

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	INCEP-005	
		Application Number		
Title of Invention	DENTAL MOUTHPIECE			
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.				

Secrecy Order 37 CFR 5.2:

☐	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
--------------------------	---

Inventor Information:

Inventor 1					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Thien		Nguyen		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	Santa Ana	State/Province	CA	Country of Residence	US
Mailing Address of Inventor:					
Address 1	11230 Grace Avenue, Suite B				
Address 2					
City	Fountain Valley	State/Province	CA		
Postal Code	92708	Country	US		
Inventor 2					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Tam Thanh		Pham		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	San Francisco	State/Province	CA	Country of Residence	US
Mailing Address of Inventor:					
Address 1	11230 Grace Avenue, Suite B				
Address 2					
City	Fountain Valley	State/Province	CA		
Postal Code	92708	Country	US		
Inventor 3					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Ethan		Nguyen		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	INCEP-005	
		Application Number		
Title of Invention	DENTAL MOUTHPIECE			

City	Santa Ana	State/Province	CA	Country of Residence ⁱ	US
------	-----------	----------------	----	-----------------------------------	----

Mailing Address of Inventor:

Address 1	11230 Grace Avenue, Suite B				
Address 2					
City	Fountain Valley			State/Province	CA
Postal Code	92708		Country ⁱ	US	

Inventor 4	Remove
Legal Name	

Prefix	Given Name	Middle Name	Family Name	Suffix
	Lauren		Nguyen	

Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service

City	Santa Ana	State/Province	CA	Country of Residence ⁱ	US
------	-----------	----------------	----	-----------------------------------	----

Mailing Address of Inventor:

Address 1	11230 Grace Avenue, Suite B				
Address 2					
City	Fountain Valley			State/Province	CA
Postal Code	92708		Country ⁱ	US	

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. [Add](#)

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
☐ An Address is being provided for the correspondence information of this application.			
Customer Number	138718		
Email Address		Add Email	Remove Email

Application Information:

Title of the Invention	DENTAL MOUTHPIECE		
Attorney Docket Number	INCEP-005	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	10	Suggested Figure for Publication (if any)	

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	INCEP-005
		Application Number	
Title of Invention	DENTAL MOUTHPIECE		

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

Request Not to Publish. I hereby request that the attached application not be published under

☐ 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not be** the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	138718		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Claims benefit of provisional	62846353	2019-05-10

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	INCEP-005
		Application Number	
Title of Invention	DENTAL MOUTHPIECE		

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013. NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	INCEP-005
		Application Number	
Title of Invention	DENTAL MOUTHPIECE		

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	INCEP-005
		Application Number	
Title of Invention	DENTAL MOUTHPIECE		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.			
Applicant 1			
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.			
Clear			
☒ Assignee		☐ Legal Representative under 35 U.S.C. 117	
		☐ Joint Inventor	
☐ Person to whom the inventor is obligated to assign.		☐ Person who shows sufficient proprietary interest	
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:			
Name of the Deceased or Legally Incapacitated Inventor:			
If the Applicant is an Organization check here. ☒			
Organization Name	DryShield, LLC		
Mailing Address Information For Applicant:			
Address 1	11230 Grace Avenue, Suite B		
Address 2			
City	Fountain Valley	State/Province	CA
Country	US	Postal Code	92708
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button.			

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	INCEP-005
		Application Number	
Title of Invention	DENTAL MOUTHPIECE		

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1				
Address 2				
City			State/Province	
Country ⁱ			Postal Code	
Phone Number			Fax Number	
Email Address				

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet must be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, all joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of all joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Ruby Chung/			Date (YYYY-MM-DD)	2020-05-08
First Name	Ruby	Last Name	Chung	Registration Number	76809

Additional Signature may be generated within this form by selecting the Add button.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	INCEP-005
		Application Number	
Title of Invention	DENTAL MOUTHPIECE		

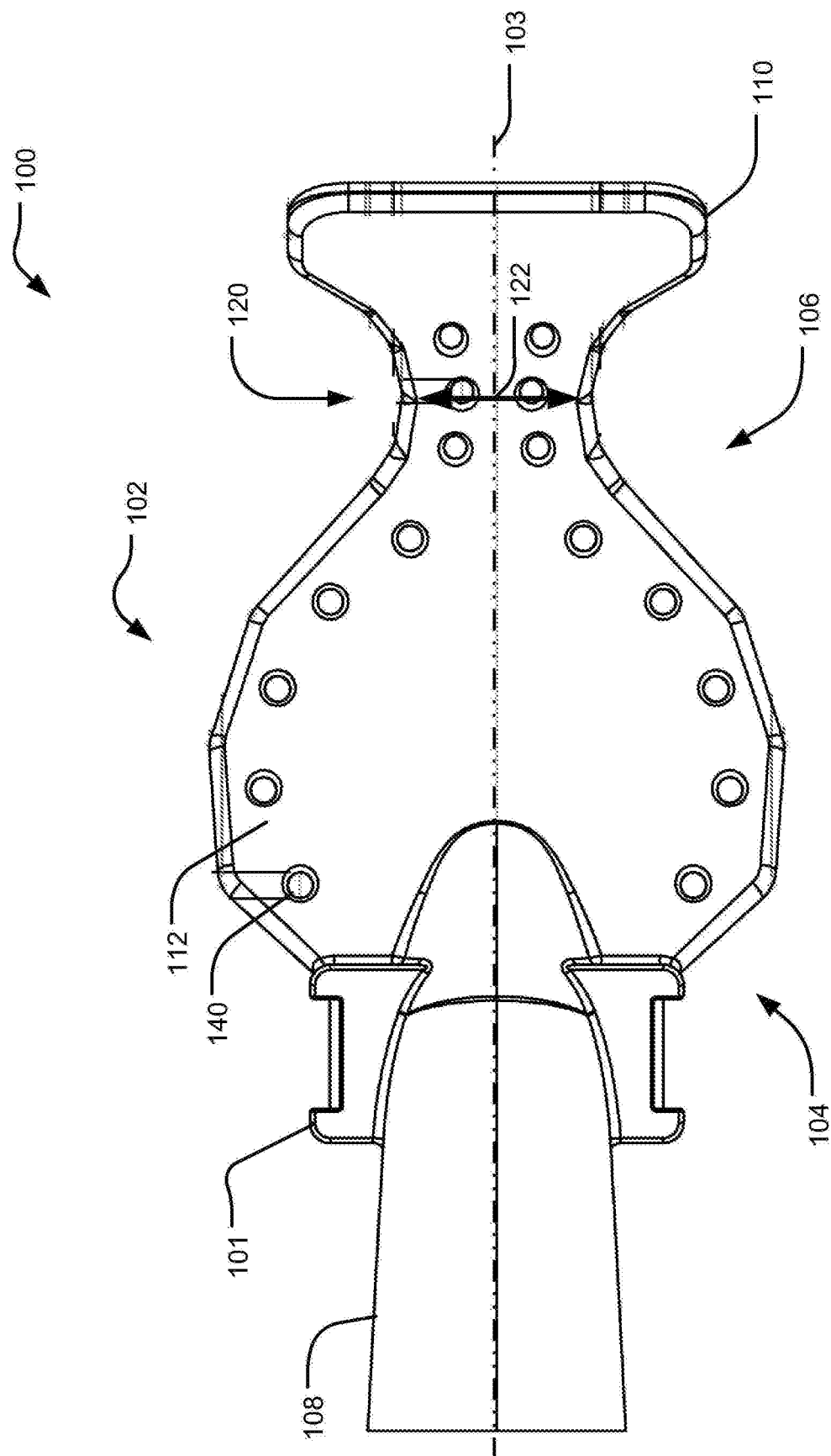
This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

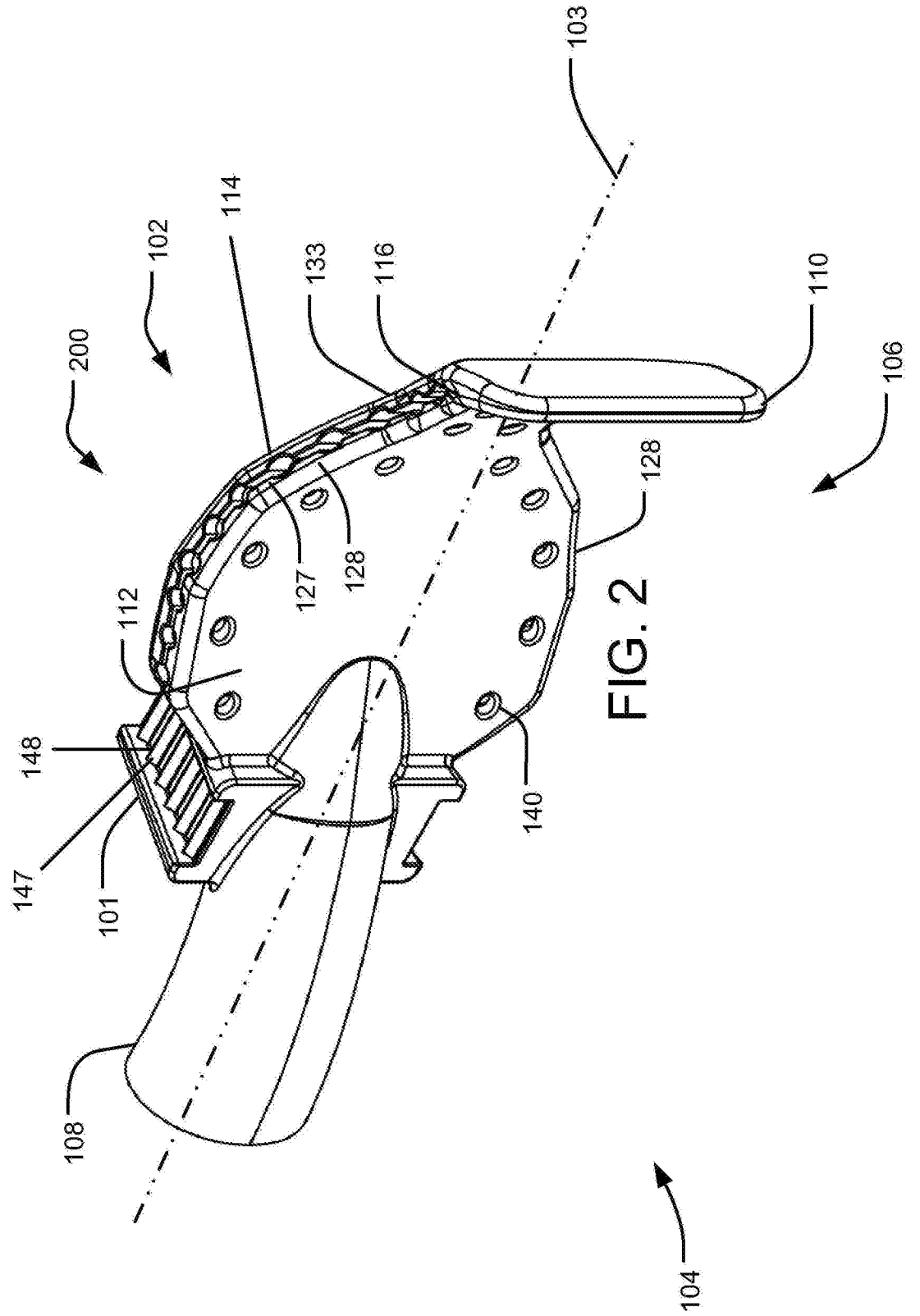
Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

- 1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
- 2 A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
- 3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
- 4 A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
- 5 A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
- 6 A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
- 7 A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
- 8 A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
- 9 A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.





+

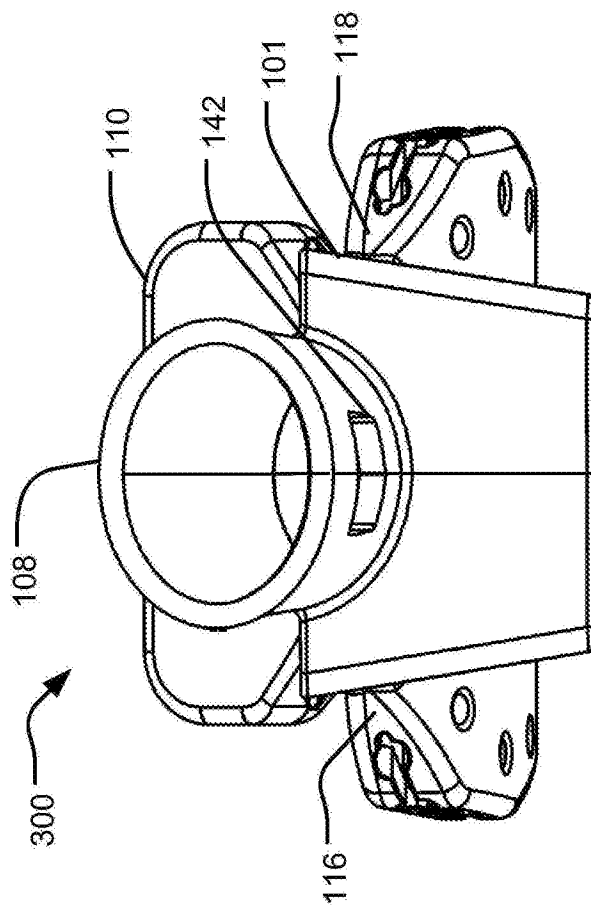


FIG. 3

+

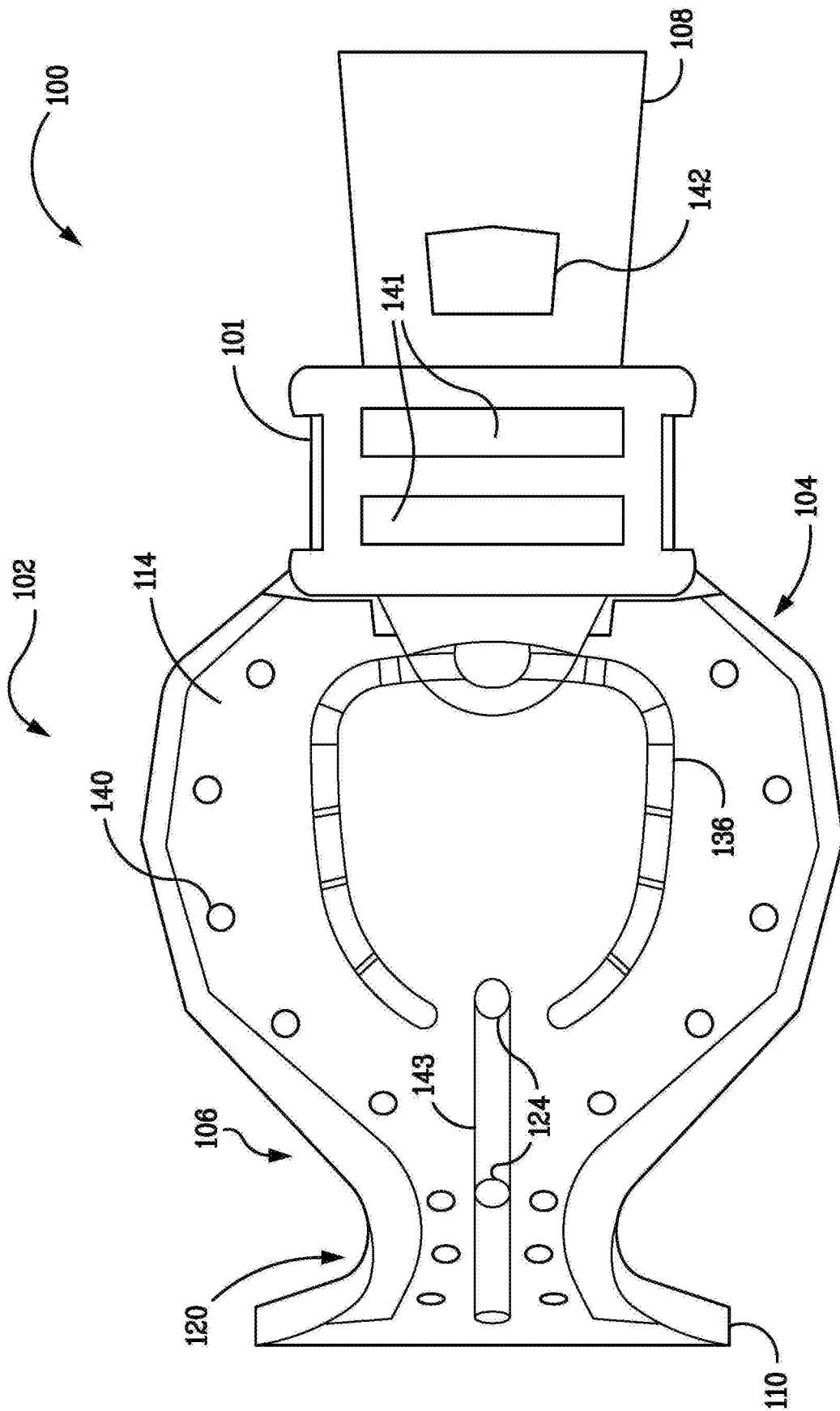
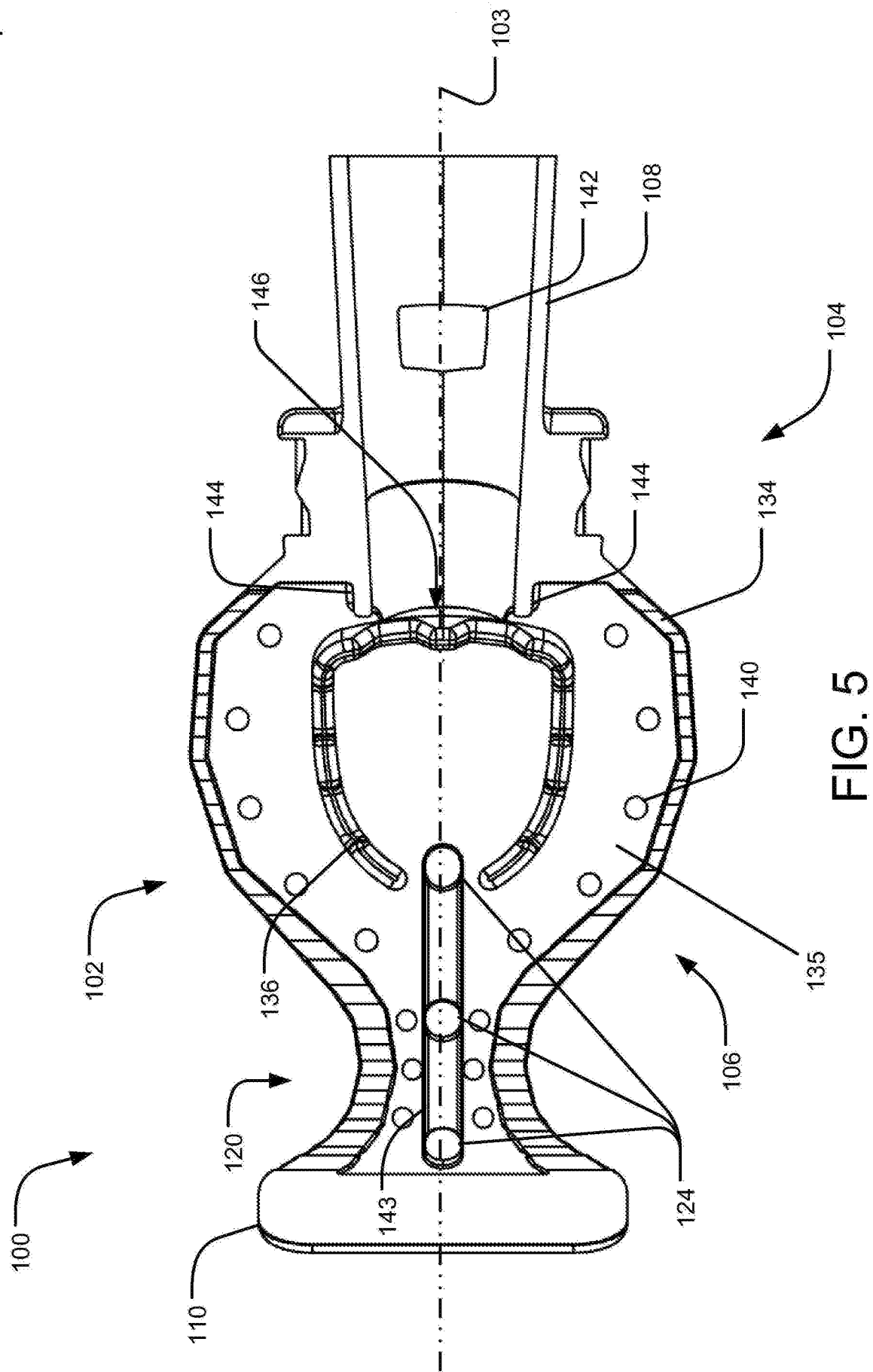


