



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/US90/02863 (22) International Filing Date: 22 May 1990 (22.05.90) (30) Priority data: 354,712 22 May 1989 (22.05.89) US (71)(72) Applicant and Inventor: PELERIN, Joseph, J. [US/US]; 3051 East Pontiac Road, Auburn Hills, MI 48057 (US). (74) Agent: SPRINKLE, Douglas, W.; Gifford, Groh, Sprinkle, Patmore & Anderson, 280 North Woodward, Suite 400, Birmingham, MI 48009 (US).		(81) Designated States: AT (European patent), BE (European patent), CA, CH (European patent), DE (European patent)*, DK (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), SE (European patent). Published <i>With international search report.</i>
(54) Title: CUSTOM DENTAL IMPRESSION TRAY <div style="text-align: center;"> </div> (57) Abstract <p>The present invention provides a custom impression dental tray (10) having a sheet (12) of thermosetting material. The thermosetting material is preferably polycapactone which becomes pliable at a temperature between 130-140°F but becomes rigid at the temperature of the human mouth. An optional separation layer (14) is disposed over one side (16) of the sheet (12) of thermosetting material with a wax or clay-like consistency. In practice, the tray (10) is heated to a temperature of between 115-150°F and then molded around the teeth in the patient's mouth (or the impression of the patient's mouth for denture work). After the tray has rigidified, the separation layer (14) and wax covering (18) are removed from the tray (10) thus providing a space for dental impression material to allow a final impression to be made.</p>		

DESIGNATIONS OF "DE"

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CUSTOM DENTAL IMPRESSION TRAYBackground of the InventionI. Field of the Invention

5 The present invention relates to a custom dental impression tray for both crown and bridge prosthesis as well as dentures.

II. Description of the Prior Art

10 Dental impression trays are necessary to construct both crown and bridge prosthesis as well as dentures. Furthermore, since the human mouth varies from one patient to the next, it is necessary for the dentist to make a custom impression tray before the bridge, crown or dentures can be constructed.

15 In the previously known methods for constructing custom impression trays, a preliminary model of the mouth is first made by the dentist. Typically, the dentist selects a standard tray which fits within the area of the mouth being treated. This tray is then filled with alginate, pressed into the patient's mouth and allowed to set. Thereafter, the
20 tray is removed and filled with plaster in order to form the preliminary model of the patient's teeth and/or mouth.

25 After the preliminary plaster model has hardened, thin separating sheets, typically constructed of asbestos, are molded onto the preliminary model in order to form a small space between the teeth or gum area on the model and the outside of the separating sheets.

30 Thereafter, powdered acrylic and liquid monomer are mixed together until the mixture reaches a putty consistency. The mixture is then molded into a patty which is then molded around the separating sheets of the preliminary model. Upon hardening, the molded
35 acrylic and monomer forms the custom tray.

After the custom tray has hardened, dental impression material is placed in the tray and then positioned within the patient's mouth. The dental impression material fills the space represented by the separating sheets on the preliminary model and, upon hardening, forms a final impression of the desired area of the patient's mouth. The crown, bridge work and/or dentures are formed from this final impression of the patient's mouth.

A primary disadvantage of this previously known method for forming custom dental impression trays is that the procedure is time consuming and tedious. Furthermore, in view of the materials employed and the multiple steps necessary to obtain the custom dental impression tray, this previously known procedure is expensive in material costs.

Summary of the Present Invention

The present invention provides a custom dental impression tray for crown and bridge prosthesis and/or dentures which overcomes all of the above mentioned disadvantages of the previously known custom dental impression trays.

The dental impression tray of the present invention comprises a sheet of thermosetting material. The thermosetting material is pliable at a temperature in the range of 115-150°F but becomes rigid when cooled to the temperature of a human mouth. Preferably, this material is polycapactone although other materials may alternatively be used.

A flexible separation layer overlies and covers one side of the thermosetting sheet. This separation layer is preferably constructed of gauze although other materials may alternatively be used.

A wax or clay-like covering then covers the other side of the separation layer. This covering is pliable at the same temperature that the thermosetting material becomes pliable so that the layer and thermosetting sheet can be simultaneously shaped and molded. Additionally, this covering has a substantially uniform thickness.

In practice, the tray is heated to a temperature of 130-140°F until both the thermosetting sheet as well as the wax covering become pliable. For crown and bridge work, the pliable tray is then molded around the affected area of the patient's mouth and allowed to cool and rigidify.

Patient may bite into tray when soft to register a closed bite impression. Patient may also grind a full range of motion into a tray at this point.

Once rigid, the separation layer, together with the covering, are removed from the sheet of thermosetting material which then forms the custom dental impression tray. Impression material is then placed within the resulting dental impression tray and a final impression of the affected area in the patient's mouth is taken in the conventional fashion.

