedding said lock-forming means in said waxy material, shaping said waxy material to form with said pre-formed water-soluble window pattern a consolidated pattern of a

desired finished tooth having said water-soluble pattern as the frontal surface thereof, leaching said water-soluble pre-formed window pattern and the lock-forming means thereon away from said waxy material with an aqueous solvent to form a window-containing pattern of the desired finished tooth and a locking means recessed therein for attachment of a veneer thereto, investing said window-containing wax pattern in a mold, reproducing a metal replica of said window-containing wax pattern in said mold, recovering said metal replica from said mold, and inserting, in said window-containing metal replica, a resilient veneer having the same size and shape as the aforesaid pre-formed water-soluble pattern.

13. A process for the preparation of a veneered crown which comprises applying a water-insoluble waxy material to a die simulating a stump to be crowned, superimposing a preformed pattern composed of a normally solid water-soluble material on the frontal surface of said waxy material, said water-soluble pattern having the shape and perspective of a tooth facing and when removed therefrom forming a window, said water-soluble pattern having undercut lock-forming means integral therewith and extending laterally from the periphery thereof for forming a locking means in said waxy material, applying additional waxy material to said waxed die and embedding said lock-forming means therein, shaping said waxy material to form with said pre-formed water-soluble window pattern a consolidated pattern of a desired finished crown having said window as the frontal surface thereof, leaching said water-soluble pre-formed window pattern and undercut lock-forming means thereon away from said waxy material with an aqueous solvent to form a window-containing waxy pattern of the desired metal crown, and undercut locking means recessed therein for attachment of a veneer thereto, investing said window-containing waxy pattern in a mold, reproducing a cast metal replica of said window-containing waxy pattern in said mold, recovering said metal replica from said mold, and inserting, in the window-containing metal replica, a resilient veneer having the same size and shape as the aforesaid pre-formed water-soluble pattern.

14. A process for the preparation of a veneered gold crown which comprises applying a water-insoluble wax to a die simulating a stump to be crowned, superimposing a preformed pattern composed of a water-soluble wax on the frontal surface of said wax covered die, said pattern having the shape and perspective of a tooth facing and when removed therefrom forming a window, said water-soluble pattern having dovetail lock-forming means integral therewith and extending laterally from two opposing edges thereof and also having an integral depending lip extending rearwardly from an edge thereof extending between said dovetail-carrying edges, said dovetails being recessed with respect to the front surface of said window, embedding said lip in said wax and applying additional wax to said waxed die to embed said dovetails therein, contouring said wax to form with said pattern a consolidated pattern of a desired finished crown having said window as a frontal surface thereof, leaching said water-soluble pattern including said lip and dovetails from said wax with water to form a window-containing wax pattern of the desired gold crown, said window-containing pattern having undercut lip and dovetail-mating members therein, investing said window-containing wax pattern in a mold, reproducing a cast gold replica of said window-containing wax pattern in said mold, and inserting, in the window-containing gold replica, a resilient plastic veneer having the same size and shape to the aforesaid dovetail and lip-carrying pre-formed water-soluble pattern, said resilient veneer being adapted to temporarily distort to permit insertion of the dovetails and lip thereon into engagement with the mating members therefor, cast in to said gold crown.

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