FIG. 4



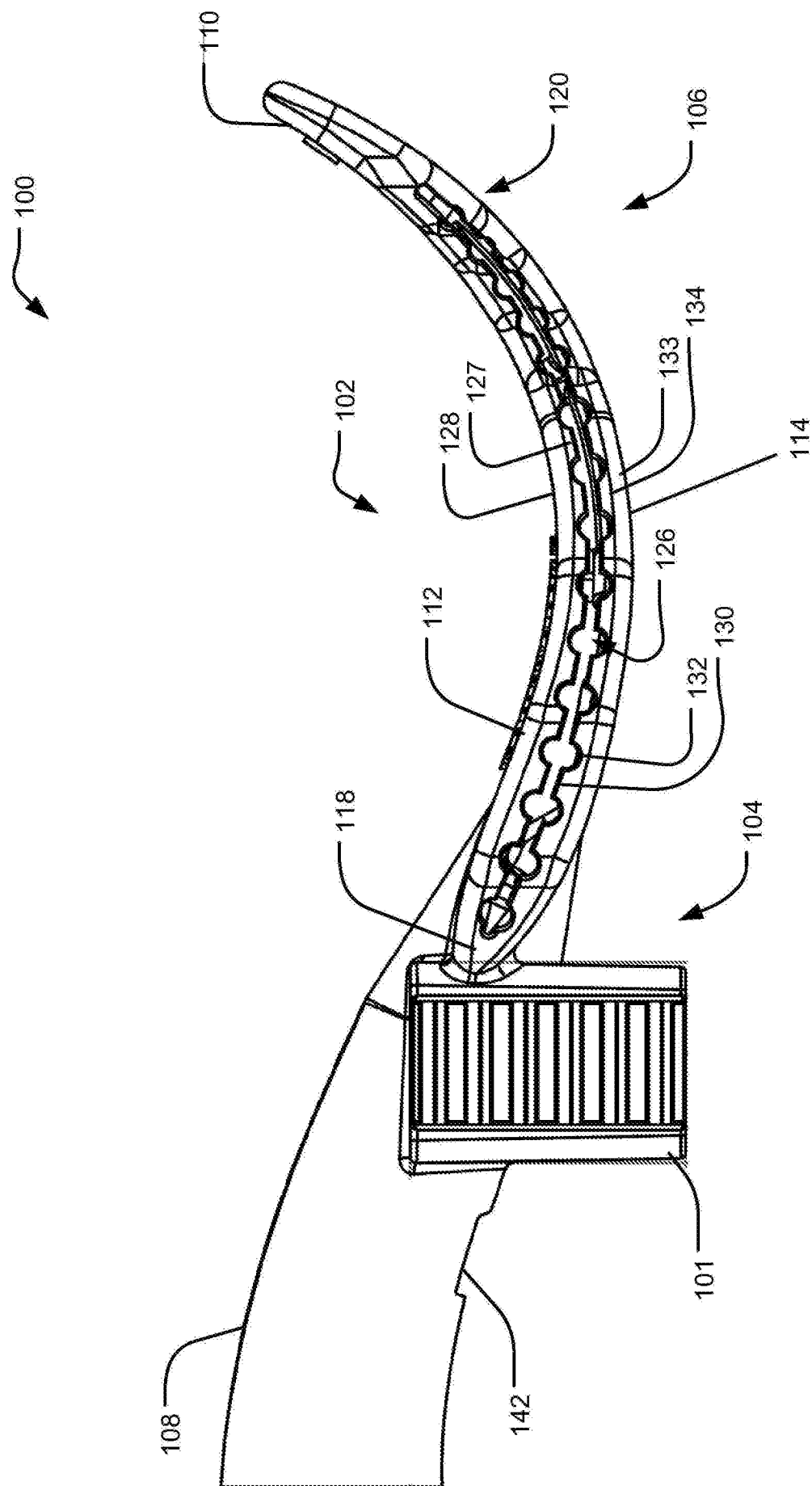


FIG. 6

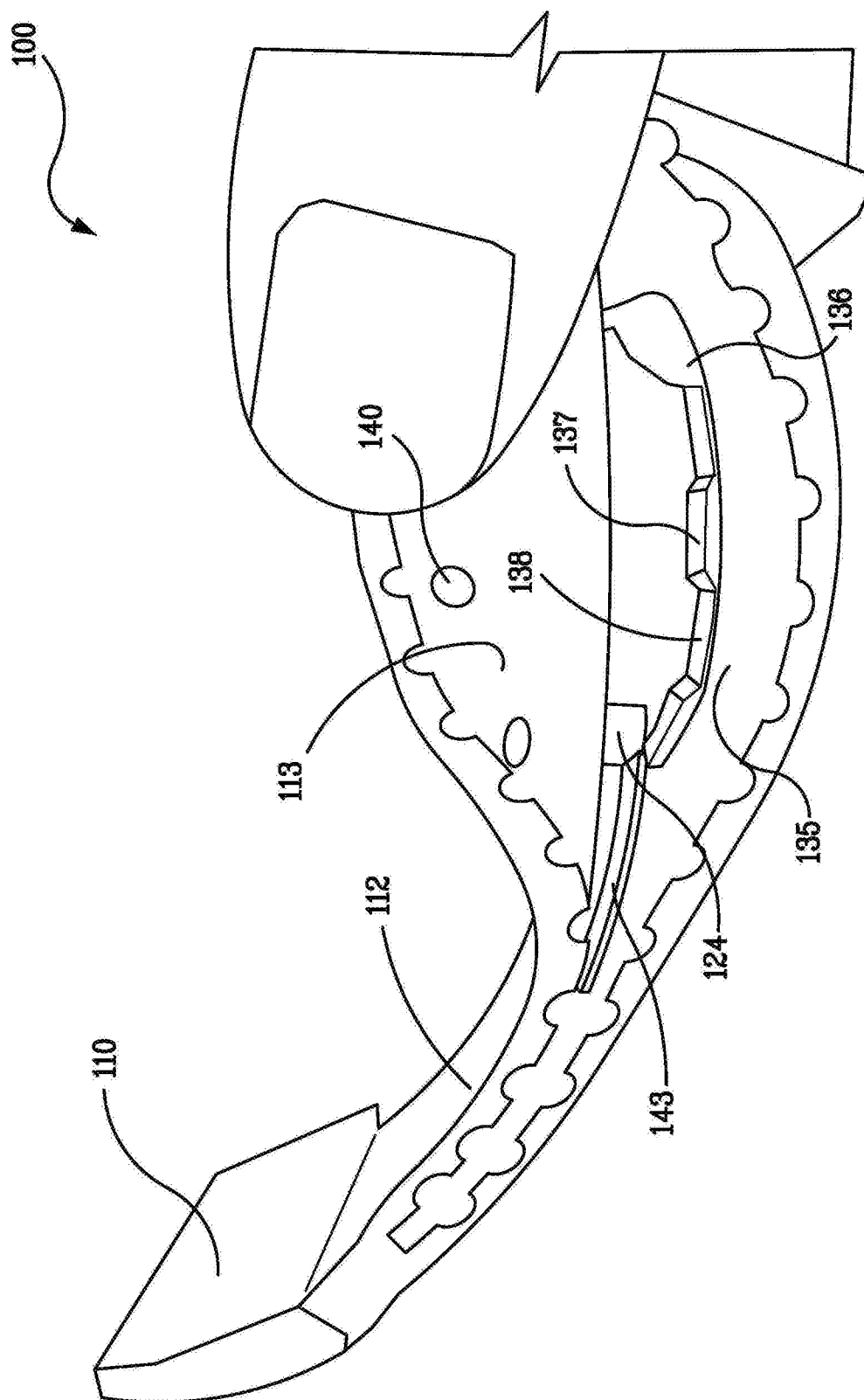


FIG. 7

+

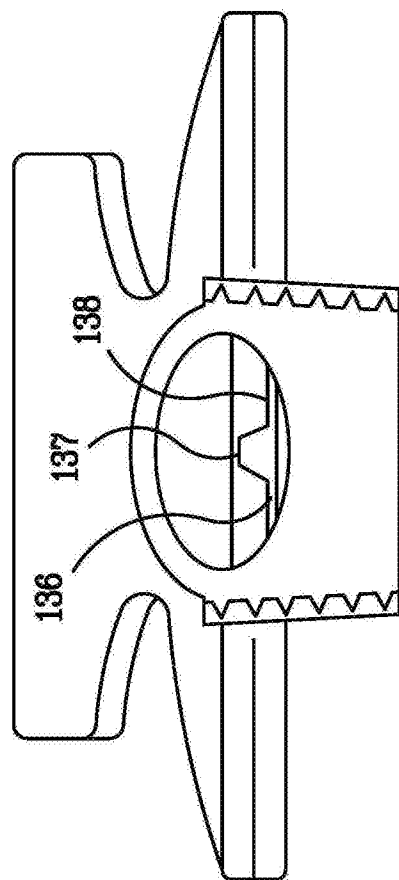
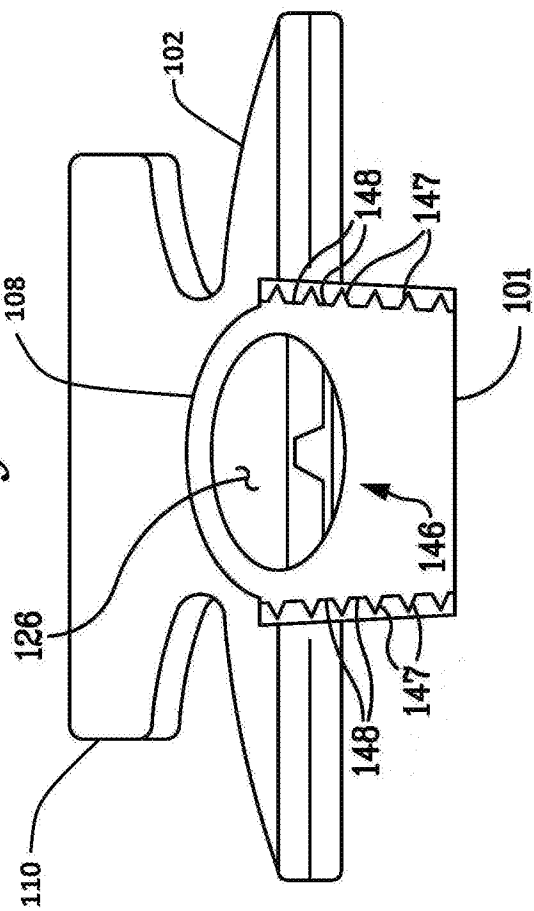


FIG. 8

FIG. 9



+

+

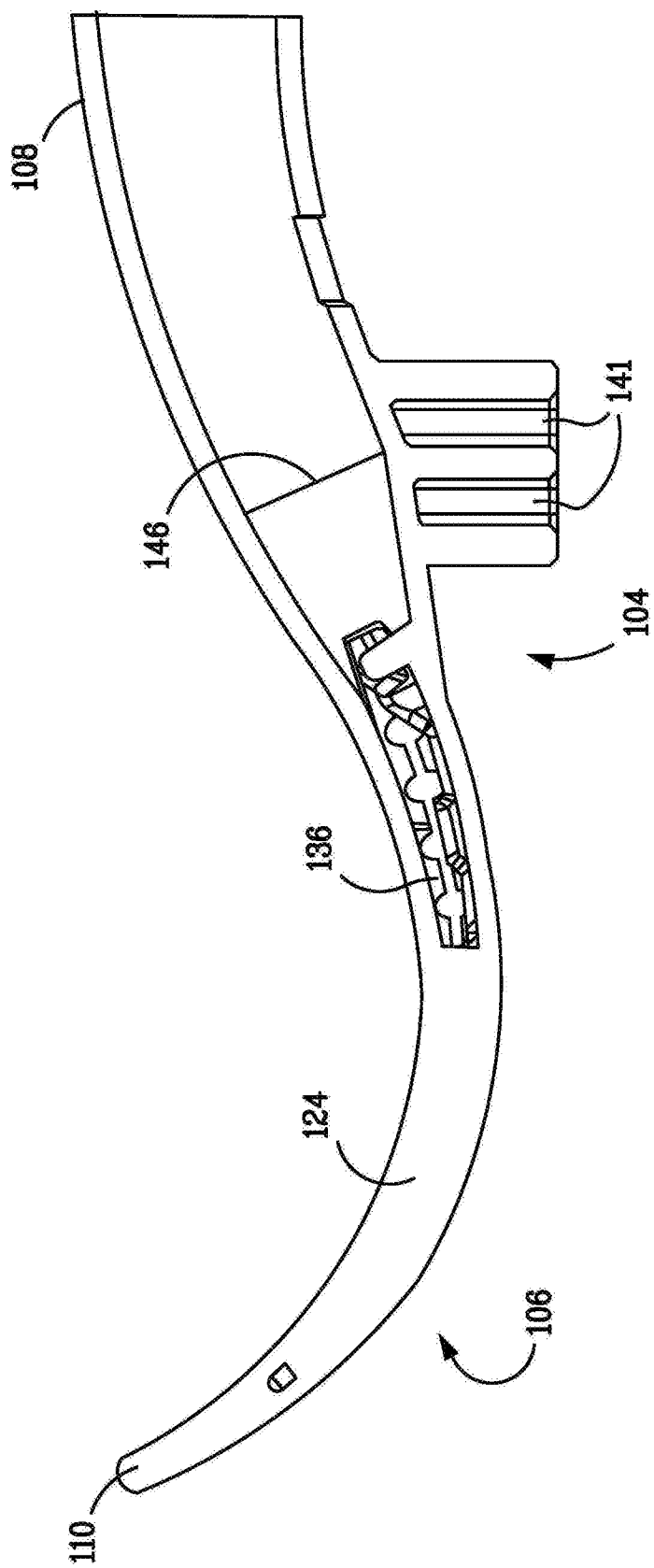


FIG. 10

+

+

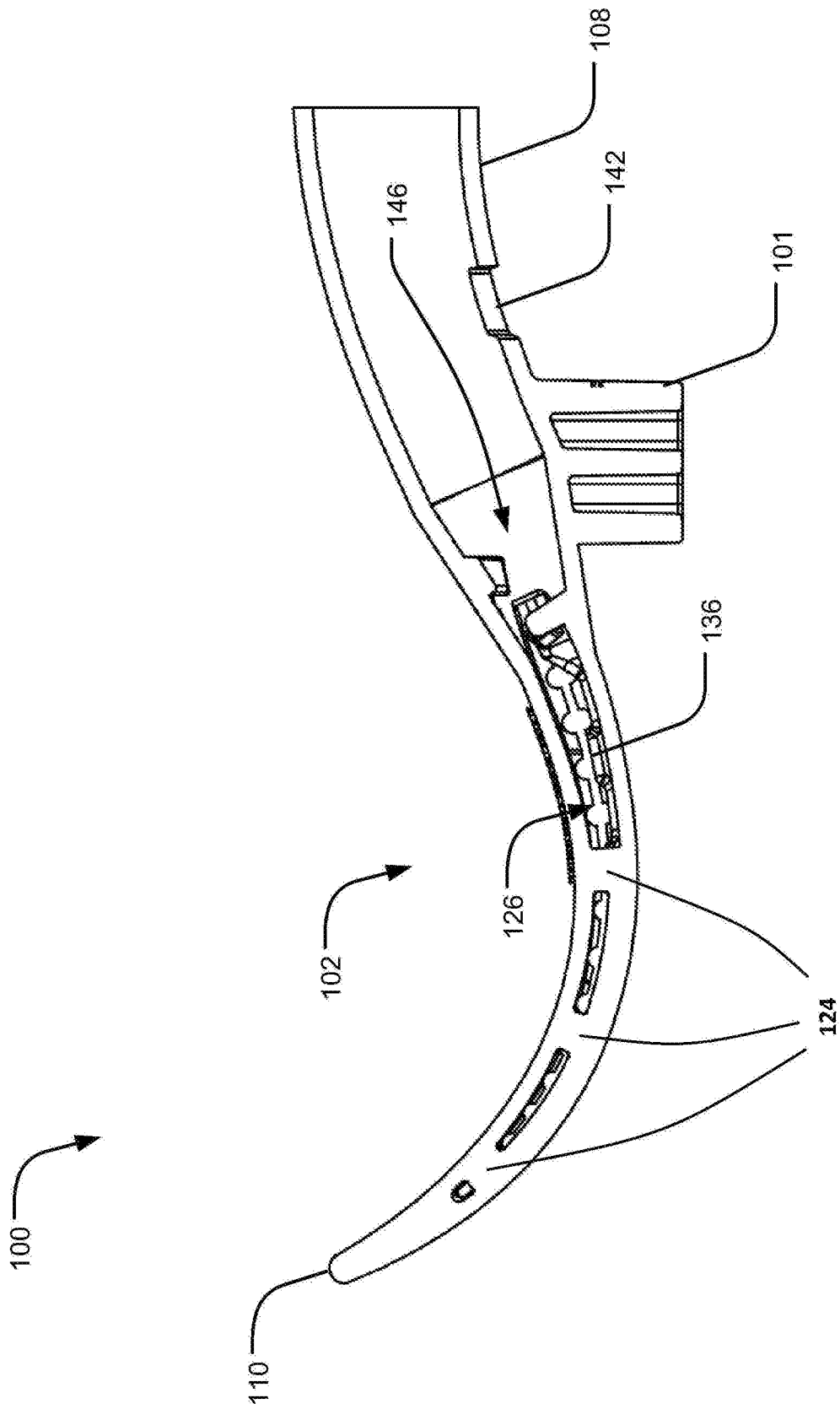


FIG. 11

+

DENTAL MOUTHPIECE

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims the priority benefit of U.S. Provisional Patent Application Serial No. 62/846,353 filed May 10, 2019 entitled, "Dental Mouthpiece," the disclosures of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] The present invention generally relates to the field of dental mouthpieces. More specifically, the present invention relates to intraoral dental suction and isolation mouthpieces.

2. Description of Related Art

[0003] Various mouthpieces are currently used by dental health professionals, dental hygienists, and dental assistants in the field of dentistry. In the past, a dental patient has been treated by a traditional two-person team that comprises a dental professional and a dental assistant. Further, dental treatment may be provided by the team using many different types of dental equipment and materials. Such dental equipment and materials may include such items as an intraoral mirror, a bite block, a slow speed suction ejector, a high speed suction ejector, gauzes, cotton rolls, and dry angles. Each item of dental equipment may be used for different purposes, though some may be used in combination for some types of dental services. As such, a dental professional seeking to provide such dental services may need to use multiple items of such dental equipment. An important role of the dental assistant is therefore to assist the dental professional in coordinating the use of these multiple items of different equipment and materials.

[0004] There is, therefore, a need in the art for improved systems and methods of providing dental services in a more efficient, comfortable, and safe manner to the dental patient.

SUMMARY OF THE CLAIMED INVENTION

[0005] Embodiments of a dental mouthpiece formed in a curve are disclosed. Such a mouthpiece may comprise of a main body portion at a central part of the curve having a first end and a second end, a suction connector portion connected to the main body portion at the first end, and a cheek retractor portion connected to the main body portion at the second end.

[0006] In some embodiments, the main body portion, the suction connector portion, and the cheek retractor portion may be molded in one piece, preferably by injection molding. In an exemplary embodiment, the mouthpiece may be made of a material that is flexible, translucent, conductive to injection molding, high heat-resistant, and autoclavable. Such a material may include silicone. Because the mouthpiece may be made of a high heat-resistant and autoclavable material, such a mouthpiece may be reusable.

[0007] The main body portion may comprise of an anterior wall inside the curve and a posterior wall outside the curve. The anterior wall and the posterior wall may define an interior space, within which at least one connector connects the anterior wall to the posterior wall. At least one anterior intervening wall extends from the anterior wall partially towards the posterior wall, and at least one posterior intervening wall extends from the posterior wall partially towards the anterior wall. The anterior intervening walls and the posterior intervening walls each has alternating crests and troughs.

BRIEF DESCRIPTION OF THE FIGURES

- [0008] FIG. 1 is a top view of the dental mouthpiece;
- [0009] FIG. 2 is an isometric view of a dental mouthpiece shown in FIG. 1;
- [0010] FIG. 3 is a rear view of the dental mouthpiece shown in FIG. 1;
- [0011] FIG. 4 is a bottom view of the dental mouthpiece shown in FIG. 1;
- [0012] FIG. 5 is a coronal top cross section view of the dental mouthpiece shown in FIG. 1;
and
- [0013] FIG. 6 is a side view of the dental mouthpiece shown in FIG. 1;
- [0014] FIG. 7 is a side of the dental mouthpiece shown in FIG. 1 with an anterior wall of the mouthpiece pulled away from a posterior wall of the mouthpiece;
- [0015] FIG. 8 is a transverse cross section view of the dental mouthpiece shown in FIG. 1 at the intersection between the suction connector and the main body.
- [0016] FIG. 9 is a transverse cross section view of the dental mouthpiece shown in FIG. 1 at the intersection between the suction connector and the main body.
- [0017] FIG. 10 is a longitudinal cross section view of an embodiment of the dental mouthpiece shown in FIG. 1 with a wall connector.
- [0018] FIG. 11 is a longitudinal cross section view of an embodiment of the dental mouthpiece shown in FIG. 1 with column connectors.

DETAILED DESCRIPTION

[0019] Embodiments of the present invention may include a mouthpiece that may be attached to a high-suction dental adapter for the purpose of assisting the dental staff during dental procedures through chair-side, hands-free suction, and isolation. Such a mouthpiece may comprise a main body portion, a cheek retractor portion, a suction connector portion, a stability bar, and a bite block. In some embodiments, any combination of the main body portion, cheek retractor portion, suction connector portion, a stability bar and bite block (and sub-portions thereof) may be molded in one piece, preferably by injection molding. In an exemplary embodiment, the mouthpiece may be made of a material that is flexible, resilient, at least translucent, and conducive to injection molding. Such a material may include thermoplastic elastomers known in the art.

[0020] FIG. 1 is a top view of the dental mouthpiece. A dental mouthpiece 100 includes a main body portion 102 having a first end 104 and a second end 106 opposite the first end 104. A longitudinal axis 103 may extend from the first end 104 to the second end 106. In the illustrated embodiment, a suction connector portion 108 may be coupled to the first end 104 and a cheek retractor portion 110 may be coupled to the second end 106, though in other examples the mouthpiece 100 may not have a suction connector portion 108 and/or a cheek retractor portion 110. A bite block 101 may also be integrated to the suction connector portion 108 near the first end 104 of the main body portion 102, though the bite block 101 may be positioned anywhere on the suction connector portion 108.

[0021] The main body portion 101 may include a neck 120 extending from the second end 106 to the cheek retractor portion 110. The neck 120 may have a width 122 that is less than a width of the main body portion 102, a width of the cheek retractor portion 110, and/or a width of the suction connector portion 108, though the width 122 may be greater than the width of the main body portion 102, the cheek retractor portion 110, and/or the suction connector portion 108 in other examples.

[0022] In the illustrated embodiment, the suction connector portion 108, the cheek retractor portion 110, the bite block 101, and the main body portion 102 are constructed as one piece,

though in other examples each of the suction connector portion 108, the cheek retractor portion 110, the bite block 101, and/or the main body 102 may be separate pieces. For example, in some embodiments, the main body portion 102, the cheek retractor portion 110, and the suction connector portion 108 (and sub-portions thereof) may be molded as one-piece, preferably by injection molding and the bite block 101 may be a separate piece attachable to the suction connector portion 108. In an exemplary embodiment, the mouthpiece 100 may be made of a material that is flexible, resilient, translucent, and conducive to injection molding. Such a material may include thermoplastic elastomer.

[0023] FIG. 2 is an isometric view of a dental mouthpiece shown in FIG. 1. As illustrated in FIG. 2, the main body portion 102 may be shaped in a curve. Because the mouthpiece 100 is made of a flexible and resilient material (e.g., thermoplastic elastomer), the mouthpiece 100 may be bent when placed in a patient's mouth to conform to the shape of the mouth. When properly positioned, the suction connector portion 108 may protrude from one side of the patient's mouth, while the main body portion 102 lies against the back of the patient's mouth, and the cheek retractor portion 110 presses against the patient's cheek on the opposite side of the patient's mouth.

[0024] The cheek retractor portion 110 may be configured to press against and retract a patient's cheek away from the patient's teeth on an opposite side of the patient's mouth than the side from which the connection portion 108 extends. The flexibility of the material used to form the mouthpiece 100 allows for some bending when placed in the patient's mouth, but the resilience of the material further allows the mouthpiece 100 to apply pressure against a part of the patient's mouth when the mouthpiece 100 is released from bending. The material is resilient enough, for example, to allow the cheek retractor portion 110 to press against the inside of the patient's cheek with such pressure being sufficient to move the cheek away from the patient's teeth. The cheek retractor portion 110 is illustrated as a hammerhead distal region, which may be attached to the main body portion 102. The cheek retractor portion 110 may be solid in some examples, though may be hollow in other examples.

[0025] The main body portion 102 may comprise an anterior wall 112 on an inner part of the curve and a posterior wall 114 (also seen in FIG. 4) on an outer part of the curve. The

anterior wall 112 may face a front of the patient's mouth and the posterior wall 114 may face a back of the patient's mouth. The anterior wall 112 and the posterior wall 114 of the main body portion 102 may be configured in parallel to each other. The anterior wall 112 has a defined shape that may correspond to the defined shape of the posterior wall 114, though the anterior wall 112 may be a different shape than the posterior wall 114 in other examples. The defined shape may be wider at the first end 104 and narrower at the second end 106. In some embodiments, the shape corresponds to a shield shape though the shape may be, for example, a square, a straight line arrow, a rectangle, a star, an oval, a circle, or a shape that generally conforms to the intraoral shape of the patient's mouth. Differently-sized mouthpieces may be provided for differently-sized mouths of adults and children. Part of the shape at the first end 104 may be formed with thicker walls than the rest of the main body portion 102. Such thickening may provide additional stability at the first end 104. When positioned within the mouth of a patient, the anterior wall 112 and the posterior wall 114 are capable of blocking an airway of the patient, while the bite block 101 is positioned between the patient's teeth, the suction connector portion 108 extends from one side of the patient's mouth, and the cheek retractor portion 110 presses against the cheek on the opposite side of the patient's mouth.

[0026] The main body portion 102 may also include openings 140 located on the anterior wall 112 and/or the posterior wall 114. Such openings 140 (e.g., perforations, slit, aperture, etc.) allow for suction of air, fluids, and small debris from the patient's mouth through the openings 140 and into the interior space 126, and into the suction connector portion 108 towards a suction source. The openings 140 may be positioned on a perimeter of the shape of the anterior wall 112 and/or the posterior wall 114. In the same example, the openings 140 may be positioned on either side of the neck 120 on the anterior wall 112 and/or the posterior wall 114. In another example, the openings 140 are apertures. In the same example, the apertures are each the same size, though in other examples some or all of the apertures may be different sizes.

[0027] FIG. 3 is a rear view of the dental mouthpiece shown in FIG 1. As visible in FIG. 3, the suction connector portion 108 may be oval-shaped and also attached to the main body portion 102. The suction connector portion 108 may be formed with thicker walls than the main body portion 102 and configured to attach to a high-suction vacuum adapter and to assist in

transferring water, saliva, and debris from the interior space 126 to the external adapter for removal. The suction connector portion 108 may also include an internal stop to assist in sliding the mouthpiece onto the adapter to a desired depth.

[0028] The superior wall 116 in FIG. 3 may be used herein to refer to the side that rests against a roof of a patient's mouth when placed therein, and the inferior wall 118 may be used to refer to the side that rests against the floor of the patient's mouth. The superior wall 116 and inferior wall 118 may be formed identically, which may allow for the mouthpiece to change orientation such that the superior wall 116 may appear as the inferior wall 118 and vice versa, in the new orientation. When in use, the superior wall 116 and the inferior wall 118 of the main body portion 101 may serve to protect and separate the top of the mouth and the bottom of the mouth/tongue. In addition, the main body portion 101 may also serve to protect the back of the mouth (e.g., throat and airway) from falling debris.

[0029] FIG. 4 is a bottom view of the dental mouthpiece shown in FIG 1. The anterior wall 112 and the posterior wall 114 may be connected to each other at by at least one connector 124. In some embodiments, the suction connector portion 108 may have a cutout 142 (e.g., which may be shaped as a logo, a rectangular notch, a square notch, or a circular notch, or any shaped notch) providing extra interlocking with a corresponding protrusion (e.g., which may also be shaped as a logo, a rectangular protrusion, a square protrusion, or a circular protrusion, or any shaped protrusion) on an external high-suction vacuum adapter.

[0030] The bite block 101 may be reinforced by bite block openings 141 to create cavities in the bite block to result in a more stable bite block. In an embodiment, the bite block openings 141 may be two parallel rectangular openings that open at the bottom of the bite block. The bite block openings 141 may extend up to the suction connector portion 108 but not extending past the thickness of the suction connector portion 108.