Conversely, for denture work, it is necessary to form a preliminary mold of the patient's mouth. The dental impression tray is then molded around this preliminary mold in order to form the dental impression tray. Thereafter, the wax covering and optionally a separation layer are removed, the tray filled with a dental impression material and a mold of the patient's gum area is taken in the conventional fashion.

Brief Description of the Drawing

A better understanding of the present invention will be had upon reference to the following

detailed description when read in conjunction with the accompanying drawing, wherein like reference characters refer to like parts throughout the several views, and in which:

5 FIG. 1 is a fragmentary crossectional view illustrating a preferred embodiment of the dental impression tray of the present invention;

 FIG. 2 is a crossectional view, but showing the dental impression tray molded around the affected
10 area of a patient's mouth;

 FIG. 3 is a view similar to FIG. 2, but showing the dental impression tray removed from the patient's mouth after an impression has been taken; and

 FIG. 4 is a view similar to FIG. 2, but
15 illustrating the dental impression tray of the present invention used to take a final impression of the affected area of the patient's mouth.

Detailed Description of a Preferred
Embodiment of the Present Invention

20 With reference first to FIG. 1, a preferred embodiment of the dental impression tray assembly 10 is thereshown and comprises a flat sheet 12 of thermosetting material. This thermosetting material becomes pliable at a temperature of between 115-150°F
25 but rigidifies at the temperature of the human mouth.

 In the preferred form of the invention, polycapractone is used as the thermosetting sheet 12. Polycapractone becomes pliable in the temperature range of 136-140°F but rigidifies at the normal temperature
30 of the mouth, i.e. about 98°F. Polycapractone is available from Interlox America, 1230 Battleground Road, Deer Park, Texas 77536, under the trademark CAPA 650.

 Still referring to FIG. 1, a separation layer 14 overlies and covers one side 16 of the thermosetting
35

sheet 12. This separation layer 14 can be constructed from any flexible material, such as one or more layers of gauze. The purpose of the separation layer 14 will be subsequently described.

5 A covering 18 is then disposed on the other side 20 of the separation layer 14. This covering 18 is also pliable when heated to 115-150°. Consequently, when the tray assembly 10 is heated to 115-150°F, the thermosetting sheet 12, separation layer 14 and wax
10 covering 18 can be molded and manipulated by the dentist as desired.

 The dental impression tray assembly of the present invention will first be described for use with bridge or crown prosthesis. With reference then to
15 FIG. 2, the dental impression tray assembly 10 is first heated to a temperature of between 115-150°F and is then placed within the patient's mouth and around one or more of the patient's teeth 22. The tray 10 is molded into a generally U-shaped form so that the wax
20 covering 18 faces and covers the affected area of the mouth while the thermosetting sheet 12, of course, is disposed around the wax covering 18. When molding the tray assembly 10 as shown in FIG. 2, the dentist carefully presses the pliable dental tray against the
25 teeth 14 and adjacent mouth structure in order to form an appropriate mold.

 Although the thermosetting sheet 12 remains pliable for an extended period of time, in some cases the sheet 12 may rigidify before the mold of the
30 affected area of the mouth is completed. When this occurs, the dental tray 10 is simply removed from the patient's mouth, reheated to 115-150°F, and then reinserted into the mouth where the molding process is continued.

After the tray assembly 10 has been molded around the affected area of the mouth as shown in FIG. 2 and rigidified, it is removed from the mouth. At this time, however, gaps may exist between the covering 18 (FIG. 2) and the tooth 22 so that the covering 18 only approximates the shape of the tooth 22 and adjacent mouth structure. The separation sheet 14, together with the covering 18, is then removed from the thermosetting sheet 12 as indicated by arrow 24. After removal of the layer 14 and covering 18, the remaining thermosetting sheet 12, now molded, forms custom dental impression tray 30.

The thickness of the covering 18 is substantially uniform. Consequently, once the covering 18 and separation layer 24 are removed from the thermosetting sheet 12 as shown in FIG. 3, the remaining custom tray contains an impression of the affected area of the patient's mouth but is somewhat larger, due to the thickness of the covering 18, than the affected area of the patient's mouth.

With reference now to FIG. 4, dental impression material 26, such as silicone, is then placed within the interior 28 of the custom impression tray 30. The custom tray 30 is then placed within the affected area of the patient's mouth as shown in FIG. 4 so that the impression material 26 fills the space previously occupied by the covering 18 and separation layer 14 and forms a final impression. As is well known, the impression material 26 more accurately replicates the shape of the tooth 22 than the covering 18.