[0031] FIG. 5 is a coronal top cross section view of the dental mouthpiece shown in FIG. 1. The main body portion 102 may include the bridge structure 136 that protrudes from the interior surface 135 of the posterior wall 114, as shown in FIG. 5 and also visible in FIGS. 7 and 8. In some embodiments, the bridge structure 136 may follow the shape of a logo (e.g., an arrowhead or shield). The bridge structure may have a gap at the tip of the arrowhead shape,

creating an open arc instead of a point of an arrow. In some embodiments, the bridge structure 136 may be centrally-located in the main body portion 110 of the mouthpiece 100. In some examples, such bridge structure 136 may protrude from the interior surface 135 in a wave shape with bridge crests 137 and bridge troughs 138. In other embodiments, the bridge structure 136 may protrude in the shape of battlements or trapezoids. The bridge crests 137 provide a plurality of contact points that are generally separate from the anterior wall 112. The bridge crests 137 near the opening 146 of the suction connector portion 108 may have a greater height than the bridge crests 137 further from the opening 146, as visible in FIGS. 7 and 8. The bridge crests 137 near the opening 146 of the suction connection portion 108 may also be longer than the bridge crests 137 further away from the suction connection portion 108 as shown later in FIG. 8. The bridge troughs 138 may be substantially flush or extend above the interior surface 135. The bridge crests 137 contact the anterior wall 112 during suction to keep the anterior wall 112 spaced away from the posterior wall 114 during suction, thereby preventing collapse of the anterior wall 112 or the posterior wall 114 into the interior space 126 so that debris and/or water can be evacuated through the interior space 126. Meanwhile, the bridge troughs 138 provide gaps that allow for suction of air, fluids, and small debris through the bridge structure 136. In other examples, the bridge structure 136 may be smooth, may include sharp crests and sharp troughs, circular crests and circular troughs, square crests and square troughs, or shape or combination of shapes of crests and troughs.

[0032] The main body portion 102 may further include a stability bar 143, shown in FIG. 5 and also visible in FIG. 7, that extends from approximately the center of the main body portion 102 toward the cheek retractor portion 110. Such stability bar 143 may protrude from the interior surface 135 of the posterior wall 114 along the longitudinal axis 103. In an embodiment, the stability bar 143 begins from the open arc of the bridge structure 136 and continue along the longitudinal axis 103 towards the second end 106 past the neck 120 and ends before reaching the cheek retractor portion 110. The stability bar 143 may protrude from the interior surface 135 of the posterior wall 114 towards the interior surface 113 of the anterior wall 112. The stability bar 143 may be of any height ranging from the height of the interior space 126 or any height less than the interior space 126. In an embodiment, the stability bar 143 may have attached

connectors 124 at specific locations that may attach the anterior wall 112 to the posterior wall 114. The connectors 124 on the stability bar 143 may assist with retraction, stability, support and curvature of the mouthpiece 100 during suction. In an exemplary embodiment, there may be multiple connectors 124 aligned with the stability bar 143 the stability bar 143, though the stability bar 143 may not be aligned with the at least one connector 124 in other examples.

[0033] FIG. 6 is a side view of the dental mouthpiece shown in FIG. 1. FIG. 6 illustrates the view of the inferior side that rests against the floor of the patient's mouth. The anterior wall 112 and the posterior wall 114 are spaced from each other and define the interior space 126. Other than the at least one connector 124, a stability bar 143, and a bridge structure 136, the interior space 126 is generally open and unobstructed, thereby allowing for suction to flow throughout the interior space 126. The interior space 126 between the anterior wall 112 and the posterior wall 114 generally follows the same defined shape of the anterior wall 112 and the posterior wall 114. In one example, the interior space 126 extends through the neck 120, though in other examples the interior space 126 may not extend through the neck 120. In yet other examples, the interior space 126 extends through the neck 120 and into the cheek retractor portion 120.

[0034] At least one anterior intervening wall 127 may extend from at least one edge 128 of the anterior wall 112 partially towards the posterior wall 114 and may have a thickness that extends from the at least one edge 128 to a mid-point between the anterior wall 112 and the posterior wall 114. The span of such anterior intervening wall 127 therefore may not extend the entire distance between the anterior wall 112 and the posterior wall 114. The thickness of such anterior intervening wall 127 may increase from the cheek retractor portion 110, through the neck 120, and to the first end 104. Such increasing depth may provide for increased rigidity at the first end 104. Such anterior intervening wall 127 may further be ridged in some embodiments, or have a smooth edge in other embodiments. In one example, the anterior intervening wall 127 includes an alternating crest 130 and trough 132. In the illustrated embodiment, the crests 130 are a flat surface and the troughs 132 are a cylindrical cutout surface, though the crests 130 and the troughs 132 may be any shape. In some examples, the crests 130 and the troughs 132 extend the entire depth of the anterior intervening wall 127, though in other examples the crests 130 and/or the troughs 132 may extend partially along the

anterior intervening wall 127. The crests 130 and the troughs 132 may provide further retraction, stability, support and curvature to the mouthpiece 100.

[0035] The posterior wall 114 may have a corresponding at least one posterior intervening wall 134 that extends from at least one edge 133 of the posterior wall 114 and partially extends towards the anterior wall 112. The posterior intervening wall 134 may likewise exhibit ridges that are the same, a mirror image, or different from the anterior intervening wall 127. In one example, the ridges of the anterior intervening wall 127 may be aligned with the ridges of the posterior intervening wall 134, as shown in FIG. 6. In combination, the anterior intervening wall 127 and the posterior intervening wall 134 and their respective aligned ridges may form an open mesh between the anterior wall 112 and the posterior wall 114. Such open mesh may follow the edges 128, 133 of each of the anterior wall 112 and the posterior wall 114 from the first end 104 to the second end 106. The open mesh between the anterior intervening wall 127 and the posterior intervening wall 134 allows for suction of air, fluids, and small debris from patient's mouth, through the mesh into the interior space 126 and into the suction connector portion 108 towards a suction source.

[0036] The anterior intervening wall 127 may join with the posterior intervening wall 134 at the superior wall 116 and the inferior wall 118 at near the suction connector portion 108 of the main body at the first end 104. The anterior intervening wall 127 may also join with the posterior intervening wall 134 at the superior wall 116 and the inferior wall 118 near the cheek retractor portion 110 at the second end 106. In some embodiments, the anterior intervening wall 127 may join with the posterior intervening wall 134 at the cheek retractor portion 110.

[0037] FIG. 7 is a side of the dental mouthpiece shown in FIG. 1 with an anterior wall of the mouthpiece pulled away from a posterior wall of the mouthpiece. The at least one connector 124 may span the distance between the anterior wall 112 and the posterior wall 114 within the interior space 126. In other words, the connector 124 may be attached to an interior surface 135 of the posterior wall 114 and to an interior surface 113 of the anterior wall 112. The at least one connector 124 may provide structural rigidity to the mouthpiece 100 and may be a pillar, column, wall, or the like. In the illustrated example, the at least one connector 124 includes three connectors, each in the shape of a pillar and linearly spaced from each other.

[0038] FIG. 8 is a transverse cross section view of the dental mouthpiece shown in FIG. 1. The bridge crests 137 near the opening 146 of the suction connector portion 108 may have a greater height than the bridge crests 137 further from the opening 146. The bridge crests 137 near the opening 146 of the suction connection portion 108 may also be longer than the bridge crests 137 further away from the suction connection portion 108.

[0039] FIG. 9 is a transverse cross section view of the dental mouthpiece in FIG. 1. FIG 9 illustrates where the suction connector attaches to the main body. As visible in FIG. 9, the suction connector portion 108 may be oval-shaped and also attached to the main body portion 102 in a seamless transition until the main body reaches the bridge structure 136, where the bridge crests 137 and the bridge troughs 138 may partially block the opening of the main body portion 102 near the suction connector portion 108. The bite block 101 is attached on the outside of the suction connector portion 108 such a manner that the bite block does not interrupt the opening of the suction connector portion 108.

[0040] The suction connector portion 108 may include an opening 146 (also shown in FIG. 5), that opens into an interior space 126 of the main body portion 102 to allow for fluid communication between the interior space 126 and the suction connector portion 108. At least one suction connector portion wall 144 may extend from the anterior wall 112 to the posterior wall 114 near the opening 146 of the suction connector portion 108 to prevent collapse of the anterior wall 112 and the posterior wall 114 during suctioning. The at least one suction connector portion wall 144 includes a pair of walls positioned on either side of the opening 146 of the suction connector portion 108.

[0041] The bite block 101 may include bite block crests 147 and bite block troughs 148 on either sides of the bite block to create greater traction and support for the bite block. In an embodiment, the bite block crests 147 and bite block troughs 148 may create jagged shape or wave shape on either sides of the bite block, although the bite block crests 147 and bite block troughs 148 may be in any shape.

[0042] FIG. 10 is a cross section view of an embodiment of the dental mouthpiece shown in FIG. 1 with a wall connector. In this embodiment, the connector 124 connects the anterior wall 112 with the posterior wall 114 at the longitudinal axis 103 as a solid wall. The connector 124

extends from the neck 120 at the second end 106 some distance away from the cheek retractor portion 110 towards the first end 104 along the longitudinal axis 103 and stops near the opening of the bridge structure 136 around the mid-point of the main body portion 102. In other embodiment, the connector 124 may extend along the longitudinal axis 103 and stop anywhere within the interior space 126 of the main body portion.

[0043] FIG. 11 is a longitudinal cross section view of an embodiment of the dental mouthpiece shown in FIG. 1 with column connectors. In this embodiment, the connector 124 connects the anterior wall 112 with the posterior wall 114 at the longitudinal axis 103 as three evenly spaced cylindrical pillars in line with the stability bar 143. A first connector is positioned in the main body portion 102, a second connector is positioned near the neck 120, and a third connector is spaced near the cheek retractor portion 110. The linear spacing of the three connectors may provide additional rigidity to the neck 120, while maintaining a narrow width 122 of the neck 120. In other examples, such connectors 124 may be located in the area where a positioned mouthpiece 100 begins to wrap from one side of the mouth, to the back of the mouth, then to the other side of the mouth, thereby assisting in shaping the mouthpiece 100 to the general intraoral shape of a patient's mouth. In other examples, the at least one connector 124 may include one connector, two connectors, or more than two connectors and each connector may be positioned anywhere on the mouthpiece 100. In one example, the at least one connector 124 is a rib that extends from the main body portion 102, through the neck 120, and to the cheek retractor portion 110.

[0044] The mouthpiece as described herein may be used with a one-piece, autoclavable, high-suction vacuum adapter. Such a high-suction vacuum body adapter may be made of a single homogenous material. Having a single lever design, such a vacuum adapter may function in the same manner as all the current high-suction vacuum evacuators and saliva ejectors in controlling the removal of water, saliva, and debris from the oral cavity to the outside vacuum source. The single lever may be designed to control the removal of water, saliva, and debris from the at least partially enclosed so main body through a single, large evacuation conduit within the suction connector portion.

[0045] While various embodiments have been described above, it should be understood that they have been presented by way of example only, and not limitation. The descriptions are not intended to limit the scope of the invention to the particular forms set forth herein. Thus, the breadth and scope of a preferred embodiment should not be limited by any of the above-described exemplary embodiments. It should be understood that the above description is illustrative and not restrictive. To the contrary, the present descriptions are intended to cover such alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims and otherwise appreciated by one of ordinary skill in the art. The scope of the invention should, therefore, be determined not with reference to the above description, but instead should be determined with reference to the appended claims along with their full scope of equivalents.

CLAIMS

WHAT IS CLAIMED:

1. A dental mouthpiece formed in a curve, the dental mouthpiece comprising:

a main body portion at a central part of the curve having a first end and a second end, the main body portion having an anterior wall inside the curve and a posterior wall outside the curve, the anterior wall and the posterior wall defining an interior space, at least one connector connecting the anterior wall to the posterior wall, at least one anterior intervening wall extending from the anterior wall partially towards the posterior wall, and at least one posterior intervening wall extending from the posterior wall partially towards the anterior wall, the at least one anterior intervening wall and the at least one posterior intervening wall each having alternating crests and troughs;

a suction connector portion connected to the first end, the connector portion connecting the interior space to a vacuum suction source; and

a cheek retractor portion connected to the second end.

2. The mouthpiece of claim 1, wherein the at least one connector is a cylindrical shaped pillar.

3. The mouthpiece of claim 1, wherein the at least one connector is a wall spanning longitudinally in the main body portion in the interior space.

4. The mouthpiece of claim 1, further comprising a bridge structure in the interior space protruding from the posterior wall, wherein the protrusions are battlement-shaped, with spaced crests.

5. The mouthpiece of claim 4, wherein the protrusions near the suction connector is in greater height and length.

6. The mouthpiece of claim 4, wherein spaces between the crests are troughs of the battlement-shape.
7. The mouthpiece of claim 1, wherein the alternating crests and troughs on the anterior intervening wall and the posterior intervening wall are semi-circle shaped.
8. The mouthpiece of claim 1, wherein the anterior intervening wall and the posterior intervening wall have varying heights to maintain integrity of the main body portion.
9. The mouthpiece of claim 1, wherein the troughs of the anterior intervening wall and the posterior intervening wall decrease in size as the troughs approach the cheek retractor portion.
10. The mouthpiece of claim 1, wherein the anterior intervening wall and the posterior intervening wall meet at a point where the suction connector meets the main body.
11. The mouthpiece of claim 1, wherein the anterior intervening wall and the posterior intervening wall meet at a point where the main body meets the cheek retractor portion.
12. The mouthpiece of claim 1, further comprising a bite block integrated to the suction connector portion, wherein the bite block provide additional crush-resistance and decreased compressibility during biting by a patient.
13. The mouthpiece of claim 1, wherein the main body portion, the suction connector portion, and the cheek retractor portion are formed by injection-molding as one piece.
14. The mouthpiece of claim 1, wherein a material that forms the main body, the suction connector portion, and the cheek retractor portion is a flexible, translucent, high heat-resistant, autoclavable silicon-based material.

15. The mouthpiece of claim 1, wherein the posterior wall further includes a stability bar protruding from an interior surface of the posterior wall and along a longitudinal axis of the main body.

16. The mouthpiece of claim 15, wherein the at least one connector lies evenly spaced along the stability bar.

17. The mouthpiece of claim 1, wherein the suction connector portion comprises a cutout corresponding to a protrusion on a vacuum adapter interlocking fit.

18. The mouthpiece of claim 1, where in the suction connector portion connects to a vacuum source, wherein activation of the vacuum source provides suction of fluids from the interior space of the main body.

19. The mouthpiece of claim 18, wherein the activation of the vacuum source draws fluids from an exterior of the main body through the crests and troughs of the anterior intervening wall and the posterior intervening wall, into the interior space of the main body.

20. The mouthpiece of claim 1, wherein the cheek retractor portion includes a surface that applies pressure based on resilience of the cheek retractor portion.

ABSTRACT

A dental mouthpiece is provided that may be attached to a high-suction dental adapter for the purpose of assisting the dental staff during dental procedures through chair-side, hands-free suction, and isolation. Such a mouthpiece may comprise a main body portion, a cheek retractor portion, and a suction connector portion. In an embodiment, the main body portion, cheek retractor portion, and suction connector portion may be molded in one piece, preferably by injection molding. The main body portion has an anterior wall inside the curve and a posterior wall outside the curve, and an at least one connector connecting the anterior wall and the posterior wall. The main body portion has an anterior intervening wall and the posterior intervening wall in between the anterior and posterior walls. The anterior intervening wall and the posterior intervening walls have alternating crests and troughs.

Electronic Patent Application Fee Transmittal

Application Number:				
Filing Date:				
Title of Invention:	DENTAL MOUTHPIECE			
First Named Inventor/Applicant Name:	Thien Nguyen			
Filer:	Ruby Lim Chung/Cheri Houle			
Attorney Docket Number:	INCEP-005			
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	75	75
UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380
Pages:				
Claims:				
Miscellaneous-Filing:				
LATE FILING FEE FOR OATH OR DECLARATION	2051	1	80	80
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				865

Electronic Acknowledgement Receipt

EFS ID:	39395414
Application Number:	16870745
International Application Number:	
Confirmation Number:	7491
Title of Invention:	DENTAL MOUTHPIECE
First Named Inventor/Applicant Name:	Thien Nguyen
Customer Number:	138718
Filer:	Ruby Lim Chung/Cheri Houle
Filer Authorized By:	Ruby Lim Chung
Attorney Docket Number:	INCEP-005
Receipt Date:	08-MAY-2020
Filing Date:	
Time Stamp:	19:25:52
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$865
RAM confirmation Number	E202058J26225196
Deposit Account	501662
Authorized User	Cheri Houle

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.19 (Document supply fees)
37 CFR 1.20 (Post Issuance fees)
37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	INCEP-005_ADS_5-8-20.pdf	180100	no	9
			3dfc28f1d6a01ed65c4726999f890563007bda1c		
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
2	Drawings-only black and white line drawings	INCEP-005_FIGS_5-8-20.pdf	2708544	no	10
			99139ba77bbf87545c0936308ed709670f225201		
Warnings:					
Information:					
3		INCEP-005_SPEC_5-8-20.pdf	142311	yes	17
			dbf47854835f49cb1a966f056f6049efde0e22eb		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	13	
	Claims		14	16	
	Abstract		17	17	
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	36597	no	2
			59044bb1901306e7fd728fa6319b225a124d1964		
Warnings:					
Information:					
Total Files Size (in bytes):			3067552		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
16/870,745	05/08/2020	3772	865	INCEP-005	20	1

CONFIRMATION NO. 7491

FILING RECEIPT



0000000117033085

138718
Polsinelli LLP
3 Embarcadero Center
Suite 2400
San Francisco, CA 94111

Date Mailed: 05/18/2020

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Thien Nguyen, Santa Ana, CA;
Tam Thanh Pham, San Francisco, CA;
Ethan Nguyen, Santa Ana, CA;
Lauren Nguyen, Santa Ana, CA;

Applicant(s)

DryShield, LLC, Fountain Valley, CA;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This appln claims benefit of 62/846,353 05/10/2019

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 05/15/2020

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/870,745**

Projected Publication Date: 11/12/2020

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

DENTAL MOUTHPIECE

Preliminary Class

433

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER
Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/870,745	05/08/2020	Thien Nguyen	INCEP-005

CONFIRMATION NO. 7491

INFORMAL NOTICE



138718
Polsinelli LLP
3 Embarcadero Center
Suite 2400
San Francisco, CA 94111

Date Mailed: 05/18/2020

INFORMATIONAL NOTICE TO APPLICANT

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

The item(s) indicated below are also required and should be submitted with any reply to this notice to avoid further processing delays.

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):
Thien Nguyen
Tam Thanh Pham
Ethan Nguyen
Lauren Nguyen

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/mgabre/

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 16/870,745			
APPLICATION AS FILED - PART I									
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY			
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)	RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75	N/A				
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	330	N/A				
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380	N/A				
TOTAL CLAIMS (37 CFR 1.16(j))	20	minus 20 = *	x 50 =	0.00					
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1	minus 3 = *	x 230 =	0.00					
APPLICATION SIZE FEE (37 CFR 1.16(s)) If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00						
			0.00						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))			TOTAL		TOTAL				
			785						
* If the difference in column 1 is less than zero, enter "0" in column 2.									
APPLICATION AS AMENDED - PART II									
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OTHER THAN SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)	RATE(\$)	ADDITIONAL FEE(\$)		
	Total (37 CFR 1.16(i))	*	Minus **	=	x =	x =	x =		
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =	x =	x =		
	Application Size Fee (37 CFR 1.16(s))								
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
				TOTAL ADD'L FEE		TOTAL ADD'L FEE			
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)	RATE(\$)	ADDITIONAL FEE(\$)		
	Total (37 CFR 1.16(i))	*	Minus **	=	x =	x =	x =		
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =	x =	x =		
	Application Size Fee (37 CFR 1.16(s))								
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
				TOTAL ADD'L FEE		TOTAL ADD'L FEE			
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.									

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:



Practitioners associated with Customer Number:

138718

OR



Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number

Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned (or to the undersigned) according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:



The address associated with Customer Number:

138718

OR

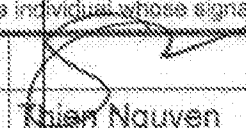
☐	Firm or Individual Name			
	Address			
	City	State	Zip	
	Country			
	Telephone	Email		

Assignee Name and Address: DryShield, LLC
11230 Grace Avenue, Suite B
Fountain Valley, CA 92708

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	7/11/2017
Name	Thuan Nguyen	Telephone	714-617-5025
Title	CEO		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to be (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.31 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1480, Alexandria, VA 22313-1480. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1480, Alexandria, VA 22313-1480.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)Applicant/Patent Owner: DryShield, LLCApplication No./Patent No.: 16/870,745Filed/Issue Date: May 8, 2020Titled: DENTAL MOUTHPIECEDryShield, LLC, a corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose one of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
- ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose one of options A or B below):

- A. ☒ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.
- B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.☐ Additional documents in the chain of title are listed on a supplemental sheet(s).☒ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Tam Thanh Pham/

Signature

Tam Thanh Pham

Printed or Typed Name

June 23, 2020

Date

50565

Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ASSIGNMENT

THIS ASSIGNMENT, by **Thien Nguyen, Tam Thanh Pham, Ethan Nguyen, and Lauren Nguyen** (hereinafter referred to as the Assignors), witnesseth:

WHEREAS, said Assignors have invented certain new and useful improvements, which are described in:

United States Provisional patent application **62/846,353** entitled **DENTAL MOUTHPIECE** and filed **May 10, 2019**,

United States patent application **16/870,745** entitled **DENTAL MOUTHPIECE** and filed **May 8, 2020**;

WHEREAS, **DryShield, LLC**, a body having corporate powers under the laws of **Delaware** and having a principal place of business at **11230 Grace Avenue, Suite B, Fountain Valley, California 92708** (hereinafter referred to as the Assignee), is desirous of obtaining the entire right, title and interest in and to said inventions and said applications for Letters Patent, and in and to any Letters Patent, United States or foreign, to be obtained therefore and thereon, and to any and all improvements which are disclosed in said applications for Letters Patent;

NOW, THEREFORE, for good and valuable consideration, the receipt of which is hereby acknowledged:

1. The Assignors have sold, assigned, transferred, and set over, and do hereby sell, assign, transfer, and set over unto said Assignee the entire right, title, and interest in, to, and under said inventions; said applications for Letters Patent; any Letters Patent which may be granted for said inventions in the United States of America and any foreign country; any division, continuation, and continuation-in-part of said applications; any reissue or extension of said Letters Patent; and all rights under the International Convention for the Protection of Industrial Property; said right, title, and interest to be held and enjoyed by said Assignee for its own use and behoove to the full end of the term for which Letters Patent may be granted, as fully and entirely as the same would have been held and enjoyed by the Assignors, had this sale and assignment not been made.

2. Said Assignors hereby warrant and represent that, at the time of execution and delivery of these presents, said Assignors were the lawful owners of the entire right, title, and interest in and to said inventions and said applications for Letters Patent, and that the same had not entered into any assignment, contract or understanding in conflict herewith.

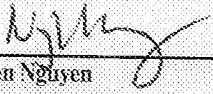
3. Said Assignors hereby covenant and agree to assist and cooperate with said Assignee, whereby said Assignee may enjoy to the fullest extent said right, title, and interest herein conveyed, provided, however, that the entire expense which may be incurred by said Assignors in lending such assistance and cooperation be paid by Assignee. Such cooperation shall include: (a) prompt execution of all papers (prepared at the expense of Assignee) that are deemed necessary or desirable by Assignee to perfect said right, title and interest herein conveyed, (b) prompt execution of all petitions, oaths, specifications, declarations and other papers (prepared at the expense of Assignee) that are deemed necessary or desirable by Assignee for filing or prosecuting in the United States or any foreign country said applications; any applications which are a division, continuation, or continuation-in-part of said applications, any reissue application for any Letters Patent granted on said applications, or for any interference proceeding involving said applications or Letters Patent granted thereon; and (c) prompt assistance and cooperation in the prosecution of all legal proceedings involving said inventions, said applications, or Letters Patent granted thereon, including oppositions, cancellation proceedings, priority contests, public use proceedings, and court actions.

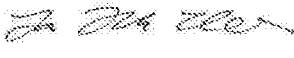
4. The terms, covenants and conditions of this Assignment shall inure to the benefit of said Assignee, its successors, assigns, and/or other legal representatives, and shall be binding upon said Assignors, their heirs, legal representatives, and assigns.

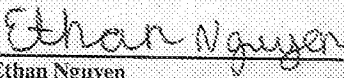
5. Said Assignors hereby request the Commissioner of Patents and Trademarks to issue said Letters Patent of the United States to said Assignee as the Assignee of said inventions.

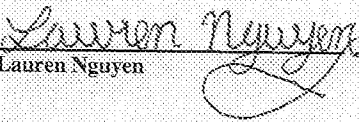
6. Said Assignors hereby request that the attorneys and agents of Polsinelli LLP insert the application number and filing date of the aforementioned application when such information is allocated by the United States Patent and Trademark Office.

IN WITNESS WHEREOF said Assignors have executed and delivered this instrument on the date noted below.

 6/10/20
Thien Nguyen Date

 6/23/2020
Tam Thanh Pham Date

 6/10/20
Ethan Nguyen Date

 6/10/20
Lauren Nguyen Date

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	DENTAL MOUTHPIECE
As the below named inventor, I hereby declare that: This declaration is directed to: ☐ The attached application, or ☒ United States application or PCT international application number <u>16/870,745</u> filed on <u>May 8, 2020</u> The above-identified application was made or authorized to be made by me. I believe that I am the original inventor or an original joint inventor of a claimed invention in the application. I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both. WARNING: Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.	
LEGAL NAME OF INVENTOR Inventor: <u>Ethan Nguyen</u> Date (Optional): <u>6/10/20</u> Signature: <u>Ethan Nguyen</u>	
Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.	

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	DENTAL MOUTHPIECE
---------------------------	--------------------------

As the below named inventor, I hereby declare that:

This declaration is directed to: ☐ The attached application, or ☒ United States application or PCT international application number 16/870,745 filed on May 8, 2020

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Lauren Nguyen Date (Optional): 6/10/20

Signature: Lauren Nguyen

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of
Invention

DENTAL MOUTHPIECE

As the below named inventor, I hereby declare that:

This declaration
is directed to:



The attached application, or



United States application or PCT international application number 16/870,745

filed on May 8, 2020

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

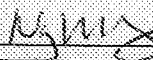
LEGAL NAME OF INVENTOR

Inventor: Thien Nguyen

Date (Optional):

6/10/20

Signature:



Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)****Title of
Invention****DENTAL MOUTHPIECE**

As the below named inventor, I hereby declare that:

This declaration ☐ The attached application, or
is directed to:☒ United States application or PCT international application number 16/870,745
filed on May 8, 2020.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001
by fine or imprisonment of not more than five (5) years, or both.**WARNING:**

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTORInventor: Tam Thanh Pham Date (Optional): June 23, 2020Signature: /Tam Thanh Pham/

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	39805685
Application Number:	16870745
International Application Number:	
Confirmation Number:	7491
Title of Invention:	DENTAL MOUTHPIECE
First Named Inventor/Applicant Name:	Thien Nguyen
Customer Number:	138718
Filer:	TamThanh Thi Pham/Tina Ingrande
Filer Authorized By:	TamThanh Thi Pham
Attorney Docket Number:	INCEP-005
Receipt Date:	23-JUN-2020
Filing Date:	08-MAY-2020
Time Stamp:	17:32:37
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
------------------------	----

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	INCEP-005_POA_6-23-20.pdf	232486	no	1
			cabf1f068da82c7e3f8bdfb180754ccf4c27dc35		

Warnings:

Information:					
2	Assignee showing of ownership per 37 CFR 3.73	INCEP-005_373c_6-23-20.pdf	2771684	no	5
			dca8365c6c02bd15c6d77a3857c6d02e2d3e06fe		
Warnings:					
Information:					
3	Oath or Declaration filed	INCEP-005_DECS_6-23-20.pdf	8011453	no	8
			bd833af5876fab23da7b094b9b34437a7465fa9c		
Warnings:					
Information:					
Total Files Size (in bytes):			11015623		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/870,745	05/08/2020	Thien Nguyen	INCEP-005

138718
Polsinelli LLP
3 Embarcadero Center
Suite 2400
San Francisco, CA 94111

CONFIRMATION NO. 7491
POA ACCEPTANCE LETTER



Date Mailed: 06/26/2020

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/23/2020.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/cnguyen/

Substitute for Form 1449/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (use as many sheets as necessary)					Complete if Known	
					Application Number	16/870,745
					Filing Date	May 8, 2020
					First Named Inventor:	Thien Nguyen
					Art Unit	3772
					Examiner Name	Not Yet Assigned
					Attorney Docket Number	INCEP-005
Sheet	1	of		9		
U.S. PATENT DOCUMENTS						
Examiner Initials*	Cite No. ¹	Document Number		Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code ² (If known)				
		US-	D495,799	9/7/2004	Hirsch et al.	
		US-	D497,426	10/19/2004	Hirsch et al.	
		US-	D615,203	5/4/2010	Hirsch et al.	
		US-	D696,779	12/31/2013	Hirsch et al.	
		US-	D734,851	7/21/2015	Nguyen	
		US-	D809,660	2/6/2018	Nguyen	
		US-	D876,627	2/25/2020	Nguyen	
		US-	50,461	10/17/1865	Dibble	
		US-	1,471,207	10/16/1923	Napoleon	
		US-	2,019,612	11/5/1935	Langhans et al.	
		US-	2,937,445	5/24/1960	Erickson	
		US-	3,090,122	5/21/1963	Erickson	
		US-	3,768,477	10/30/1973	Anders et al.	
		US-	3,802,081	4/9/1974	Rogers	
		US-	3,857,181	12/31/1974	Rappaport	
		US-	3,877,691	4/15/1975	Foster	
		US-	3,924,333	12/9/1975	Erickson	
		US-	4,017,975	4/19/1977	Johnson	
		US-	4,024,642	5/24/1977	Zorovich	
		US-	4,083,115	4/11/1978	McKelvey	
		US-	4,167,814	9/18/1979	Schubert	
		US-	4,192,071	3/11/1980	Erickson	
		US-	4,511,329	4/16/1985	Diamond	
		US-	4,718,662	1/12/1988	North	
		US-	4,802,851	2/7/1989	Rhoades	
		US-	4,822,278	4/18/1989	Oliva et al.	
		US-	5,037,298	8/6/1991	Hickham	
		US-	5,078,602	1/7/1992	Honoshofsky	
		US-	5,460,524	10/24/1995	Anderson	
		US-	5,516,286	5/14/1996	Kushner	

Examiner Signature		Date Considered	
--------------------	--	-----------------	--

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. ¹Applicant's unique citation designation number (optional). ²See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴For Japanese patent documents, the indication of the year of reign of the Emperor must precede the serial number of the patent document. ⁵Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. ⁶Applicant is to place a check mark here if English language translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SENT FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Substitute for Form 1449/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT (use as many sheets as necessary)					Complete if Known	
					Application Number	16/870,745
					Filing Date	May 8, 2020
					First Named Inventor:	Thien Nguyen
					Art Unit	3772
					Examiner Name	Not Yet Assigned
					Attorney Docket Number	INCEP-005

U.S. PATENT DOCUMENTS						
Examiner Initials*	Cite No. ¹	Document Number		Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind	Code ² (If known)			
		US-	5,762,496	6/9/1998	Albertsson et al.	
		US-	5,890,899	4/6/1999	Sclafani	
		US-	6,022,214	2/8/2000	Hirsch et al.	
		US-	6,213,772	4/10/2001	Costello	
		US-	6,267,591	7/31/2001	Barstow	
		US-	6,338,627	1/15/2002	Hirsch et al.	
		US-	6,575,746	6/10/2003	Hirsch et al.	
		US-	6,908,308	6/21/2005	Hirsch et al.	
		US-	6,974,321	12/13/2005	Hirsch et al.	
		US-	7,287,981	10/30/2007	Hirsch	
		US-	7,293,990	11/13/2007	Hirsch et al.	
		US-	7,611,354	11/3/2009	Hirsch et al.	
		US-	7,748,981	7/6/2010	Hirsch et al.	
		US-	8,029,280	10/4/2011	Black et al.	
		US-	8,057,227	11/15/2011	Hirsch et al.	
		US-	8,057,228	11/15/2011	Hirsch et al.	
		US-	8,075,310	12/13/2011	Hirsch et al.	
		US-	8,297,973	10/30/2012	Hirsch et al.	
		US-	8,529,256	9/10/2013	Hirsch et al.	
		US-	8,535,056	9/17/2013	Dragan et al.	
		US-	8,911,232	12/16/2014	Nguyen	
		US-	9,084,656	7/21/2015	Hirsch	
		US-	9,089,389	7/28/2015	Hirsch et al.	
		US-	9,358,086	6/7/2016	Hirsch	
		US-	9,788,924	10/17/2017	Nguyen	
		US-	2003/0134253	7/17/2003	Hirsch et al.	
		US-	2006/0063126	3/23/2006	Aloise et al.	
		US-	2006/0063129	3/23/2006	Hirsch	
		US-	2006/0084031	4/20/2006	Hirsch et al.	
		US-	2008/0166684	7/10/2008	Kanas	

Examiner Signature		Date Considered	
--------------------	--	-----------------	--

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. ¹Applicant's unique citation designation number (optional). ²See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴For Japanese patent documents, the indication of the year of reign of the Emperor must precede the serial number of the patent document. ⁵Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. ⁶Applicant is to place a check mark here if English language translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SENT FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Application Number	16/870,745
Filing Date	May 8, 2020
First Named Inventor:	Thien Nguyen
Art Unit	3772
Examiner Name	Not Yet Assigned
Attorney Docket Number	INCEP-005

9

[illegible]

Date Considered

67 of 295

Substitute for Form 1449/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(use as many sheets as necessary)</i>				Complete if Known	
				Application Number	16/870,745
				Filing Date	May 8, 2020
				First Named Inventor:	Thien Nguyen
				Art Unit	3772
				Examiner Name	Not Yet Assigned
Sheet	4	of	9	Attorney Docket Number	INCEP-005

[illegible]

Examiner Signature		Date Considered	
-----------------------	--	-----------------	--

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. ¹Applicant's unique citation designation number (optional). ²See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴For Japanese patent documents, the indication of the year of reign of the Emperor must precede the serial number of the patent document. ⁵Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. ⁶Applicant is to place a check mark here if English language translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SENT FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Substitute for Form 1449/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(use as many sheets as necessary)</i>		Complete if Known			
		Application Number	16/870,745		
		Filing Date	May 8, 2020		
		First Named Inventor:	Thien Nguyen		
		Art Unit	3772		
		Examiner Name	Not Yet Assigned		
Sheet	5	of	9	Attorney Docket Number	INCEP-005
NON PATENT LITERATURE DOCUMENTS					
Examiner Initials*	Cite No'	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published			T ²
		PCT Application No. PCT/US2014/032892 International Search Report and Written Opinion dated 9/4/14			
		Australian Patent Application No. 2014202637; AU Examination Report dated 1/23/15			
		Brazilian Patent Application No. BR1120140116377 Preliminary Office Action 1/7/20			
		Canadian Patent Application No. 2,919,142; CA Examination Report dated 5/31/16			
		Chinese Patent Application No. 201480039991.2 First Office Action dated 12/29/16			
		European Patent Application No. 14721736.8; Extended European Search Report dated 10/20/15			
		European Patent Application No. 17150671.0; Extended European Search Report dated 5/29/17			
		Docket No. INCEP-001 U.S. Patent Application 14/100,323; Final Office Action mailed 10/24/14			
		Docket No. INCEP-001 U.S. Patent Application 14/100,323; Office Action mailed 5/6/14			
		Docket No. INCEP-001COA U.S. Patent Application 14/228,046; Office Action mailed 1/10/20			
		Docket No. INCEP-001COA U.S. Patent Application 14/228,046; Final Office Action mailed 7/15/19			
		Docket No. INCEP-001COA U.S. Patent Application 14/228,046; Office Action mailed 10/5/18			

Examiner Signature		Date Considered	
-----------------------	--	--------------------	--

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

'Applicant's unique citation designation number (optional). 'Applicant is to place a check mark here if English Translation is attached.

This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SENT FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Substitute for Form 1449/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(use as many sheets as necessary)</i>		Complete if Known			
		Application Number	16/870,745		
		Filing Date	May 8, 2020		
		First Named Inventor:	Thien Nguyen		
		Art Unit	3772		
		Examiner Name	Not Yet Assigned		
Sheet	6	of	9	Attorney Docket Number	INCEP-005

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No'	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published	T ²
		Docket No. INCEP-001COA U.S. Patent Application 14/228,046; Final Office Action mailed 1/16/18	
		Docket No. INCEP-001COA U.S. Patent Application 14/228,046; Office Action mailed 6/5/17	
		Docket No. INCEP-001COA U.S. Patent Application 14/228,046; Office Action mailed 11/7/16	
		Docket No. INCEP-001COA U.S. Patent Application 14/228,046; Final Office Action mailed 6/6/16	
		Docket No. INCEP-001COA U.S. Patent Application 14/228,046; Office Action mailed 11/6/15	
		Docket No. INCEP-001COB U.S. Patent Application 14/228,050; Office Action mailed 11/4/16	
		Docket No. INCEP-001COB U.S. Patent Application 14/228,050; Final Office Action mailed 5/20/16	
		Docket No. INCEP-001COB U.S. Patent Application 14/228,050; Office Action mailed 11/6/15	
		Docket No. INCEP-001COC U.S. Patent Application 14/228,054; Office Action mailed 1/13/20	
		Docket No. INCEP-001COC U.S. Patent Application 14/228,054; Final Office Action mailed 8/8/19	
		Docket No. INCEP-001COC U.S. Patent Application 14/228,054; Office Action mailed 11/29/18	
		Docket No. INCEP-001COC U.S. Patent Application 14/228,054; Final Office Action mailed 11/2/17	

Examiner Signature		Date Considered	
--------------------	--	-----------------	--

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

'Applicant's unique citation designation number (optional). 'Applicant is to place a check mark here if English Translation is attached.

This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SENT FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Substitute for Form 1449/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(use as many sheets as necessary)</i>		Complete if Known			
		Application Number	16/870,745		
		Filing Date	May 8, 2020		
		First Named Inventor:	Thien Nguyen		
		Art Unit	3772		
		Examiner Name	Not Yet Assigned		
Sheet	7	of	9	Attorney Docket Number	INCEP-005

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No'	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published	T ²
		Docket No. INCEP-001COC U.S. Patent Application 14/228,054; Office Action mailed 4/24/17	
		Docket No. INCEP-001COC U.S. Patent Application 14/228,054; Office Action mailed 12/3/15	
		Docket No. INCEP-001COD U.S. Patent Application 14/228,057; Final Office Action mailed 5/19/20	
		Docket No. INCEP-001COD U.S. Patent Application 14/228,057; Office Action mailed 10/7/19	
		Docket No. INCEP-001COD U.S. Patent Application 14/228,057; Final Office Action mailed 3/22/19	
		Docket No. INCEP-001COD U.S. Patent Application 14/228,057; Office Action mailed 9/7/18	
		Docket No. INCEP-001COD U.S. Patent Application 14/228,057; Final Office Action mailed 11/2/17	
		Docket No. INCEP-001COD U.S. Patent Application 14/228,057; Office Action mailed 4/13/17	
		Docket No. INCEP-001COD U.S. Patent Application 14/228,057; Final Office Action mailed 6/7/16	
		Docket No. INCEP-001COD U.S. Patent Application 14/228,057; Office Action mailed 11/20/15	
		Docket No. INCEP-001COE U.S. Patent Application 14/228,061; Final Office Action mailed 1/10/20	
		Docket No. INCEP-001COE U.S. Patent Application 14/228,061; Final Office Action mailed 7/11/19	

Examiner Signature		Date Considered	
--------------------	--	-----------------	--

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

'Applicant's unique citation designation number (optional). 'Applicant is to place a check mark here if English Translation is attached.

This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SENT FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Substitute for Form 1449/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(use as many sheets as necessary)</i>		Complete if Known			
		Application Number	16/870,745		
		Filing Date	May 8, 2020		
		First Named Inventor:	Thien Nguyen		
		Art Unit	3772		
		Examiner Name	Not Yet Assigned		
Sheet	8	of	9	Attorney Docket Number	INCEP-005

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No'	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published	T ²
		Docket No. INCEP-001COE U.S. Patent Application 14/228,061; Office Action mailed 10/4/18	
		Docket No. INCEP-001COE U.S. Patent Application 14/228,061; Final Office Action mailed 10/20/17	
		Docket No. INCEP-001COE U.S. Patent Application 14/228,061; Office Action mailed 4/12/17	
		Docket No. INCEP-001COE U.S. Patent Application 14/228,061; Final Office Action mailed 6/30/16	
		Docket No. INCEP-001COE U.S. Patent Application 14/228,061; Office Action mailed 12/4/15	
		Docket No. INCEP-002DCOA U.S. Patent Application 29/491,367 Final Office Action mailed 3/4/15	
		Docket No. INCEP-002DCOA U.S. Patent Application 29/491,367 Office Action mailed 11/14/14	
		Docket No. INCEP-003DCOA U.S. Patent Application 29/477,887 Final Office Action mailed 6/1/16	
		Docket No. INCEP-003DCOA U.S. Patent Application 29/477,887 Office Action mailed 11/27/15	
		Docket No. INCEP-003DCOA U.S. Patent Application 29/477,887 Final Office Action mailed 5/1/15	
		Docket No. INCEP-003DCOA U.S. Patent Application 29/477,887 Office Action mailed 11/14/14	
		Docket No. INCEP-004DCOA U.S. Patent Application 29/477,888 Office Action mailed 3/21/17	

Examiner Signature		Date Considered	
--------------------	--	-----------------	--

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

'Applicant's unique citation designation number (optional). 'Applicant is to place a check mark here if English Translation is attached.

This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SENT FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Substitute for Form 1449/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(use as many sheets as necessary)</i>		Complete if Known	
		Application Number	16/870,745
		Filing Date	May 8, 2020
		First Named Inventor:	Thien Nguyen
		Art Unit	3772
		Examiner Name	Not Yet Assigned
Sheet	9	of	9
		Attorney Docket Number	INCEP-005
NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No'	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published	T ²
		Docket No. INCEP-004DCOA U.S. Patent Application 29/477,888 Final Office Action mailed 6/1/16	
		Docket No. INCEP-004DCOA U.S. Patent Application 29/477,888 Office Action mailed 12/2/15	
		Docket No. INCEP-004DCOA U.S. Patent Application 29/477,888 Final Office Action mailed 5/1/15	
		Docket No. INCEP-004DCOA U.S. Patent Application 29/477,888 Office Action mailed 11/14/14	

Examiner Signature		Date Considered	
-----------------------	--	--------------------	--

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

'Applicant's unique citation designation number (optional). 'Applicant is to place a check mark here if English Translation is attached.

This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SENT FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.



(22) **Date de dépôt/Filing Date:** 2014/05/14

(41) **Mise à la disp. pub./Open to Public Insp.:** 2015/06/09

(45) **Date de délivrance/Issue Date:** 2016/02/09

(30) **Priorités/Priorities:** 2013/12/09 (US14/100,323);
2014/04/03 (USPCT/US2014/032892)

(51) **Cl.Int./Int.Cl.** **A61C 17/06** (2006.01),
A61B 1/24 (2006.01), **A61C 17/10** (2006.01),
A61C 5/14 (2006.01)

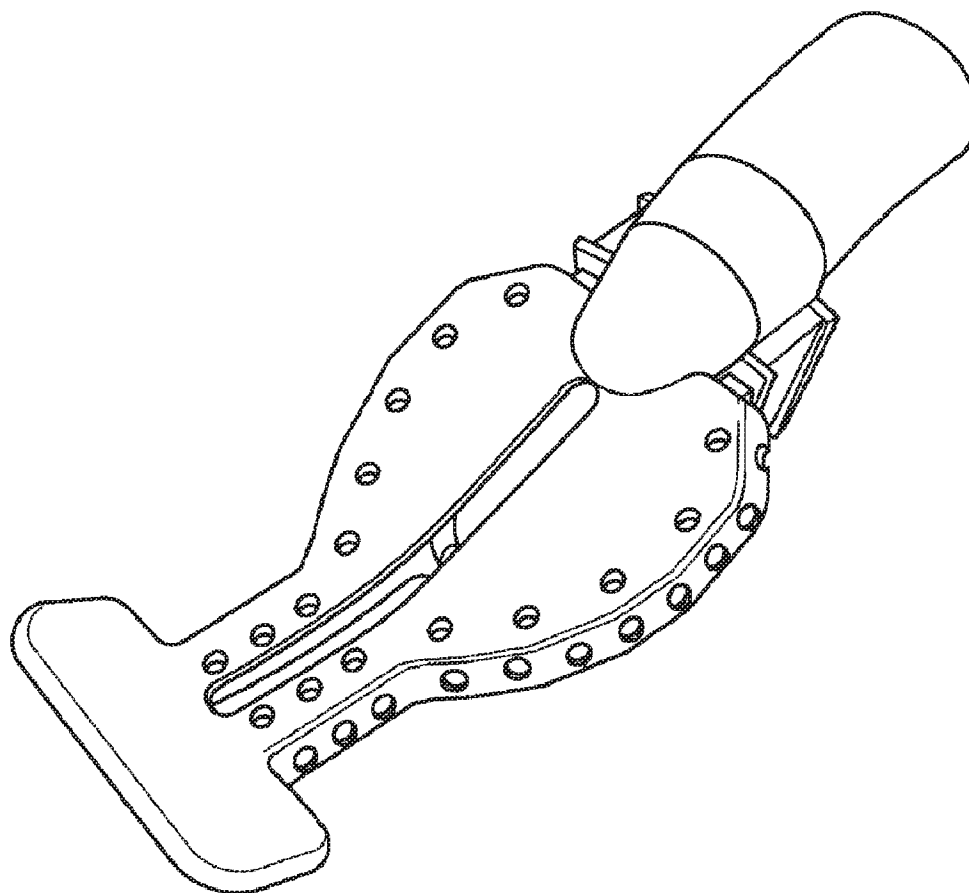
(72) **Inventeurs/Inventors:**
NGUYEN, THIEN, US;
PHAM, TAM THANH, US

(73) **Propriétaire/Owner:**
INCEPT, INC., US

(74) **Agent:** RICHES, MCKENZIE & HERBERT LLP

(54) **Titre :** SYSTÈME DENTAIRE D'ASPIRATION ET D'ISOLATION INTRA-ORAL

(54) **Title:** INTRAORAL DENTAL SUCTION AND ISOLATION SYSTEM



(57) **Abrégé/Abstract:**

A dental mouthpiece is provided that may be attached to a high-suction dental adapter for the purpose of assisting the dental staff during dental procedures through chair-side, hands-free suction, and isolation. Such a mouthpiece may comprise a main body



(57) Abrégé(suite)/Abstract(continued):

portion, a cheek retractor portion, and a suction connector portion. In some embodiments, the main body portion, cheek retractor portion, and suction connector portion (and sub-portions thereof) may be molded in one piece, preferably by injection molding. In an exemplary embodiment, the mouthpiece may be made of a material that is flexible, translucent, conducive to injection molding, high heat-resistant, and autoclavable. Such a material may include silicone. Because the mouthpiece may be made of a high heat-resistant and autoclavable material, such a mouthpiece may be reusable.

ABSTRACT

A dental mouthpiece is provided that may be attached to a high-suction dental adapter for the purpose of assisting the dental staff during dental procedures through chair-side, hands-free suction, and isolation. Such a mouthpiece may comprise a main body portion, a cheek retractor portion, and a suction connector portion. In some embodiments, the main body portion, cheek retractor portion, and suction connector portion (and sub-portions thereof) may be molded in one piece, preferably by injection molding. In an exemplary embodiment, the mouthpiece may be made of a material that is flexible, translucent, conducive to injection molding, high heat-resistant, and autoclavable. Such a material may include silicone. Because the mouthpiece may be made of a high heat-resistant and autoclavable material, such a mouthpiece may be reusable.

INTRAORAL DENTAL SUCTION AND ISOLATION SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to the field of dental mouthpieces. More specifically, the present invention relates to intraoral dental suction and isolation mouthpieces.

2. Description of Related Art

Various mouthpieces are currently used by dental health professionals, dental hygienists, and dental assistants in the field of dentistry. In the past, a dental patient has been treated by a traditional two-person team that comprises a dental professional and a dental assistant. Further, dental treatment may be provided by the team using many different types of dental equipment and materials. Such dental equipment and materials may include such items as an intraoral mirror, a bite block, a slow speed suction ejector, a high speed suction ejector, gauzes, cotton rolls, and dry angles. Each item of dental equipment may be used for different purposes, though some may be used in combination for some types of dental services. As such, a dental professional seeking to provide such dental services may need to use multiple items of such dental equipment. An important role of the dental assistant is therefore to assist the dental professional in coordinating the use of these multiple items of different equipment and materials.

There is, therefore, a need in the art for improved systems and methods of providing dental services in a more efficient, comfortable, and safe manner to the dental patient.

SUMMARY OF THE CLAIMED INVENTION

Embodiments of the present invention may include a mouthpiece that may be attached to a high-suction dental adapter for the purpose of assisting the dental staff during dental procedures through chair-side, hands-free suction, and isolation. Such a mouthpiece may comprise a main body portion, a cheek retractor portion, and a suction connector portion. In some embodiments, the main body portion, cheek retractor portion, and suction connector portion (and sub-portions thereof) may be molded in one piece, preferably by injection molding. In an exemplary embodiment, the mouthpiece may be made of a material that is flexible, translucent, conducive to injection molding, high heat-resistant, and autoclavable. Such a material may include silicone. Because the mouthpiece may be made of a high heat-resistant and autoclavable material, such a mouthpiece may be reusable.

The main body portion may comprise an enclosed pocket made up of an anterior wall, a posterior wall, and a side wall in between the anterior and posterior walls. The side wall may be perforated with a plurality of perforations. Such perforations may constitute a mesh. Additional perforations may be located on the anterior and posterior walls. The main body portion may further include a slit along a longitudinal, central axis on the anterior wall. Such openings (*e.g.*, perforations and slit) allow for suction of air, fluids, and small debris from the patient's mouth, through the openings into the interior portion, and into the suction connector portion towards a suction source. Because the mouthpiece is made of a flexible and resilient material (*e.g.*, silicone), the mouthpiece may be bent when placed in a patient's mouth to conform to the shape of the mouth. When properly positioned, the suction connector portion may protrude from one side of the patient's mouth, while the main body lies against the back of the patient's mouth, and the cheek retractor presses against the patient's cheek on the opposite side of the patient's mouth.