Once the impression material 26 hardens, the custom tray 30 together with the impression material 26 are removed from the patient's mouth and the final or

working model of the affected area of the patient's mouth is constructed in the conventional fashion. Thereafter, the bridge work and/or crown is also constructed in a conventional fashion so that a further
5 description thereof is unnecessary.

The dental impression tray assembly 10 of the present invention can also be used to form an impression for dentures. Since the gum area of the mouth is relatively soft, however, it is first
10 necessary to form a preliminary mold of the patient's gum area and then to mold the dental impression tray assembly 10 as shown in FIGS. 2 and 3 around the preliminary mold rather than directly in the patient's mouth. Otherwise, the above procedure is identical so
15 that a further description is not necessary.

The dental impression tray of the present invention is thus advantageous in several different respects. First, the dental impression tray of the present invention can be easily and rapidly molded in
20 the patient's mouth. Furthermore, as previously described, even in the event that the thermosetting sheet 12 cools and becomes rigid during the molding process, it can be simply reheated and the molding process can be continued.

A still further advantage of Applicant's invention is that only a small amount of dental impression material 26 is necessary in order to make the final impression. Since such material is relatively expensive, substantial cost savings are
25 achieved.
30

Having described my invention, however, many modifications thereto will become apparent to those skilled in the art to which it pertains without deviation from the spirit of the invention as defined
35 by the scope of the appended claims.

I claim:

CLAIMS

1 1. A custom impression dental tray assembly
2 comprising:

3 a sheet of thermosetting material, said
4 thermosetting material becoming pliable at a
5 temperature above the temperature present in a human
6 mouth and rigid at the temperature of the mouth,

7 a separation layer having one side overlying
8 and covering one side of said sheet of thermosetting
9 material,

10 a pliable covering on the other side of the
11 separation layer, said covering being moldable with
12 said sheet of thermosetting material and having a
13 substantially uniform thickness,

14 wherein, after said tray assembly is heated
15 and molded into the desired shape, said separation
16 layer enables said separation layer and said wax
17 covering to be removed from said sheet of thermosetting
18 material which forms a custom impression tray.

1 2. The invention as defined in claim 1
2 wherein said sheet becomes pliable in the range of
3 115-150°F.

1 3. The invention as defined in claim 1
2 wherein said thermosetting material is polycapractone.

1 4. The invention as defined in claim 1
2 wherein said separation layer comprises a sheet of
3 gauze.

1 5. A custom impression dental tray assembly
2 comprising:

3 a sheet of thermosetting material, said
4 thermosetting material becoming pliable at a
5 temperature above the temperature present in a human
6 mouth and rigid at the temperature of the mouth,

7 a covering on the one side of the sheet, said
8 covering being moldable with said sheet of
9 thermosetting material and having a substantially
10 uniform thickness,

11 wherein, after said tray assembly is heated
12 and molded into the desired shape, said covering is
13 removable from said sheet of thermosetting material
14 which forms a custom impression tray.

1 6. The invention as defined in claim 5
2 wherein said sheet becomes pliable in the range of
3 115-150°F.

1 7. The invention as defined in claim 5
2 wherein said thermosetting material is polycapractone.

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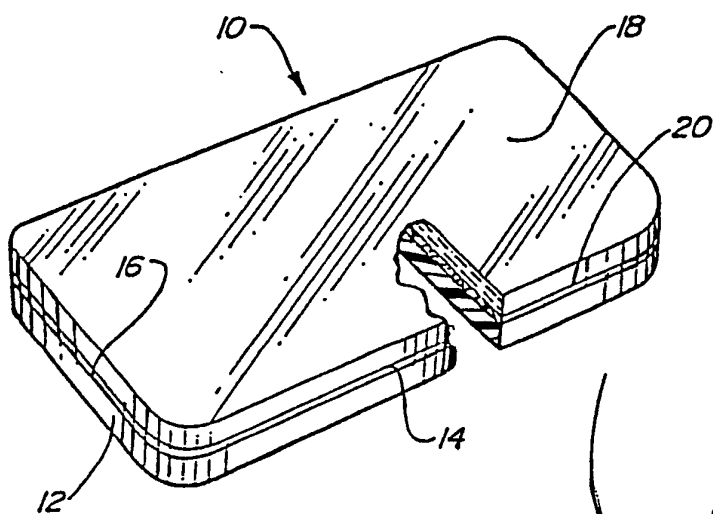