The main body may further include an protruding bridge structure on the interior surface of the posterior wall. Such a bridge structure may protrude from the interior surface in a wave shape with crests and troughs. The crests provide a plurality of contact points with the anterior wall to keep the anterior wall separated

from the posterior wall during suction. Meanwhile, the troughs provide gaps that allow for suction of air, fluids, and small debris through the bridge structure.

Accordingly, in one aspect, the present invention resides in a dental mouthpiece composed of a bendable material, the dental mouthpiece formed in a curve and comprising: a main body portion at a central part of the curve and comprising a defined pocket having an anterior wall inside the curve, a posterior wall outside the curve, and a side wall in between the anterior wall and the posterior wall, wherein the anterior wall, the posterior wall, and the side wall define an interior portion of the defined pocket, wherein the posterior wall comprises a bridge structure protruding from an interior surface of the posterior wall in a wave shape, the protruding bridge structure comprising a plurality of spaced contact points that keep the anterior wall separated from the posterior wall during suction, wherein the spaced contact points are at crests of the wave shape, and wherein a plurality of troughs of the wave shape between the spaced contact points allow for suction through the bridge structure; a cheek retractor portion connected to the main body portion and having a surface that applies pressure when the dental mouthpiece is bent, wherein the pressure is based on resilience of the bendable material; and a suction connector portion for connecting the interior portion of the main body portion to a vacuum suction source, wherein the suction connector portion is connected to the main body portion on an end opposite the cheek retractor.

In another aspect, the present invention resides in a dental mouthpiece composed of a bendable material, the dental mouthpiece formed in a curve and comprising: a main body portion at a central part of the curve and comprising a defined pocket having an anterior wall inside the curve, a posterior wall outside the curve, and a side wall in between the anterior wall and the posterior wall, wherein the anterior wall, the posterior wall, and the side wall define an interior portion of the defined pocket; a cheek retractor portion connected to the main body portion and having a surface that applies pressure when the dental mouthpiece is bent, wherein the pressure is based on resilience of the bendable material; a suction connector portion for connecting the interior portion of the main body portion to a vacuum suction source, wherein the suction connector portion is connected to the main body portion on an end opposite the cheek retractor; and a detachable mouth prop comprising a strap configured to fit

around the suction connector portion, wherein an external surface of the suction connector portion comprises a notch region corresponding to the strap, and wherein an external surface of the strap is substantially flush with a remaining external surface of the suction connector portion when the strap sits in the notch region.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1A is a perspective view of an exemplary mouthpiece with a detachable mouth prop.

FIG. 1B is a top view of the exemplary mouthpiece and detachable mouth prop of FIG. 1A.

FIG. 1C is a bottom view of the exemplary mouthpiece and detachable mouth prop of FIG. 1A.

FIG. 1D is a side view of the exemplary mouthpiece and detachable mouth prop of FIG. 1A.

FIG. 1E is a cross-sectional view of the exemplary mouthpiece and detachable mouth prop of FIG. 1A.

FIG. 2A is a perspective view of the exemplary mouthpiece of FIG. 1A where the detachable mouth prop has been detached.

FIG. 2B is a top view of the exemplary mouthpiece of FIG. 2A.

FIG. 2C is a bottom view of the exemplary mouthpiece of FIG. 2A.

FIG. 2D is a side view of the exemplary mouthpiece of FIG. 2A.

FIG. 2E is a cross-sectional view of the exemplary mouthpiece of FIG. 2A.

FIG. 3A is a front view of an exemplary mouth prop.

FIG. 3B is a back view of the exemplary mouth prop of FIG. 3A.

FIG. 3C is a bottom view of the exemplary mouth prop of FIG. 3A.

FIG. 3D is a perspective view of the exemplary mouth prop of FIG. 3A.

FIG. 3E is a side view of the exemplary mouth prop of FIG. 3A.

FIG. 3F is a top view of the exemplary mouth prop of FIG. 3A.

FIG. 4 is a close-up view of exemplary mesh sides in an exemplary mouthpiece.

FIG. 5 is a close-up view of an internal bridge in an exemplary mouthpiece.

FIG. 6A is a close-up view of an exemplary reinforcing bar in an exemplary mouthpiece.

FIG. 6B is a cross-sectional view of the exemplary reinforcing bar of FIG. 6A.

FIG. 7A is a close-up view of an exemplary cheek retractor portion in an

exemplary mouthpiece.

FIG. 7B is a cross-sectional view of the exemplary cheek retractor portion of FIG. 7A.

DETAILED DESCRIPTION

Embodiments of the present invention provide for a mouthpiece comprising a main body portion, a cheek retractor portion, and a suction connector portion. In some embodiments, the main body portion, cheek retractor portion, and suction connector portion (and sub-portions thereof) may be molded as one-piece, preferably by injection molding. In an exemplary embodiment, the mouthpiece may be made of a material that is flexible, translucent, conducive to injection molding, high heat-resistant, and autoclavable. Such a material may include silicone. Because the mouthpiece may be made of a high heat-resistant and autoclavable material, such a mouthpiece may be reusable.

FIGs. 1A-E are different views of an exemplary mouthpiece with an attachable mouth prop 160, while FIGs. 2A-E are different views of the exemplary mouthpiece of FIG. 1A where the attachable mouth prop 160 has been detached. Such a mouthpiece may include a main body portion 110, a suction connector portion 120, and a cheek retractor portion 130.

The main body portion 110 may include mesh or perforations 140, a stability bar 150, an open slit 170, and an internal bridge 180. The main body portion 110 may connect to a suction connector portion 120 on one end and a cheek retractor portion 130 at the other end. Such a cheek retractor portion 130 may be configured to press against and retract a patient's cheek away from the patient's teeth. When placed in a patient's mouth, the suction connector portion 120 may protrude from one side of the patient's mouth, while the main body portion 110 lies against the back of the patient's mouth, and the cheek retractor portion 130 retracts the patient's cheek on the opposite side of the patient's mouth. The flexibility of the material used to form the mouthpiece allows for some bending when placed in the patient's mouth. The material is, however, resilient enough that the cheek retractor portion presses against the inside of the patient's cheek with such pressure being sufficient to move the cheek away from the patient's teeth.

An exemplary main body portion 110, when placed in a mouth, may include an anterior wall facing the front of the mouth (e.g., the side with slit 170) and a posterior

wall facing the back of the mouth. The two walls may connect at a superior wall and an inferior wall forming a body that is at least partially enclosed.

Superior may be used herein to refer to the side that rests against a roof of a patient's mouth when placed therein, and inferior may be used to refer to the side that rests against the floor of the patient's mouth. The superior and inferior sides may be formed identically, which may allow for the mouthpiece to change orientation such that the superior side may appear as the inferior side and vice versa, in the new orientation. When in use, the respective sides of the main body portion 110 may serve to protect and separate the top of the mouth and the bottom of the mouth/tongue. In addition, the main body portion 110 may also serve to protect the back of the mouth (*e.g.*, throat and airway) from falling debris.

Much of the main body portion 110 of the mouthpiece may be shaped as a straight-line arrowhead or shield whose base generally conforms to the intraoral shape of a patient's mouth. Differently-sized mouthpieces may be provided for differently-sized mouths of adults and children. Part of the base side of the arrowhead may be formed with thicker walls than the rest of the main body. Such thickening may provide additional stability.

In addition, the main body portion 110 of the mouthpiece may include a plurality of holes 140 distributed along the superior and inferior sides of the anterior and posterior walls to assist in suctioning of water, saliva and debris from the oral cavity. In some embodiments, a set of holes may also form a mesh along the walls of the superior and inferior edges. FIG. 4 is a close-up view of an exemplary mesh wall in an exemplary mouthpiece.

At the narrow end of the arrowhead that connects to the cheek retractor portion 130, the main body portion 110 may include a rectangular portion. Narrower than the base of the arrowhead, the rectangle may additionally include a reinforcing bar (or stability bar) 150 (described in further detail below) and may be at least partially crossed by a slit 170 (described in further detail below) into the interior of the pocket of the main body portion 110.

Stability bar 150 may be a protrusion or otherwise a thickened area that reinforces the stability of the rectangular portion and assist in shaping this region to

the intraoral posterior shape of a patient's mouth. FIG. 6A is a close-up view of an exemplary stability bar 150 of an exemplary mouthpiece. FIG. 6B is a cross-sectional view of the exemplary reinforcing bar in the cheek retractor connector portion of FIG. 6A.

In some embodiments, the internal, rectangular-shaped reinforcing or stability bar 150 may be located distally to the internal wavelike bridge structure 180 and attached to both the interior side of the posterior surface of the main body and the rectangular portion. Such a stability bar 150 may be located in the area where a positioned mouthpiece begins to wrap from the lingual side of the most posterior mandibular tooth, around the distal side of the most posterior tooth, and to anterior side of the most posterior mandibular tooth, thereby assisting in shaping the mouthpiece to the general intraoral shape of a patient's mouth.

Various embodiments of the mouthpiece may further include a longitudinal, open slit 170 extending over approximately two-thirds of the main body on the anterior surface. Running along the center of the main body across the rectangle and most of the arrowhead, such a slit 170 may assist in capture and suction of water, saliva and debris, as well as assisting in cleaning and maintenance.

Additionally, the main body of the mouthpiece may include a bridge structure 180 on an interior surface to ensure that the anterior and posterior surfaces remain separated during suction. FIG. 1E is a cross-sectional view of the mouthpiece in which the bridge structure 180 is illustrated. FIG. 5 is a close-up view of the bridge structure 180 without the surrounding walls of the main body portion. Such a bridge structure 180 may be formed as an wave-like protrusion that generally corresponds to the distance between the anterior and posterior walls extending substantially (e.g., within 1 mm) the full distance at its crest and substantially flush to the surface at its trough. In some embodiments, the bridge structure 180 may be centrally-located in the main body portion 110 of the mouthpiece. The gaps (or troughs) between the waves of the bridge structure 180 assist in the suction-driven transfer of water and saliva to the suction connector portion 120 and ultimately, into a central suction vacuum. In some embodiments, the bridge structure 180 may follow the shape of a logo (e.g., an arrowhead or shield).

The suction connector portion 120 may be oval-shaped and also attached to the main body portion 110. The suction connector portion 120 may be formed with thicker walls than the main body portion 110 and configured to attach to a high-suction vacuum adapter and to assist in transferring water, saliva, and debris from the oral cavity to the external adapter for removal. The suction connector portion 120 may also include an internal stop to assist in sliding the mouthpiece onto the adapter to a desired depth. The suction connector portion 120 may additionally have an external, concave, notched region 210 that corresponds to a removable strap such that when the strap is in place, the external walls of the strap and the rest of the connector portion may be flush.

The cheek retractor portion 130 is illustrated as a hammerhead distal region, which may be attached to the main body portion 110. FIG. 7A is a close-up view of an exemplary cheek retractor portion 130 in an exemplary mouthpiece. FIG. 7B is a cross-sectional view of the exemplary cheek retractor portion 130 of FIG. 7A.

The mouthpiece may be used with a mouth prop 160, as illustrated in FIGs. 1 (with a mouth prop 160) and FIGs. 2 (illustrated without the mouth prop 160). FIGs. 3A-E provide different close-up views of an exemplary mouth prop 160. The removable strap 310 may be attached to mouth prop 160, which may be used to prop open a patient's mouth and teeth. In this regard, the suction connector portion 120 may additionally have an external plug 220 (FIG. 2C) protruding from the posterior side of the suction connector portion 120. Such a plug 220 may correspond to and serve to connect with an opening in the mouth prop 160. The mouth prop 160 may be reinforced by the presence of the plug 220 in the opening, thereby resulting in a more crush-resistant, nearly incompressible, and stable mouth prop 160. In some embodiments, the suction connector portion 120 may further have a cutout 230 (e.g., which may be shaped as a logo) providing extra interlocking with a corresponding protrusion (e.g., which may also be shaped as a logo) on an external high-suction vacuum adapter.

The mouth prop 160 may be made of thickened silicone material injection molded in a single piece with an elastic strap corresponding to the circumference of the suction connector portion. The mouth prop 160 has an internal, rectangular-

shaped female slot designed to fit snugly with the external, rectangular-shaped male plug 220 of the suction connector portion 120 of the mouthpiece. Mouth props may be made in different sizes for differently sized mouths. Because the mouth prop and mouthpiece are detachable from each other, different sizes of each may be mixed and matched as needed for a particular patient's mouth.

The mouthpiece as described herein may be used with a one-piece, autoclavable, high-suction vacuum adapter. Such a high-suction vacuum body adapter may be made of a single homogenous material. Having a single lever design, such a vacuum adapter may function in the same manner as all the current high-suction vacuum evacuators and saliva ejectors in controlling the removal of water, saliva, and debris from the oral cavity to the outside vacuum source. The single lever may be designed to control the removal of water, saliva, and debris from the at least partially enclosed so main body through a single, large evacuation conduit within the suction connector portion.

While various embodiments have been described above, it should be understood that they have been presented by way of example only, and not limitation. The descriptions are not intended to limit the scope of the invention to the particular forms set forth herein. Thus, the breadth and scope of a preferred embodiment should not be limited by any of the above-described exemplary embodiments. It should be understood that the above description is illustrative and not restrictive. To the contrary, the present descriptions are intended to cover such alternatives, modifications, and equivalents as may be included within the scope of the invention as defined by the appended claims and otherwise appreciated by one of ordinary skill in the art. The scope of the invention should, therefore, be determined not with reference to the above description, but instead should be determined with reference to the appended claims along with their full scope of equivalents.

What is claimed is:

1. A dental mouthpiece composed of a bendable material, the dental mouthpiece formed in a curve and comprising:

a main body portion at a central part of the curve and comprising a defined pocket having an anterior wall inside the curve, a posterior wall outside the curve, and a side wall in between the anterior wall and the posterior wall, wherein the anterior wall, the posterior wall, and the side wall define an interior portion of the defined pocket, wherein the posterior wall comprises a bridge structure protruding from an interior surface of the posterior wall in a wave shape, the protruding bridge structure comprising a plurality of spaced contact points that keep the anterior wall separated from the posterior wall during suction, wherein the spaced contact points are at crests of the wave shape, and wherein a plurality of troughs of the wave shape between the spaced contact points allow for suction through the bridge structure;

a check retractor portion connected to the main body portion and having a surface that applies pressure when the dental mouthpiece is bent, wherein the pressure is based on resilience of the bendable material; and a suction connector portion for connecting the interior portion of the main body portion to a vacuum suction source, wherein the suction connector portion is connected to the main body portion on an end opposite the cheek retractor.

2. The mouthpiece of claim 1, wherein the side wall includes a plurality of perforations.

3. The mouthpiece of claim 1, wherein the anterior wall and the posterior wall each includes a plurality of perforations.

4. The mouthpiece of claim 1, wherein the anterior wall further includes a slit along a central axis.

5. The mouthpiece of claim 1, further comprising a stability bar protruding from an interior surface of the posterior wall, wherein a thickness of the stability bar reinforces stability during bending of the dental mouthpiece.
6. The mouthpiece of claim 1, wherein the main body portion, the cheek retractor portion, and the suction connector portion are injection-molded as one piece.
7. The mouthpiece of claim 1, wherein the material is a flexible, translucent, high heat-resistant, autoclavable silicone-based material.
8. The mouthpiece of claim 1, wherein the suction connector portion comprises an internal stop to assist in positioning of the vacuum suction source or a vacuum adaptor.
9. The mouthpiece of claim 1, further comprising a detachable mouth prop.
10. The mouthpiece of claim 9, wherein the detachable mouth prop comprises a strap configured to fit around the suction connector portion, wherein an external surface of the suction connector portion comprises a notch region corresponding to the strap, and wherein an external surface of the strap is substantially flush with a remaining external surface of the suction connector portion when the strap sits in the notch region.
11. The mouthpiece of claim 10, wherein the strap and other portions of the mouth prop are injection-molded as a single piece.
12. The mouthpiece of claim 9, wherein the suction connector portion further comprises an external plug protrusion corresponding to an opening in the mouth prop.
13. The mouthpiece of claim 12, wherein the plug protrusion fits into the opening to provide additional crush-resistance and decreased compressibility.

14. The mouthpiece of claim 1, wherein the suction connector portion comprises a cutout corresponding to a protrusion on a vacuum adapter for an interlocking fit.
15. The mouthpiece of claim 1, wherein the anterior wall and the posterior wall have different thicknesses.
16. The mouthpiece of claim 1, wherein the main body portion comprises:
a base portion connected to the suction connector portion at a first end,
a cheek retractor connector portion connected to a second end of the base portion, the second end opposite the first end of the base portion, wherein the cheek retractor connector portion is narrower than the base portion, and the cheek retractor connects to main body portion at the cheek retractor connector portion.
17. The mouthpiece of claim 1, wherein one or more of the walls is a protective wall, and wherein debris external to mouthpiece is subject to being caught by suction and/or by the protective wall.
18. A dental mouthpiece composed of a bendable material, the dental mouthpiece formed in a curve and comprising:
a main body portion at a central part of the curve and comprising a defined pocket having an anterior wall inside the curve, a posterior wall outside the curve, and a side wall in between the anterior wall and the posterior wall, wherein the anterior wall, the posterior wall, and the side wall define an interior portion of the defined pocket;
a cheek retractor portion connected to the main body portion and having a surface that applies pressure when the dental mouthpiece is bent, wherein the pressure is based on resilience of the bendable material;
a suction connector portion for connecting the interior portion of the main body portion to a vacuum suction source, wherein the suction connector portion is connected to the main body portion on an end opposite the cheek retractor; and

a detachable mouth prop comprising a strap configured to fit around the suction connector portion, wherein an external surface of the suction connector portion comprises a notch region corresponding to the strap, and wherein an external surface of the strap is substantially flush with a remaining external surface of the suction connector portion when the strap sits in the notch region.

19. The mouthpiece of claim 18, wherein the side wall includes a plurality of perforations.
20. The mouthpiece of claim 18, wherein the anterior wall and the posterior wall each includes a plurality of perforations.
21. The mouthpiece of claim 18, wherein the anterior wall further includes a slit along a central axis.
22. The mouthpiece of claim 18, further comprising a stability bar protruding from an interior surface of the posterior wall, wherein a thickness of the stability bar reinforces stability during bending of the dental mouthpiece.
23. The mouthpiece of claim 18, wherein the main body portion, the cheek retractor portion, and the suction connector portion are injection-molded as one piece.
24. The mouthpiece of claim 18, wherein the material is an autoclavable silicone-based material.
25. The mouthpiece of claim 18, further comprising a bridge structure protruding from an interior surface of the posterior wall, the protruding bridge structure comprising a plurality of spaced contact points that keep the anterior wall separated from the posterior wall during suction.

26. The mouthpiece of claim 25, wherein the bridge structure protrudes from the interior surface of the posterior wall in a wave shape, and wherein the contact points are at crests of the wave shape.
27. The mouthpiece of claim 26, wherein troughs of the wave shape allow suction through the bridge structure.
28. The mouthpiece of claim 18, wherein the suction connector portion comprises an internal stop to assist in positioning of the vacuum suction source or a vacuum adaptor.
29. The mouthpiece of claim 18, wherein the strap and other portions of the mouth prop are injection-molded as a single piece.
30. The mouthpiece of claim 18, wherein the suction connector portion further comprises an external plug protrusion corresponding to an opening in the mouth prop.
31. The mouthpiece of claim 30, wherein the plug protrusion fits into the opening to provide additional crush-resistance and decreased compressibility.
32. The mouthpiece of claim 18, wherein the suction connector portion comprises a cut-out corresponding to a protrusion on a vacuum adapter for an interlocking fit.
33. The mouthpiece of claim 18, wherein the anterior wall and the posterior wall have different thicknesses.
34. The mouthpiece of claim 18, wherein the main body portion comprises:
a base portion connected to the suction connector portion at a first end,
a cheek retractor connector portion connected to a second end of the base portion, the second end opposite the first end of the base portion, wherein the cheek retractor connector portion is narrower than the base portion, and the cheek retractor connects to main body portion at the cheek retractor connector portion.

35. The mouthpiece of claim 18, wherein one or more of the walls is a protective wall, and wherein debris external to mouthpiece is subject to being caught by suction and/or by the protective wall.

1/11

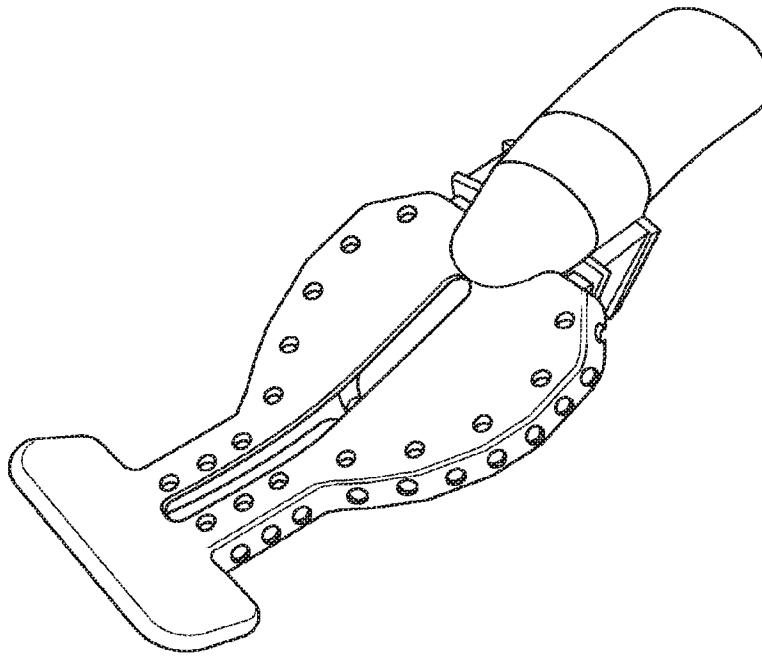
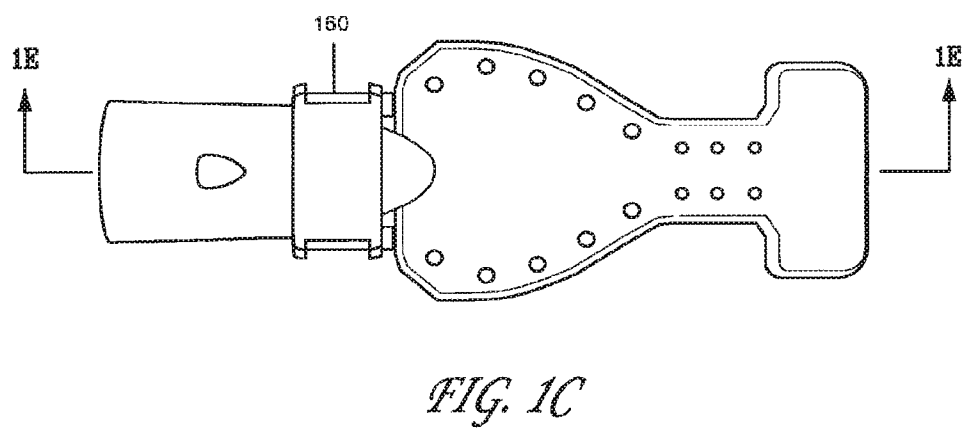
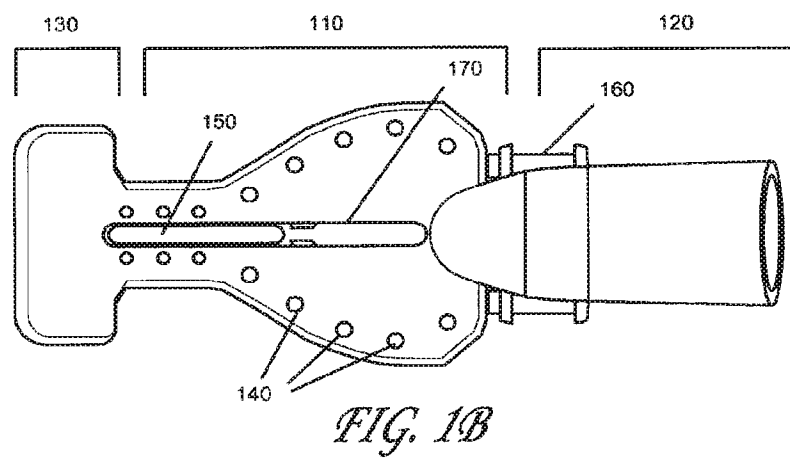
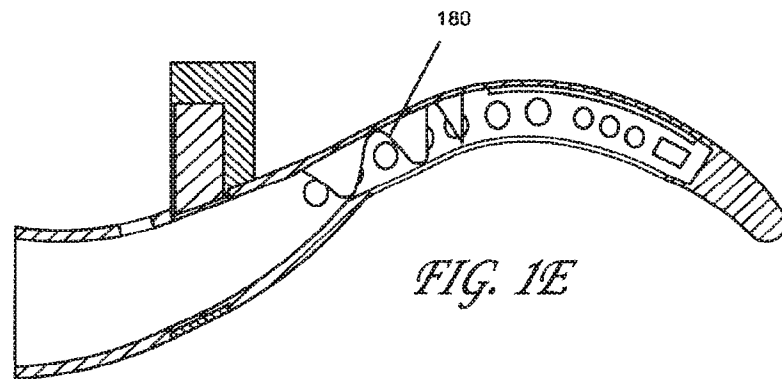
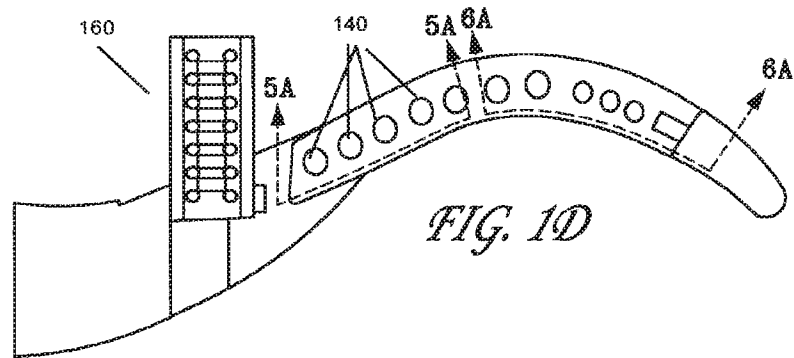


FIG. 1A

2/11



3/11



4/11

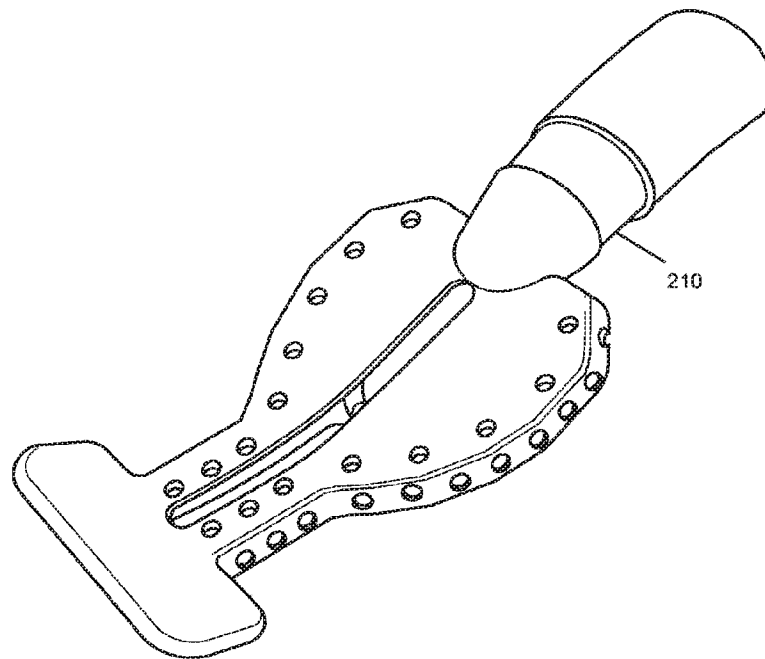


FIG. 2A

5/11

+

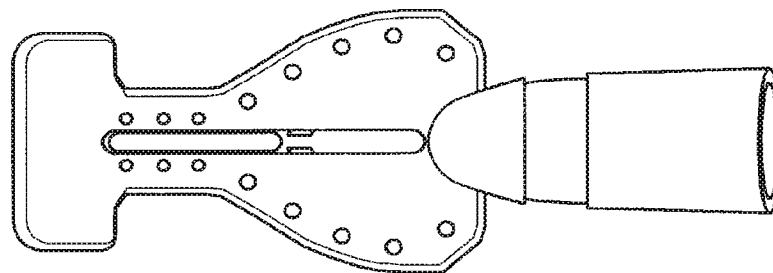


FIG. 2B

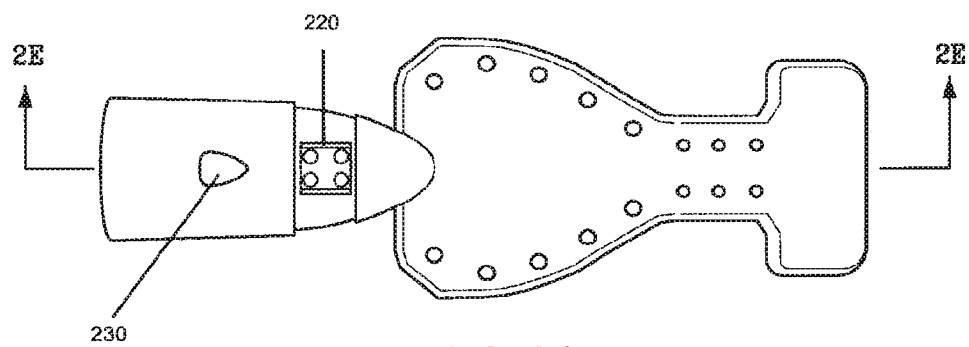


FIG. 2C

+

6/11

+

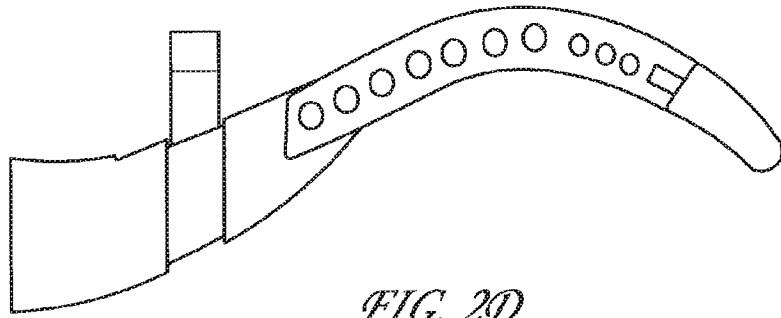


FIG. 2D

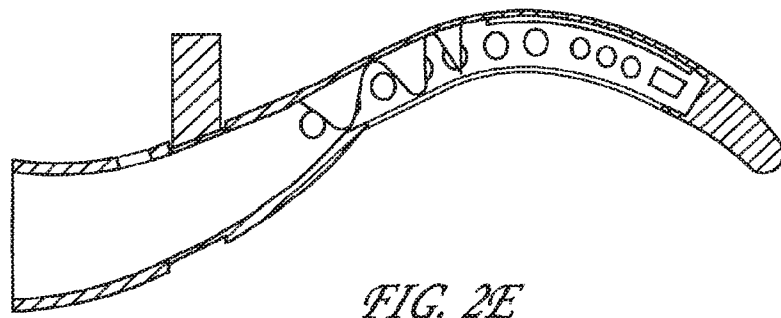


FIG. 2E

+

7/11

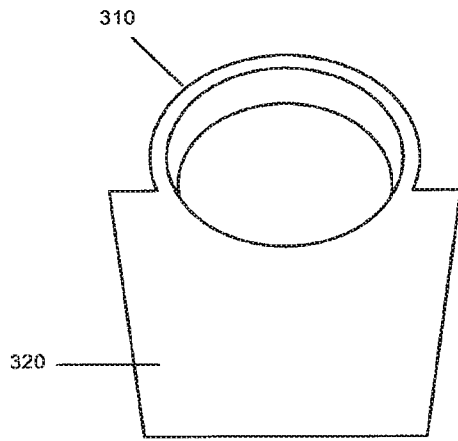


FIG. 3A

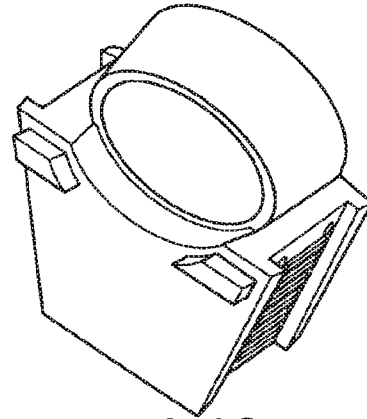


FIG. 3D

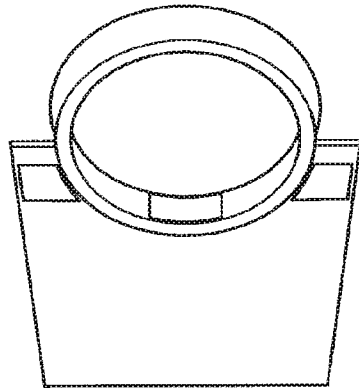


FIG. 3B

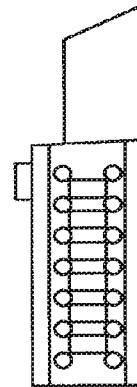


FIG. 3E

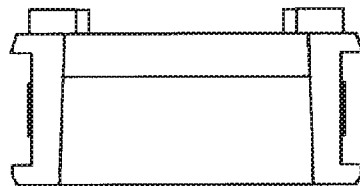


FIG. 3C

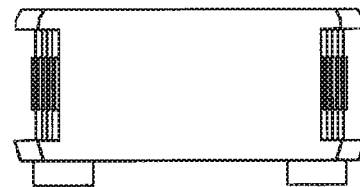
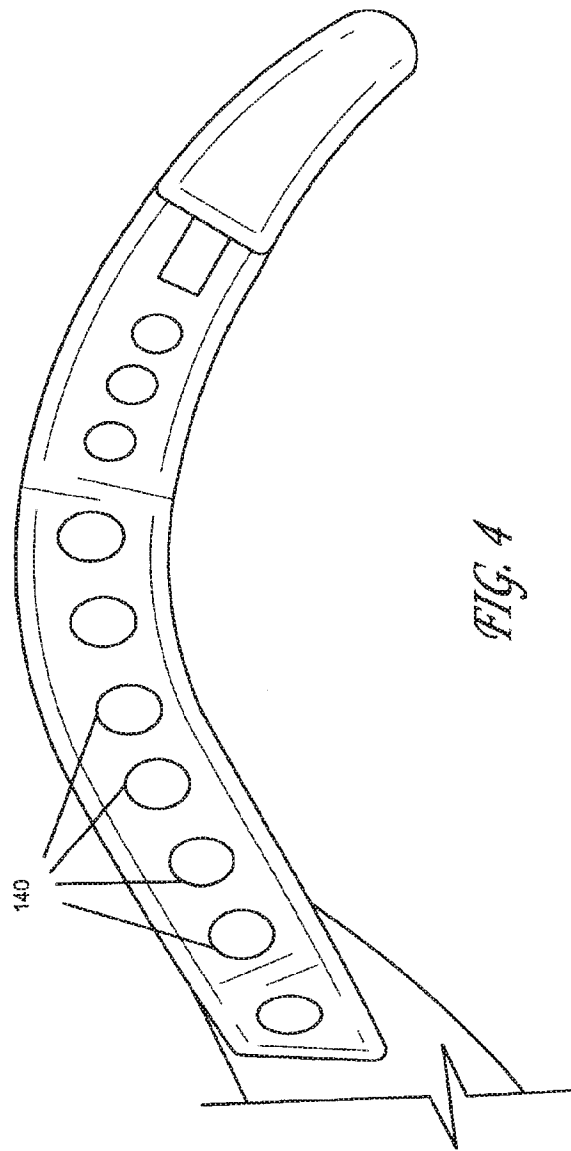


FIG. 3F

8/11



9/11

+

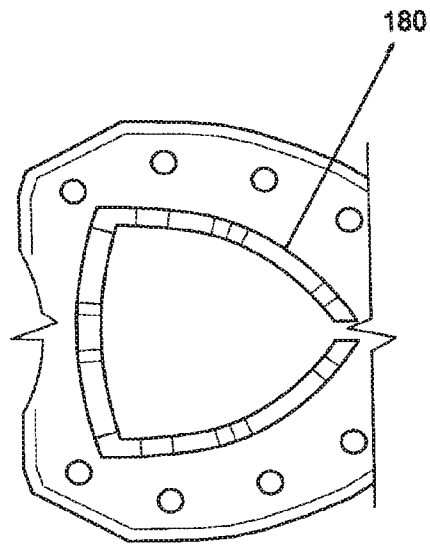


FIG. 5

+

10/11

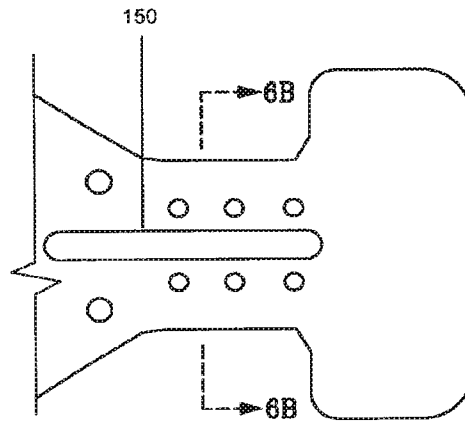


FIG. 6A

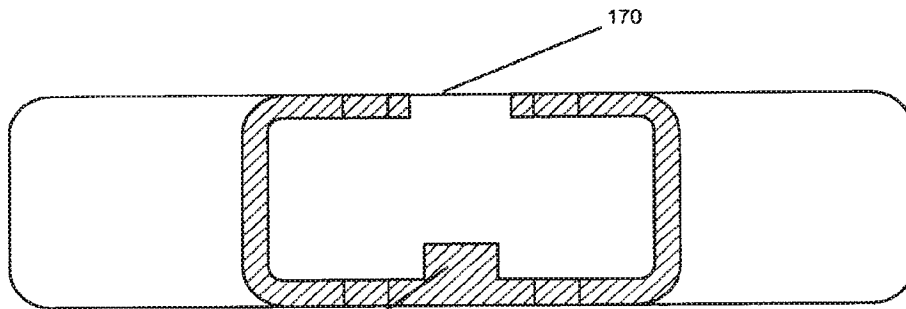


FIG. 6B

11/11

+

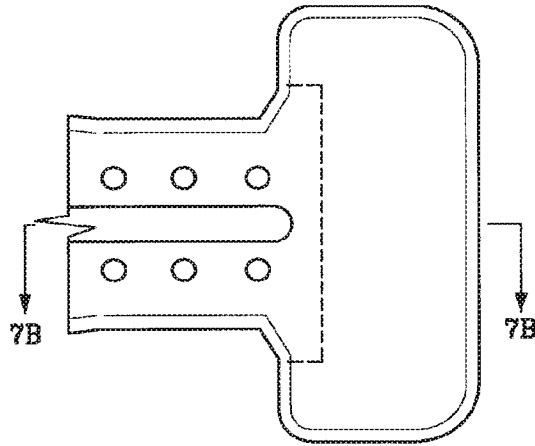


FIG. 7A

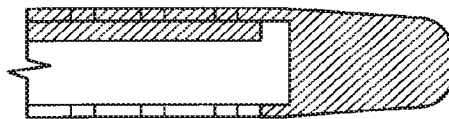
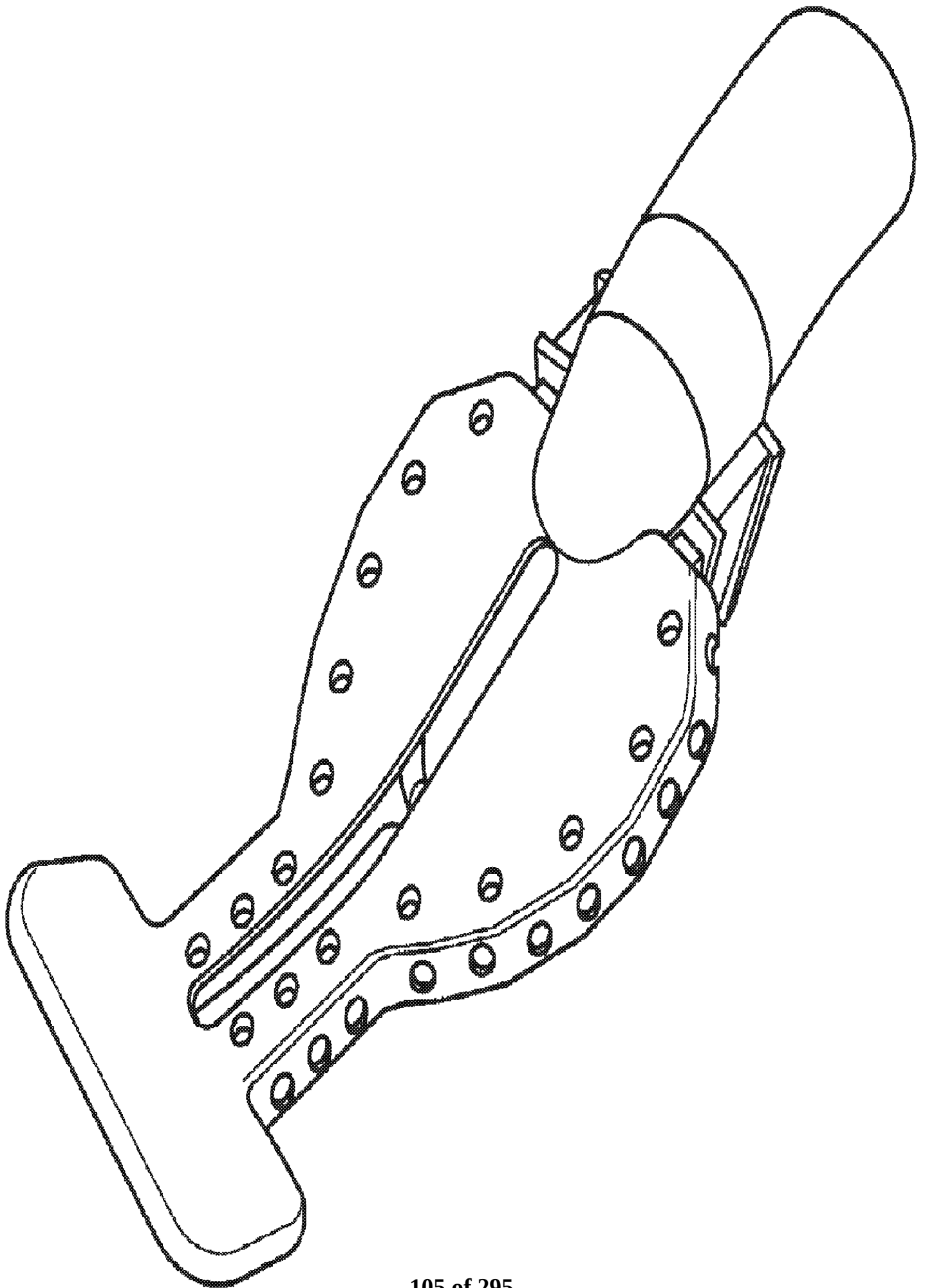


FIG. 7B

+





Espacenet

Bibliographic data: CN102026587 (A) — 2011-04-20

Tips for protecting the tongue, bite block, and intraoral illumination device having a saliva-sucking function

Inventor(s): HYOUNG KOO CHA ± (KOO CHA HYOUNG)

Applicant(s): DENTOZONE CO LTD ± (DENTOZONE CO., LTD)

Classification: - **international:** A61B1/24; A61C17/10
 - **cooperative:** A61B1/00105; A61B1/0676; A61B1/24;
A61C5/90; A61B90/30; A61C1/088; A61C17/043

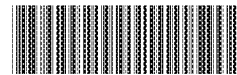
Application number: CN2010801473 20100303 Global Dossier

Priority number (s): WO2010KR01322 20100303 ; KR20090019328 20090306

Also published as: EP2404569 (A2) EP2404569 (A4) US2012015320 (A1)
KR100936221 (B1) WO2010101407 (A2) more

Abstract of CN102026587 (A)

The present invention relates to a TIPS (Twist Isolated Plate of Suction) for protecting the tongue, to a bite block, and to an intraoral illumination device having a saliva-sucking function. More particularly, the present invention relates to a TIPS for protecting the tongue, to a bite block, and to an intraoral illumination device having a saliva-sucking function, which enables a dental patient to undergo examination and treatment with the tongue thereof comfortably protected, quickly removes saliva from the throat of the patient to minimize disagreeable feelings of irritation, and isolates the tongue of the patient to the side opposite the side of the mouth to be treated, and also lightens the oral cavity of the patient to enable a dentist to perform examination and treatment with ease.



(12) 发明专利申请

(10) 申请公布号 CN 102026587 A

(43) 申请公布日 2011.04.20

(21) 申请号 201080001473.3

(51) Int. Cl.

(22) 申请日 2010.03.03

A61C 17/10(2006.01)

A61B 1/24(2006.01)

(30) 优先权数据

10-2009-0019328 2009.03.06 KR

(85) PCT申请进入国家阶段日

2010.11.04

(86) PCT申请的申请数据

PCT/KR2010/001322 2010.03.03

(87) PCT申请的公布数据

W02010/101407 K0 2010.09.10

(71) 申请人 登托施有限公司

地址 韩国首尔

(72) 发明人 具滋亨

(74) 专利代理机构 北京市盈科律师事务所

11344

代理人 赵成伟

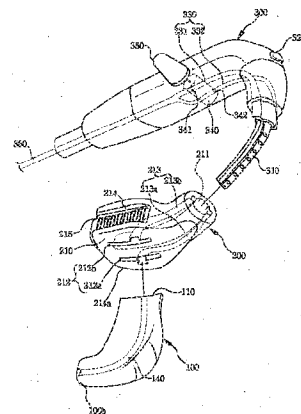
权利要求书 3 页 说明书 8 页 附图 5 页

(54) 发明名称

具有吸除唾液功能的舌头保护装置、牙垫及口腔照明设备

(57) 摘要

本发明公开一种具有唾液吸除功能的舌头保护装置、牙垫及口腔照明设备。具体来说,能使得患者的舌头得到安全保护的情况下进行牙科治疗;迅速吸除从咽喉涌来的唾液减少异物感;把舌头隔离在需要进行口腔治疗一侧的另一侧,确保治疗的空间;同时完全照亮患者的口腔内部,使医生的治疗能更容易进行的具有唾液吸除功能的舌头保护装置,牙垫和唾液吸除功能的口腔照明设备。



CN 102026587 A

1. 一种舌头保护装置，所述舌头保护装置安装在由口腔内一侧上下牙齿咬住并打开口腔的牙垫上，所述舌头保护装置一端与所述牙垫连接，另一端向口腔内另一侧舌根部延伸，在牙科治疗时保护舌头。

2. 根据权利要求 1 所述的舌头保护装置，其特征在于：包括与所述牙垫连接的牙垫连接部、从牙垫连接部向所述另一侧舌根部弯曲延长的装置主体和从所述装置主体的一侧由上向下延长保护舌头一侧的舌头保护部位。

3. 根据权利要求 2 所述的舌头保护装置，其特征在于：所述舌头保护部位保护舌尖部，使舌头与口腔内另一侧牙齿隔离。

4. 根据权利要求 1-3 中任何一项所述的舌头保护装置，其特征在于：所述舌头保护装置的另一端是以假想的延长轴为中心从所述舌头保护装置的一端延长，并以所述延长轴为中心以一定的角度弯曲延长，这样能保护舌头的一侧面。

5. 根据权利要求 1-3 中任何一项所述的舌头保护装置，其特征在于：所述舌头保护装置的一端到另一端设有通孔，且通孔中装有唾液吸管，用于吸除从咽喉涌到口腔内另一侧舌根处的唾液。

6. 根据权利要求 5 所述的舌头保护装置，其特征在于：所述唾液吸管为多数个。

7. 根据权利要求 4 所述的舌头保护装置，其特征在于：所述舌头保护装置的一端到另一端被穿孔打通，且孔中装有唾液吸管，用于吸除从咽喉涌到口腔内另一侧舌根处的唾液。

8. 根据权利要求 7 所述的舌头保护装置，其特征在于：所述唾液吸管为多数个。

9. 一种牙垫，包括由口腔内一侧的上下牙齿咬住并能打开口腔的牙垫主体，所述牙垫主体的一端被穿孔形成插入外部光源的光源插入孔；所述牙垫主体位于口腔内侧的部分设有装置连接孔；在所述牙垫主体上设有光源插入孔的一端设有唾液传递孔，唾液传递孔与所述光源插入孔相互分离，唾液传递孔与所述装置连接孔相连通，唾液传递孔中装有唾液传递管，唾液传递管与外部吸入排管连接，经所述装置连接孔流入的唾液通过唾液传递管传递到所述吸入排管。

10. 根据权利要求 9 所述的牙垫，其特征在于：所述装置连接孔是相互分离的多数个装置连接孔，所述唾液传递管分别穿过装置连接孔，所述唾液传递管是相互分离的多数个唾液传递管。

11. 根据权利要求 10 所述的牙垫，其特征在于：所述装置连接孔包括第 1 装置连接孔和第 2 装置连接孔；所述唾液传递管包括分别设置在第 1 唾液传递孔和第 2 唾液传递孔中的第 1 唾液传递管和第 2 唾液传递管。

12. 根据权利要求 9 所述的牙垫，其特征在于：所述装置连接孔是相互分离的多数个装置连接孔，所述唾液传递管在所述装置连接孔处分离，并能分别穿过多个装置连接孔。

13. 根据权利要求 12 所述的牙垫，其特征在于：所述装置连接孔是相互分离的第 1 装置连接孔和第 2 装置连接孔两个装置连接孔。

14. 根据权利要求 9-13 中任何一项所述的牙垫，其特征在于：所述的牙垫主体的上部和下部设有上下牙齿咬住的凹槽。

15. 根据权利要求 14 所述的牙垫，其特征在于：所述的凹槽处有防止上下牙齿打滑

的突起。

16. 根据权利要求 14 所述的牙垫，其特征在于：所述的突起是在凹槽的底部。

17. 根据权利要求 9 所述的牙垫，其特征在于：所述牙垫主体是能使光源的光透过的透明牙垫主体。

18. 一种口腔照明设备，该设备包括设有光源的机头，所述机头上设有光源的一端与在口腔内一侧用上下牙齿咬住打开口腔的牙垫连接，使得所述光源的光传递到口腔内部，所述牙垫一侧面上连接保护舌头的一侧并向口腔内另一侧舌根延长的舌头保护装置。