Fig-1

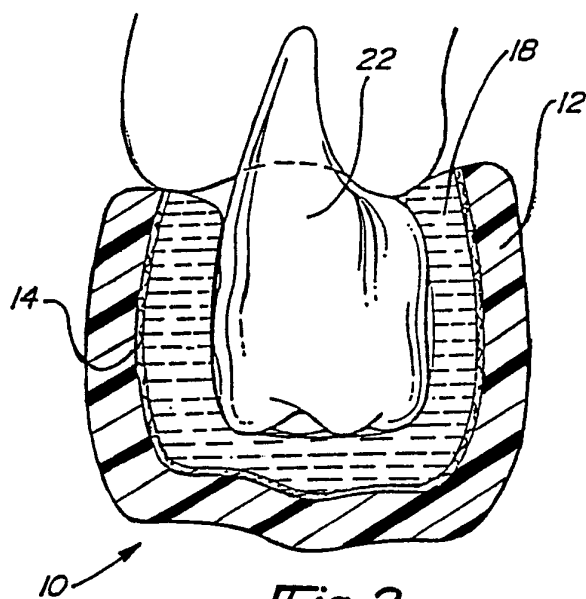


Fig-2

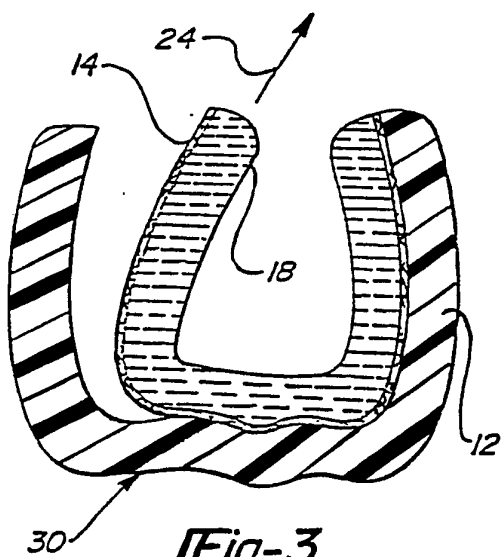


Fig-3

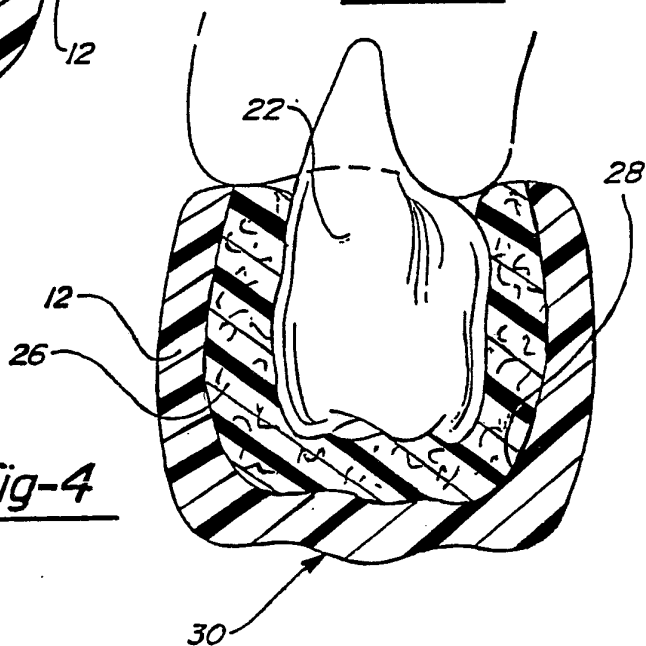


Fig-4

SUBSTITUTE SHEET

INTERNATIONAL SEARCH REPORT

International Application No. **PCT/US90/02863**

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC (5) : A61C9/00		
U.S. Cl : 433/48		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
U.S.	433/71,48,41,37; 128/863	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
Y	US,A 1,763,553 (DENNIS) 10 June 1930 See page 1, lines 1-97.	1-7
Y	US,A 4,413,979 (GINSBURG ET AL) 08 November 1983 See Column 3, lines 4-25.	1-7
A	US,A 4,569,342 (VON NOSTITZ) 11 February 1986 See entire document.	1-7
A	US,A 4,768,951 (ABIRU ET AL) 06 September 1988 See entire document.	1-7
A	US,A 4,227,877 (TUREAUD ET AL) 14 October 1980 See entire document.	1-7
A	US,A 2,404,683 (BARISHMAN) 23 July 1946 See entire document.	1-7
<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>* Special categories of cited documents: ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 48%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div> </div>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
18 June 1990	31 AUG 1990	
International Searching Authority	Signature of Authorized Officer	
ISA/US	CARY E. STONE INTERNATIONAL DIVISION	

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

A

US, A, 4,657,509 (MORRIS) 14 April 1987
See entire document.

1-7

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers _____, because they relate to subject matter ¹² not required to be searched by this Authority, namely:

2. ☐ Claim numbers _____, because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out ¹³, specifically:

3. ☐ Claim numbers _____, because they are dependent claims not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING ²

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.
2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

- ☐ The additional search fees were accompanied by applicant's protest.
☐ No protest accompanied the payment of additional search fees.