19. 根据权利要求 18 所述的口腔照明设备，其特征在于：所述的舌头保护装置包括与所述牙垫连接的牙垫连接部、从所述牙垫连接部向口腔内另一侧舌根弯曲延长的装置主体和从所述装置主体的一侧向下部延长保护舌头一侧面的舌头保护部位。

20. 根据权利要求 19 所述的口腔照明设备，其特征在于：所述舌头保护部位着重保护舌尖部，使舌头与口腔内另一侧牙齿隔离。

21. 根据权利要求 18-20 中任何一项所述的口腔照明设备，其特征在于：所述舌头保护装置的另一端是以假想的延长轴为中心从所述舌头保护装置的一侧延长，并以所述延长轴为中心以一定的角度弯曲延长，这样能保护舌头的一侧面。

22. 根据权利要求 18-20 中任何一项所述的口腔照明设备，其特征在于：所述舌头保护装置的一端到另一端被穿孔打通，且穿孔中装有吸除从咽喉涌到口腔内另一侧舌根处唾液的唾液吸管。

23. 根据权利要求 22 所述的口腔照明设备，其特征在于：所述唾液吸管为多数个。

24. 根据权利要求 21 所述的口腔照明设备，其特征在于：所述舌头保护装置的一端到另一端被穿孔打通，且穿孔中装有吸除从咽喉涌到口腔内另一侧舌根处唾液的唾液吸管。

25. 根据权利要求 24 所述的口腔照明设备，其特征在于：所述唾液吸管是多数个。

26. 根据权利要求 22 所述的口腔照明设备，其特征在于：所述牙垫位于口腔内一侧的是由上下牙齿咬住的牙垫主体，所述牙垫主体的一端被穿孔，成为光源插入的光源插入孔；所述牙垫主体在口腔内的部分有连接所述舌头保护装置的装置连接孔。

27. 根据权利要求 26 所述的口腔照明设备，其特征在于：所述机头的一端与另一端之间被打通，所述机头与连接吸入排管的外部吸入器连接，所述牙垫与所述吸入排管连接，由所述装置连接孔流入的唾液经唾液传递管传递到所述吸入排管。

28. 根据权利要求 27 所述的口腔照明设备，其特征在于：所述装置连接孔是相互分离的多数个装置连接孔，所述唾液传递管是分别穿过所述装置连接孔的相互分离的多数个唾液传递管。

29. 根据权利要求 28 所述的口腔照明设备，其特征在于：所述吸入排管是相互分离的多数个吸入排管，所述唾液传递管分别连接所述吸入排管。

30. 根据权利要求 29 所述的口腔照明设备，其特征在于：所述吸入排管分为第 1 吸入排管和第 2 吸入排管两个吸入排管，所述装置连接孔分为第 1 连接孔和第 2 连接孔两个装置连接孔，所述唾液传递管分别连接第 1 吸入排管和第 2 吸入排管，第 1 唾液传递管和第 2 唾液传递管分别穿过所述第 1 装置连接孔和第 2 连接孔。

31. 根据权利要求 27 所述的口腔照明设备，其特征在于：所述装置连接孔是相互分离的多数个装置连接孔，所述唾液传递管被所述装置连接孔分开，并穿过所述装置连接孔。

32. 根据权利要求 30 所述的口腔照明设备，其特征在于：所述牙垫主体的上部和下部有上下牙齿咬住时的凹槽。

33. 根据权利要求 32 所述的口腔照明设备，其特征在于：所述凹槽处有防止上下牙齿打滑的突起。

34. 根据权利要求 33 所述的口腔照明设备，其特征在于：所述突起是在所述凹槽的底部。

35. 根据权利要求 30 所述的口腔照明设备，其特征在于：所述机头包括控制所述吸入排管开闭的阀门。

36. 根据权利要求 35 所述的口腔照明设备，其特征在于：所述阀门位于所述机头的内部同时与所述吸入排管相连，阀门是能选择性的开闭所述吸入排管的开闭阀门。

37. 根据权利要求 35 所述的口腔照明设备，其特征在于：所述机头还包括驱动所述开闭阀门的阀门驱动杠杆。

38. 根据权利要求 37 所述的口腔照明设备，其特征在于：在所述机头上某特定部位设有光源的开关。

39. 根据权利要求 38 所述的口腔照明设备，其特征在于：所述光源开关是触摸开关。

40. 根据权利要求 18 所述的口腔照明设备，其特征在于：所述牙垫是能使所述光源的光透过的透明牙垫。

41. 根据权利要求 18 所述的口腔照明设备，其特征在于：所述光源是 LED 光源。

42. 根据权利要求 18-20 项中任何一项所述的口腔照明设备，其特征在于：在所述机头的某一特定部位上有向口腔内部照射紫外线的紫外线灯。

43. 根据权利要求 42 所述的口腔照明设备，其特征在于：所述紫外线灯在所述光源内。

44. 根据权利要求 18-20 项中任何一项所述的口腔照明设备，其特征在于：所述机头的某一特定部分上还包括了取得口腔内部治疗时影像的摄像头。

45. 根据权利要求 44 所述的口腔照明设备，其特征在于：所述摄像头设置在光源上。

具有吸除唾液功能的舌头保护装置、牙垫及口腔照明设备

技术领域

[0001] 本发明是具有唾液吸除功能的舌头保护装置、牙垫及口腔照明设备。具体来说，是一种能使患者的舌头在处于被保护的状态下进行牙科治疗，并能抽出咽喉部位涌出的唾液以减少异物感，把舌头隔离在需要进行治疗一侧的另一侧能够确保治疗的空间，同时为患者的口腔内部提供全方位的照明使医生的牙科治疗更便利的设备。

背景技术

[0002] 一般的牙科治疗为了对患者的口腔内部进行观察是利用外部光源对患者的口腔内部进行照明来确保医生和护士的视线。

[0003] 但即使是对于熟练的医生和护士来说，利用外部光源对口腔内部进行照明同时还要进行牙科治疗是非常困难的事情，利用外部光源对狭长口腔内部进行照明是不可能完全照亮口腔内部的。

[0004] 图1是传统的口腔照明设备的示意图，图2是传统的口腔照明设备在口腔内使用的示意图，图3是为了说明传统的口腔照明设备吸除唾液过程的示意图。

[0005] 参照这些示意图，传统的口腔照明设备包括一侧与光纤结合管子连接孔11形成管子连接部位10，上下两侧的薄片(21，22)可以把舌头推向内侧，在中间形成舌头保护部分20；还包括与上述管子连接部位10和上述舌头保护部分20之间形成的牙垫30，患者可以用牙齿咬住牙垫30在口腔内起到固定作用。

[0006] 即传统的口腔照明设备是当患者在口腔内用一侧的上下牙齿咬住牙垫30时，舌头保护部分20从舌头的前方插入把舌头推向口腔内侧以确保医生实施手术的空间，并且，在管子连接部位10的光纤连接孔53中插入光纤对口腔内部进行照明。

[0007] 因此，上述光纤在口腔内部发光，能产生对口腔内部所有部位均匀的照明的效果。

[0008] 并且，在牙垫30上设有突起32和凹槽31，防止口腔照明设备在患者的牙齿间打滑脱落，另外，延长的分支部分40固定在口腔另一侧的上下牙齿间，使得口腔照明设备在患者口腔内牢牢的固定住。

[0009] 利用上述管子连接部位10处形成的第1吸入孔51，第2吸入孔52、牙垫吸入孔54和舌头保护部分20处的吸入细孔23吸收口腔内的唾液1并向外部排出。

[0010] 所述吸入细孔23虽然具有吸入口腔内各部位唾液的效果，但是它的缺点是因为没有直接与所述吸入孔(51，52，54)连接，导致吸力不强。

[0011] 另外，传统的口腔照明设备中的舌头保护部分20是从前方把舌头推向口腔内侧固定，因此患者可能感觉舌头受到压迫，只有在唾液从咽喉部位上涌到舌头前方时才能通过上述吸入细孔23吸出唾液1，在次过程中因唾液引起的异物感也是一大缺点。

[0012] 并且，传统的口腔照明设备的管子连接部位10、舌头保护部分20和牙垫30是制作成一体，体积较大会对患者的心理上造成不安，而且清洗不便也是一个缺点。

发明内容

[0013] 为了解决现有技术中存在的上述问题，本发明的目的是提供一种插入口腔内部进行口腔照明，并能吸除口腔内唾液的舌头保护装置、牙垫及口腔照明设备，能使得患者在牙科治疗时舌头得到保护，利用本发明口腔中的唾液能被迅速吸除，而且清洗方便，同时能对口腔内部各部位进行均匀照明，另外在使用过程中患者的舌头可以免受压迫，把舌头隔离在治疗一侧的另一侧，在保护舌头的同时能充分保证口腔内一侧的治疗空间。

[0014] 本发明是一种能使从咽喉涌出的唾液能被迅速吸除并排到外部，减少因唾液引起的异物感的舌头保护装置、牙垫及口腔照明的设备。

[0015] 本发明是利用患者口腔一侧的上下牙齿咬住牙垫使口腔张开，同时利用插入牙垫内部的光源对口腔内部直接照明的舌头保护装置、牙垫及口腔照明设备。

[0016] 本发明是一个舌头保护装置与牙垫相互分离的舌头保护装置、牙垫及口腔照明设备。

[0017] 本发明在治疗时能对口腔内部进行杀菌，可以为医生、患者提供拍摄治疗过程的舌头保护装置、牙垫及口腔照明设备。

[0018] 本发明的目的并不只限于上述提及的目的，未提及的其他目的通过以下内容本领域的技术人员将能够清楚理解。

[0019] 为了达到上述目的，本发明的技术方案是这样实现的：一种舌头保护装置、牙垫及口腔照明设备，包括由口腔内一侧的上下牙齿咬住并能打开口腔的牙垫和舌头保护装置，舌头保护装置一端与所述牙垫连接，另一端护住舌头并向舌根部延伸，在牙科治疗时可以保护舌头。

[0020] 在实施过程中所述舌头保护装置包括牙垫连接部、装置主体和舌头保护部位，与所述牙垫相连接的部位为牙垫连接部，从所述牙垫连接部向口腔内舌头另一侧的舌根部弯曲延长构成装置主体，装置主体的一侧面由上向下延长护住舌头的一侧为舌头保护部位。

[0021] 在实施过程中所述舌头保护部位主要实现对舌尖部的保护，把舌头与口腔内部另一侧的牙齿分开，保护舌头。

[0022] 在实施过程中所述舌头保护装置的另一端是以假想的延长轴为中心护住舌头的一侧面并以一定的角度弯曲延长。

[0023] 在实施过程中所述舌头保护装置的一端到另一端设有通孔，且通孔中装有唾液吸管，用于吸除从咽喉涌到口腔内另一侧舌根处的唾液。

[0024] 在实施过程中所述唾液吸管可以是由几个唾液吸管组合而成。

[0025] 本发明中所述牙垫包括通过口腔内的一侧牙齿咬住打开口腔的牙垫主体，在所述牙垫主体一端穿孔成为插入外部光源的光源插入孔，所述牙垫主体位于口腔内部分的一侧面上设有装置连接孔，所述舌头保护装置通过装置连接孔与所述牙垫主体连接，所述牙垫主体上的装置连接孔与所述光源插入孔连通形成唾液传递孔，传递管从唾液传递孔中穿过，通过唾液吸管吸入的唾液经传递管传递到外部的吸入排管。

[0026] 在实施过程中所述牙垫的装置连接孔为多数个且相互分离，所述唾液传递管分别穿过装置连接孔，唾液传递管为多数个且相互分离。

[0027] 在实施过程中所述装置连接孔分为第1连接孔和第2连接孔两个连接孔，所述唾液传递管包括分别连接所述第1装置连接孔和第2装置连接孔的第1唾液传递管和第2唾液传递管。

[0028] 在实施过程中所述舌头保护装置的装置连接孔为至少一个且相互分离，所述唾液传递管能同时被连接入所述装置连接孔。

[0029] 在实施过程中所述牙垫的装置连接孔是相互分离的，有第1装置连接孔和第2装置连接孔两个连接孔。

[0030] 在实施过程中所述牙垫主体的上部和下部设有依据牙齿咬住时的形状做成的凹凸状的凹槽。

[0031] 在实施过程中所述凹槽处有为了防止上下牙齿打滑形成的突起。

[0032] 在实施过程中所述突起是在凹槽的底部。

[0033] 在实施过程中所述牙垫主体是由能使光源透过的透明材料制成的。

[0034] 并且，本发明还包括具备光源的机头，光源连接在所述机头的一端，为了使所述光源的光传递到口腔内部，所述机头带光源的一端插入利用口腔内一侧牙齿咬住并打开口腔的牙垫中构成口腔照明器械，牙垫的另一侧面上是护住一侧舌头并向另一侧舌根部延长的舌头保护装置的。

[0035] 在实施过程中所述舌头保护装置包括与所述牙垫连接的牙垫连接部，从所述连接部位向口腔内部另一侧舌根弯曲延长的舌头保护装置主体和从舌头保护装置主体的一侧向下延长护住舌头的一侧面的舌头保护部位。

[0036] 在实施过程中所述舌头保护装置着重保护舌尖，把舌头与口腔内的另一侧牙齿隔开。

[0037] 在实施过程中所述舌头保护装置的另一端是以假想的延长轴为中心护住舌头的一侧面并以一定的角度弯曲延长。

[0038] 在实施过程中所述舌头保护装置的一端到另一端被穿孔打通，且孔中装有唾液吸管，用于吸除从咽喉涌到口腔内另一侧舌根处的唾液。

[0039] 在实施过程中所述唾液吸管可以是多数个唾液吸管。

[0040] 在实施过程中所述牙垫包括所述插入光源的光源插入孔和在所述牙垫主体的一侧穿孔形成的与所述舌头保护装置连接的装置连接孔。

[0041] 在实施过程中所述机头的一端与另一端之间被穿孔打通，通孔中装有与外部吸入器相连的吸入排管，所述吸入排管穿过所述牙垫上的装置连接孔，吸入的唾液经装置连接孔和传递管传递到吸入排管。

[0042] 在实施过程中所述装置连接孔是多数个装置连接孔，且是相互分离的，所述唾液传递管是通过装置连接孔相互分离的多数个唾液传递管。

[0043] 在实施过程中所述吸入排管可以多数个，并且是相互分离的，所述唾液传递管分别与所述吸入排管连接。

[0044] 在实施过程中所述吸入排管分为第1吸入排管和第2吸入排管两个吸入排管。所述装置连接孔分为第1装置连接孔和第2连接孔两个装置连接孔。所述唾液传递管分别连接第1吸入排管和第2吸入排管，第1唾液传递管和第2唾液传递管穿过所述第1装置连接孔和第2装置连接孔。

- [0045] 在实施过程中所述装置连接孔可以是多数个，并且是相互分离的，所述唾液传递管可以同时穿过装置连接孔。
- [0046] 在实施过程中所述牙垫主体的上部和下部有所述得便于上下牙齿咬住的凹槽。
- [0047] 在实施过程中所述凹槽上有为了防止上下牙齿打滑的突起。
- [0048] 在实施过程中所述突起是在凹槽的底部。
- [0049] 在实施过程中所述机头包括控制所述吸入排管开闭的阀门。
- [0050] 在实施过程中所述阀门位于所述机头内部与所述吸入排管同时设置，并能对所述装置连接孔进行选择性的开闭。
- [0051] 在实施过程中所述机头还包括了驱动所述开闭阀门的阀门驱动杠杆。
- [0052] 在实施过程中所述机头的外部的某一特定部分上有控制光源的光源开关。
- [0053] 在实施过程中所述光源的开关为触摸开关。
- [0054] 在实施过程中所述牙垫是能使光源的光透过的透明的牙垫。
- [0055] 在实施过程中所述光源是 LED 光源。
- [0056] 在实施过程中所述机头的某一特定部分上设置了在口腔内部放射紫外线的紫外线灯。
- [0057] 在实施过程中所述光源中包括所述紫外线灯。
- [0058] 在实施过程中所述机头的某一特定部分上还包括了能取得口腔 内部治疗影像的摄像头。
- [0059] 在实施过程中上述摄像头包括在上述光源中。
- [0060] 本发明的有益效果：
- [0061] 首先，有了本发明的舌头保护装置、牙垫和口腔照明设备使得患者的舌头不会再被向口腔后方挤压，舌头的侧面受到保护，把舌头与治疗部位分离，使患者的舌头在安全的状态下接受牙科治疗。
- [0062] 本发明的舌头保护装置、牙垫和口腔照明设备可以利用舌头保护装置把患者的舌头隔离在需要治疗的口腔内的另一侧，充分保证口腔内牙齿治疗的空间，便于医生进行治疗。
- [0063] 本发明舌头保护装置、牙垫和口腔照明设备中的舌头保护装置向一侧舌根延长，在唾液涌到舌头前部之前可以把从咽喉部涌向舌根的唾液吸除，减小因唾液产生的异物感。
- [0064] 本发明的舌头保护装置、牙垫和口腔照明设备中舌头保护装置，牙垫和机头相互分离，利用洗涤剂可以使整个设备保持清洁，防止患者发生二次感染。
- [0065] 本发明的舌头保护装置、牙垫和口腔照明设备中利用紫外线可以减少治疗时发生的细菌感染。
- [0066] 本发明的舌头保护装置、牙垫和口腔照明设备中利用摄像头能取得治疗时的影像，能为医生和患者提供治疗的过程。
- [0067] [77]

附图说明

- [0068] 图 1 是传统口腔照明设备的示意图；

[0069] 图 2 是传统口腔照明设备在口腔内使用的示意图；
[0070] 图 3 是传统口腔照明设备吸除唾液过程的示意图；
[0071] 图 4 是本发明使用时舌头保护装置上表面的示意图；
[0072] 图 5 是本发明使用时舌头保护装置下表面的示意图；
[0073] 图 6 是本发明使用时舌头保护装置吸除唾液过程的说明示意图；
[0074] 图 7 是本发明使用时口腔照明设备的示意图；
[0075] 图 8 是本发明使用时口腔照明设备的分解图；
[0076] 图 9 是本发明在口腔内使用的说明示意图；
[0077] 图中：100 舌头保护装置，110 牙垫连接部位，120 装置主体，130 舌头保护部位，140 唾液吸管，200 牙垫，210 牙垫主体，211 光源插入孔，212 舌头保护装置连接孔，213 唾液传递管，214 凹槽，215 突起，300 机头，310 光源，320 光源开关，330 吸入排管，331 第 1 吸入排管，332 第 2 吸入排管，340 阀门，341 第 1 阀门孔，342 第 2 阀门孔，350 阀门驱动杠杆，360 唾液排出管。

具体实施方式

[0078] 本发明中使用的用语尽可能选择现在广泛使用的一般用语，特定情况下有申请人任意选择使用的用语，但此种情况并非单纯的名称用语，而是为了详细说明发明的某部分或充分考虑了用语的语义。

[0079] 以下，参照附图对本发明的技术构成作详细的说明。

[0080] 但本发明并不局限于此处说明的用途，还可有其他具体化的形态。在整个说明书中，相同的编号对应同一个部位。

[0081] 图 4 是本发明使用时舌头保护装置上面的示范图，图 5 是本发明使用时舌头保护装置下面的示范图，图 6 是本发明使用时唾液吸除过程的说明图。

[0082] 参照示意图本发明实施时舌头保护装置 100 是安装在打开口腔的在口腔内用一侧上下牙齿咬住的牙垫 200 上，在治疗时起到保护舌头的作用。

[0083] 所述舌头保护装置 100 的一端 100a 连接所述牙垫 200，另一端 100b 护住舌头 2 的一个侧面 2a 向口腔内的另一侧舌根 2b 方向延长。

[0084] 即所述舌头保护装置 100 从口腔内的一侧牙齿向另一侧舌根 2b 方向呈流线型弯曲的形态。

[0085] 传统口腔照明设备中的舌头保护部分 20 是通过把舌头从上往下按，把舌头向后方压迫来是实现的，而本发明中的舌头保护装置 100 是通过护住舌头 2 的一个侧面 2a 同时向口腔内一侧靠拢并隔离，充分保证口腔内另一侧牙齿治疗的空间。

[0086] 这样，医生就能够更加方便的为患者进行口腔内部治疗，患者的舌头不再受到压迫能在安全舒适的状态下接受治疗。

[0087] 传统的口腔照明设备的舌头保护部分 20 是从上向下把舌头压迫向口腔后方，患者的舌头 2 不能活动，本发明在使用中舌头保护装置 100 护住舌头 2 的一侧面 2a 使得舌头 2 靠向另一侧能安全的活动。

[0088] 所述舌头保护装置 100 在一端 100a 形成与所述牙垫 200 连接的牙垫连接部 110，装置主体 120 从所述牙垫连接部 110 向口腔内的另一侧舌根 2b 弯曲延长，舌头保护部位

130 是从所述装置主体 120 的一侧向下延长, 护住舌头 2 的一侧面 2a。

[0089] 所述舌头保护部位 130 能着重保护舌头 2 的舌尖 2c, 确保患者的门牙和口腔内另一侧牙齿的治疗空间。

[0090] 所述舌头保护装置 100 一端 100a 到另一端 100b 被打通穿孔, 孔内装有吸除涌到上述口腔内的另一侧舌根 2b 处唾液的唾液吸管 140。

[0091] 所述唾液吸管 140 可以是多数个。

[0092] 所述唾液吸管 140 是从所述舌头保护装置 100 的另一端 100b 向所述舌头保护装置 100 的一端 100a 传递唾液。

[0093] 本发明中舌头保护装置 100 的使用如图 6 所示, 能及时吸除涌到口腔内另一侧舌根 2b 处的唾液。

[0094] 因此, 与传统的口腔照明设备的吸入细孔 23 比较, 本发明中唾液吸管 140 由于直接吸入唾液 1 而没有吸力的损失, 使得唾液 1 在涌到舌头 2 的前面之前在舌根处被迅速吸除, 最大限度减少因唾液使患者产生的异物感。

[0095] 所述舌头保护装置 100 的另一端 110b 是以假想的延长轴 a 为中心护住上述舌头 2 的一侧面 2a 并以一定的角度 α 弯曲延长。

[0096] 因此所述舌头保护装置 100 能保护到上述舌头 2 的一侧面 2a 的下部。

[0097] 图 7 是本发明口腔照明设备的示意图, 图 8 是本发明口腔照明设备的分解图, 图 9 是本发明口腔照明设备在口腔内使用时的说明示意图。

[0098] 参照图示本发明的口腔照明设备是由机头 300, 牙垫 200 和舌头保护装置 100 构成。

[0099] 所述机头 300 一端设有光源 310, 所述光源 310 是从牙垫 200 的一端处插入固定的, 能直接对口腔内部照明。

[0100] 在所述机头 300 上某一特定部位处装有所述光源 310 的光源开关 320。

[0101] 光源开关 320 是触摸开关, 用手碰触一次光源开关 320 则所述光源 310 打开, 再碰触一次光源开关 320 则所述光源 310 关闭。

[0102] 所述光源开关 320 可以是各种开关装置。

[0103] 所述光源 310 包含多数个 LED 光源, 从所述牙垫 200 一端插入形成面光源, 在口腔内部照明能减少阴影。

[0104] 所述光源 310 中还包含与 LED 光源连接的照射口腔内部可以对治疗时产生的细菌起到杀菌作用的紫外线灯 (没有图示)。

[0105] 所述紫外线灯要能在口腔内部照射紫外线的话可以安装在所述机头 300 的任何部位。

[0106] 所述光源 310 中还包含取得口腔内部治疗影像的摄像头 (没有图示), 使得医生和患者能在事后看到治疗时的影像确保了对治疗的信赖。

[0107] 所述摄像头要能在口腔内部摄像可以设置在所述机头 300 的任何部位, 本发明中所述机头 300 上的摄像头能有效的取得治疗影像。

[0108] 在所述机头 300 的一端到另一端被打通穿孔, 通孔中装有吸入排管 330, 吸入排管 330 是将唾液传递到外部的吸入机 (没有图示)。

[0109] 所述机头 300 内部有控制所述吸入排管 330 开闭的阀门 340, 在所述机头 300 的

外部有驱动上述阀门 340 的阀门杠杆 350。

[0110] 具体来说,所述吸入排管 330 包括相互分离的第 1 吸入排管 (331) 和第 2 吸入排管 (332) 两个吸入排管,所述第 1、2 吸入排管 (331, 332) 上同时设置上述阀门 340, 阀门 340 是具有选择性的使上述第 1、2 吸入排管 (331, 332) 单独开关的开关阀门。

[0111] 所述阀门 340 位于机头 300 上的穿孔内, 阀门 340 分别与所述第 1 吸入排管 331 和第 2 吸入排管 332 连接并形成第 1 阀门孔 341 和第 2 阀门孔 342。

[0112] 即所述第 1 阀门孔 341 将所述第 1 吸入排管 331 打开时, 所述第 2 吸入排管 332 关闭, 所述第 2 阀门孔 342 将所述第 2 吸入排管 332 打开时, 所述第 1 吸入排管 331 关闭, 所述阀门 340 驱动杠杆 350 可以选择性的开关上述第 1、2 吸入排管 (331, 332)。

[0113] 所述阀门 340 在第 1 吸入排管 331 和第 2 吸入排管 332 上分别设置一个阀门, 所述阀门驱动杠杆 350 包括分别驱动上述两个阀门的两个驱动杠杆。

[0114] 所述吸入排管 (331, 332) 在所述阀门 340 和所述外部的吸入器 (没有图示) 之间相互合并, 使得所述外部的吸入器 (没有图示) 能有效的吸除唾液。

[0115] 但所述吸入排管 (331, 332) 可以分别与所述外部的吸入器 (没有图示) 连接。

[0116] 所述牙垫 200 是通过口腔内一侧的上下牙齿咬住打开口腔的, 口腔内一侧上下牙齿咬住的是牙垫主体 210。

[0117] 在所述牙垫主体 210 的一端上穿孔形成所述光源 310 插入的光源插入孔 211。

[0118] 具体来说, 所述光源插入孔 211 是在患者咬住所述牙垫主体时从口腔前方能看见的牙垫主体一端上的穿孔。

[0119] 所述牙垫主体 210 是用高透明材质制成, 从所述光源插入孔 211 插入的光源 310 能向牙垫主体 210 外部透光。

[0120] 患者咬住所述牙垫主体 210 时口腔内侧是与所述舌头保护装置 100 连接的装置连接孔 212。

[0121] 所述牙垫主体 210 上与所述光源插入孔 211 位于同一端的并与所述光源插入孔 211 相分离的唾液传递孔与所述装置连接孔 212 相连通, 唾液传递管 213 从上述唾液传递孔和装置连接孔 212 中穿过。

[0122] 所述装置连接孔 212 是相互分离的多数个装置连接孔, 更具体的说是有可以分别与舌头保护装置 100 连接的第 1 装置连接孔 212a 和第 2 装置连接孔 212b 两个连接孔。

[0123] 所述唾液传递管 213 是相互分离的, 包括穿过所述牙垫主体 210 的一端和所述装置连接孔 (212a, 212b) 的两个唾液传递管 (213a, 213b)。

[0124] 但其中一根上述唾液传递管 213 可以从所述装置连接孔 (212a, 212b) 处分开连接。

[0125] 所述各唾液传递管 (213a, 213b) 的一端是与所述机头 300 的吸入排管 (331, 332) 相互咬合连接, 另一端与所述舌头保护装置 100 的唾液吸入管 140 连接。

[0126] 即口腔内的唾液 1 由所述舌头保护装置 100 的唾液吸管 140 吸入, 通过所述牙垫 200 的唾液传递管 213 向所述机头 300 的吸入排管传递, 最后吸至外部的吸入器 (没有图示)。

[0127] 具体来说, 所述吸入排管 330 和所述外部的吸入器 (没有图示) 靠唾液排出管 360 连接, 传递到所述吸入排管 330 的唾液经过唾液排出管 360, 向外部吸入器 (没有图

示) 排出。

[0128] 所述唾液排出管 360 和所述吸入排管 330 可以是相同的排管。

[0129] 所述牙垫主体 210 的上部和下部是患者上下牙齿咬住的凹槽 214，凹槽 214 的底部有防止上下牙齿打滑的突起 215。

[0130] 所述牙垫主体 210 在患者用上下牙齿咬住的状态下不能前后左右移动，不会从牙齿中脱落，所述光源 310 可以安全的在口腔内进行照明。

[0131] 所述舌头保护装置 100 参照图 4 至图 6 的说明，此处省略。

[0132] 以上是对本发明图示的说明，在上述说明的基础上在此技术领域的技术人员可以对本发明进行多种多样的变化和修改。

[0133] 生产利用的可能性

[0134] 本发明是具有唾液吸除功能的舌头保护装置、牙垫和口腔照明设备，在医疗领域特别是牙科和五官科对患者进行口腔内部治疗时可以使治疗安全有效的进行。

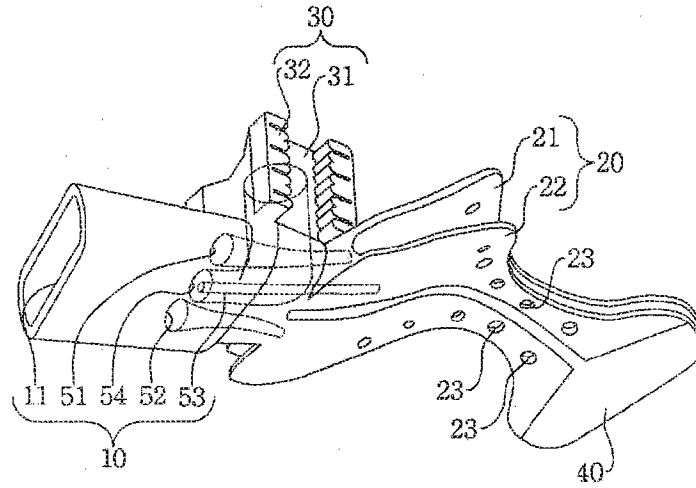


图 1

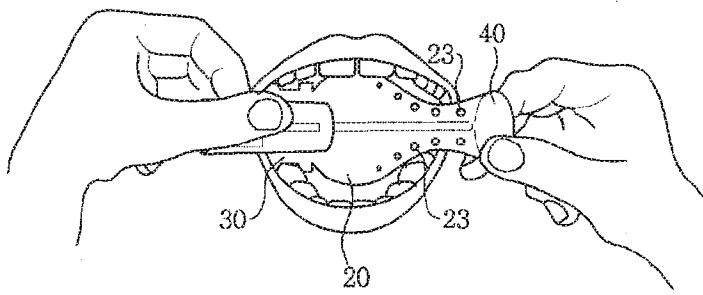


图 2

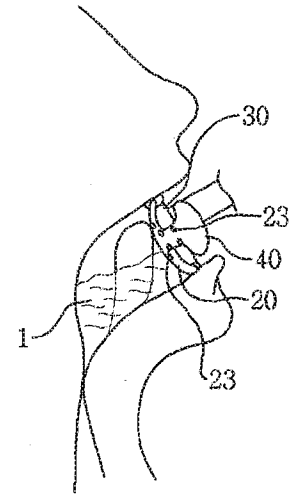


图 3

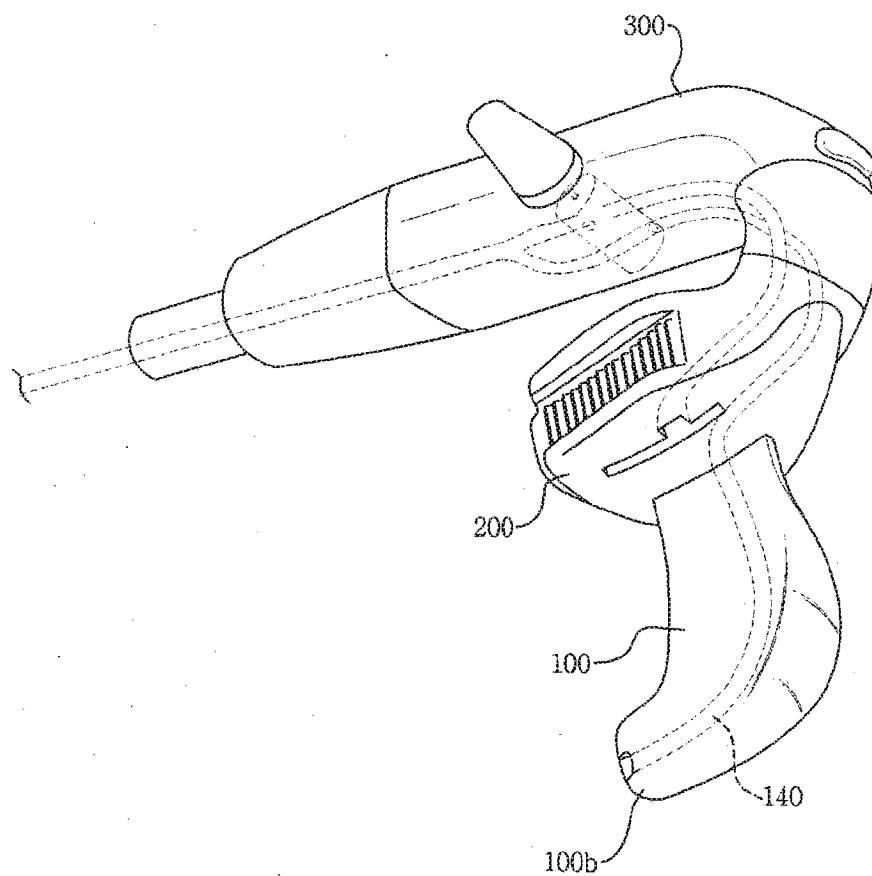


图 7

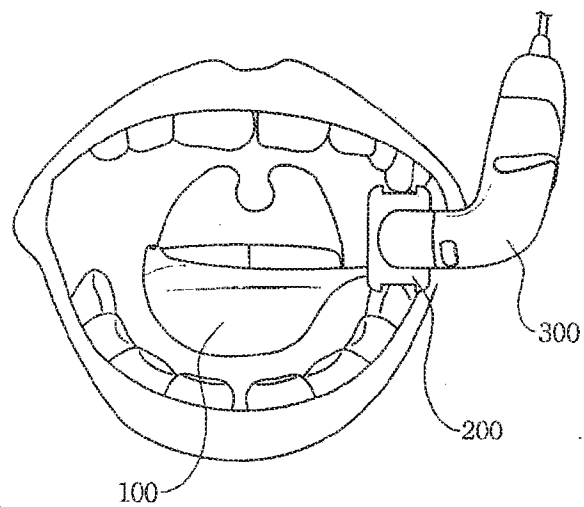


图 9



Espacenet

Bibliographic data: CN102247140 (A) — 2011-11-23

Multifunctional electrocardio examining table

Inventor(s): QUANYUN CAI; GUOTIAN YIN; RUOYI DONG; XIAOJING WANG
± (CAI QUANYUN, ; YIN GUOTIAN, ; DONG RUOYI, ; WANG XIAOJING)

Applicant(s): THIRD HOSPITAL XINXIANG MEDICAL UNIVERSITY ± (THE
THIRD HOSPITAL XINXIANG MEDICAL UNIVERSITY)

Classification: - **international:** **A61B5/0402**
- **cooperative:**

Application number: CN2011179077 20110324 Global Dossier

Priority number (s): CN2011179077 20110324

Abstract of CN102247140 (A)

The invention provides a multifunctional electrocardio examining table, aiming to provide a multifunctional electrocardio examining table with high examination efficiency and low labor intensity. The technical scheme of the invention is that: the multifunctional electrocardio examining table comprises a table board and a connected electrode, wherein a lower limb connected electrode plate exposed to the table board is arranged on the front and the back sides of the table board at the right end respectively; two connected electrode plates which are exposed to the table board and opposite to the lower part of the upper limb of an examined person are also arranged on the table board; four hollow screws penetrate through table board holes and are connected with upper and lower limb connected electrode plates respectively; four connected wires penetrate through the hollow screws and are connected with the upper and the lower limb connected electrode plates respectively; a stand is arranged on the front side at the left end of the table board, and two hanging hooks are arranged on the top of the stand; and the upper and the lower limb connected wires and a chest connected wire are arranged on the lower surface of the table board, and the chest connected wire is extracted from the front side at the left end of the table board and hung on the two hanging hooks on the top of the stand. The multifunctional electrocardio examining table is particularly suitable for physical examination of large sample crowds.



(12) 发明专利申请

(10) 申请公布号 CN 102247140 A

(43) 申请公布日 2011. 11. 23

(21) 申请号 201110079077. 9

(22) 申请日 2011. 03. 24

(71) 申请人 新乡医学院第三附属医院

地址 453003 河南省新乡市华兰大道东段新
乡医学院第三附属医院

(72) 发明人 蔡全云 殷国田 董若怡 王晓静

(74) 专利代理机构 新乡市平原专利有限责任公
司 41107

代理人 毋致善

(51) Int. Cl.

A61B 5/0402 (2006. 01)

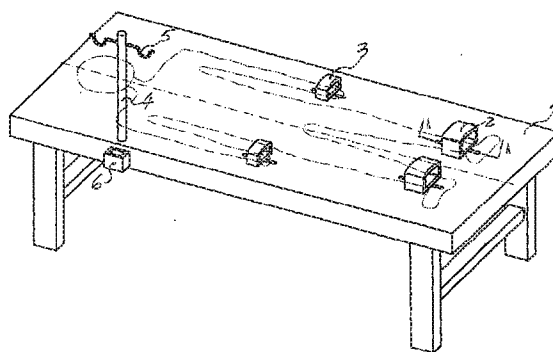
权利要求书 1 页 说明书 2 页 附图 1 页

(54) 发明名称

一种心电多功能检查床

(57) 摘要

一种心电多功能检查床, 本发明目的是提供一种检查效率高、劳动强度低心电多功能检查床。实现发明目的的技术方案是, 一种心电多功能检查床, 包括床板和导联电极, 在床板右端的前后床板上各设一个外露于床板的下肢导联电极板, 在床板上还设有两个外露于床板且与受测人员上肢下部相对的导联电极板, 四个空心螺钉穿于床板孔分别与上述的上、下肢导联电极板连接, 四条导联线穿于所述空心螺钉中与所述上、下肢导联电极板连接, 在床板左端的前侧设有一支架, 支架的顶部设有两个挂钩; 上、下肢导联线和胸部的导联线设在床板的下表面上, 其中胸部导联线由床板左端前侧引出后挂在所述支架顶部的两挂钩上。本发明特别适合大样本人群的健康体检。



1. 一种心电多功能检查床,包括床板和导联电极,其特征在于:在床板右端的前后床板上各设一个外露于床板的下肢导联电极板,在床板上还设有两个外露于床板且与受测人员上肢下部相对的导联电极板,四个空心螺钉穿于床板孔分别与上述的上、下肢导联电极板连接,四条导联线穿于所述空心螺钉中与所述上、下肢导联电极板连接,在床板左端的前侧设有一支架,支架的顶部设有两个挂钩;上、下肢导联线和胸部的导联线设在床板的下表面上,其中胸部导联线由床板左端前侧引出后挂在所述支架顶部的两挂钩上。

2. 如权利要求1所述的一种心电多功能检查床,其特征在于:所述上、下肢导联电极板为弧形面。

3. 如权利要求1或3所述的一种心电多功能检查床,其特征在于:在床板左端的前侧板上设有盛导电糊盒。

一种心电多功能检查床

技术领域：

[0001] 本发明涉及一种医用检查床，特别是一种心电多功能检查床。

背景技术：

[0002] 现有心电图检查床在检查心脏功能时，受检者躺在床上，检查医生将两个下肢导联电极夹分别夹在受检者的左、右下肢体上，再将两个上肢导联电极夹夹在其左、右上肢体上，最后将六个胸部导联电极吸盘分别吸到受检者胸部的指定位置上后，即可开机对受检者心脏的生物电信号进行采集并打印出心电图，由医生对受检者的心电信号进行分析作出结论。上述四个上下肢导联电极夹，每作一次需上夹和取夹八个动作，耗时长劳动强度大，特别是大样本人群健康体检时，其缺点尤为突出；此外，10个导联电极板的导联连线较长，而且各个导联线极易发生缠绕，如果出现缠绕需进行整理，否则容易发生导联错误连接，出现误接误判现象。

发明内容：

[0003] 本发明目的是提供一种检查效率高、劳动强度低和导联线不易缠绕的一种心电多功能检查床。本发明实现发明目的的技术方案是，一种心电多功能检查床，包括床板和导联电极，其特征在于：在床板右端的前后床板上各设一个外露于床板的下肢导联电极板，在床板上还设有两个外露于床板且与受测人员上肢下部相对的导联电极板，四个空心螺钉穿于床板孔分别与上述的上、下肢导联电极板连接，四条导联线穿于所述空心螺钉中与所述上、下肢导联电极板连接，在床板左端的前侧设有一支架，支架的顶部设有两个挂钩；上、下肢导联线和胸部的导联线设在床板的下表面上，其中胸部导联线由床板左端前侧引出后挂在所述支架顶部的两挂钩上。一种心电多功能检查床，其特征在于：所述上、下肢导联电极板为弧形面。一种心电多功能检查床，其特征在于：在床板左端的前侧板上设有盛导电糊盒。本发明与现有技术比较具有效率高和劳动强度低及避免导联线错误连接，且导联线不易缠绕的显著优点。

附图说明：

[0004] 图1是本发明的立体结构示意图，图2是图1的A-A局部剖视图。

具体实施方式：

[0005] 结合以下实施例对本发明作详细说明，在床板1右端部的前后两侧各设有一外露于床板的下肢导联电极板2，此电极板的表面呈弧形面，可避免电极板表面的棱角对受测人员产生的不舒服感，在床板的下肢导联电极板的上方设有两个与受测人员上肢相对的上肢导联电极板3，此上肢导联电极板的上表面呈弧形面外露于床板的上表面，上述下肢导联电极板和上肢导联电极板与空心螺钉7连接，此空心螺钉穿于床板的孔内，在床板下表面下方的空心螺钉上套设有元宝螺帽8，两条下肢导联线和两条上肢导联线分别穿在上述四个

空心螺钉的孔中与两个下肢导联电极板和两个上肢导联电极板连接。上述四个导联电极板用导电性能好的材料如铜合金制作,其表面上设有涂覆银层。为了适应个别身高特高或者过低人员进行检查,可将穿空心螺钉的床板孔制成长孔,以便于移动电极板,在床板的左部的前侧设有一支架 4,支架的顶部设有两个挂钩 5,三个胸部导联电极吸盘和三个左胸部导联电极吸盘的导联线分别挂在上述支架顶部的两个挂钩上。上述上、下肢导联线和左右胸部导联线设在床板的下表面上,其中左右胸部导联线从床板的左端前侧引出吊挂在支架的挂钩上。在床板左端的前侧板上设有盛导电糊盒 6,方便操作医生向四个肢体导联电极板以及受检测人员涂抹导电糊(或其它湿润液)。

[0006] 本发明的操作原理,受测人员从床板的后侧躺在床板上,直接将左、右上、下肢下部的裸露处置于各上、下肢导联电极板上,操作医生将六个左、右胸部导联电极吸盘吸在受测人员胸部的指定部位上后,即可启动仪器进行各种心电监测,检测结束时,只需将六个胸部导联电极吸盘从受测人员身上取下即可,省去了肢体电极夹的上、下动作,减轻了劳动强度,提高了效率。本发明检查床适用于检查常规心电图和检查心电向量图,还可以用于检查心率变异分析、高频心电检测和 Q-T 离散检测,本发明特别适合大样本人群的健康体检。

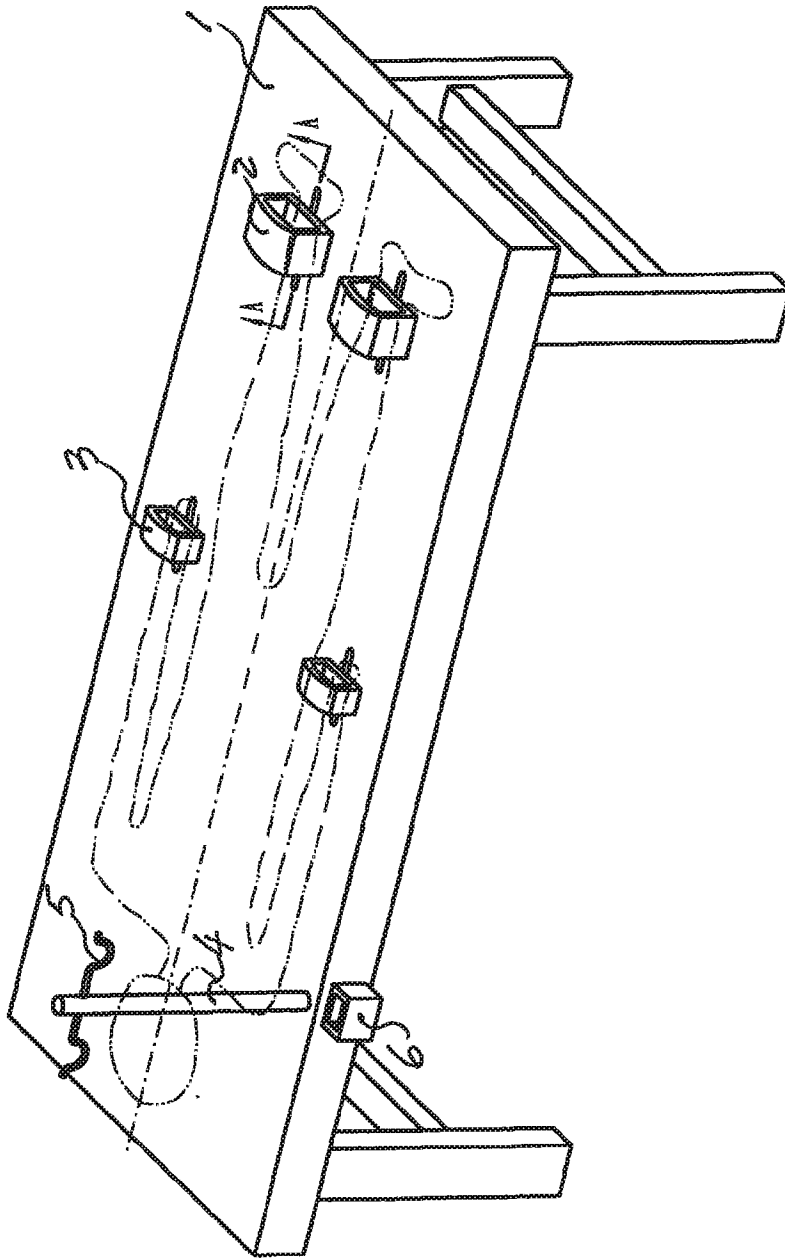


图 1

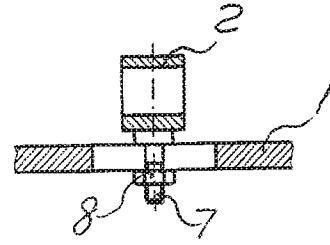


图 2

[Home](#) [About sipo](#) [News](#) [Law&policy](#) [Special topic](#)

SITE SEARCH



Intraoral dental suction and isolation system

Application Number	201480009991	Application Date	2014.04.03
Publication Number	105578888A	Publication Date	2018.05.11
Priority Information	2013/12/9 US 14/100,323		
International Classification	A61C17/00;A61C17/08		
Applicant(s) Name	INCEPT INC		
Address			
Inventor(s) Name	NGUYEN THIEN,PHAM TAM THANH		
Patent Agency Code	11105	Patent Agent	

Abstract

A dental mouthpiece is provided that may be attached to a high-suction dental adapter for the purpose of assisting the dental staff during dental procedures through chair-side, hands-free suction, and isolation. Such a mouthpiece may comprise a main body portion, a cheek retractor portion, and a suction connector portion. In some embodiments, the main body portion, cheek retractor portion, and suction connector portion (and sub-portions thereof) may be molded in one piece, preferably by injection molding. In an exemplary embodiment, the mouthpiece may be made of a material that is flexible, translucent, conducive to injection molding, high heat-resistant, and autoclavable. Such a material may include silicone. Because the mouthpiece may be made of a high heat-resistant and autoclavable material, such a mouthpiece may be reusable.

[Machine Translation](#)[Close](#)[SITE MAP](#) | [CONTACT US](#) | [PRODUCTS&SERVICES](#) | [RELATED LINKS](#)

Copyright © 2007 SIPO, All Rights Reserved



(12) 发明专利申请

(10) 申请公布号 CN 105578986 A

(43) 申请公布日 2016. 05. 11

(21) 申请号 201480039991. 2

代理人 郝娟君

(22) 申请日 2014. 04. 03

(51) Int. Cl.

(30) 优先权数据

14/100, 323 2013. 12. 09 US

A61C 17/00(2006. 01)

A61C 17/06(2006. 01)

(85) PCT国际申请进入国家阶段日

2016. 01. 13

(86) PCT国际申请的申请数据

PCT/US2014/032892 2014. 04. 03

(87) PCT国际申请的公布数据

W02015/088577 EN 2015. 06. 18

(71) 申请人 因赛普特股份有限公司

地址 美国加利福尼亚州

(72) 发明人 T. 古延 T. T. 法姆

(74) 专利代理机构 北京市柳沈律师事务所

11105

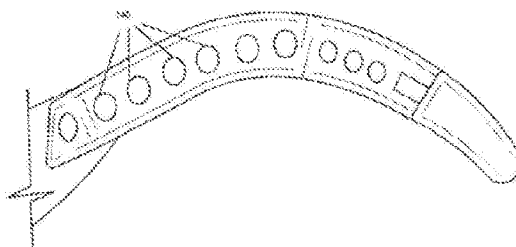
权利要求书1页 说明书4页 附图8页

(54) 发明名称

口内牙科抽吸和隔离系统

(57) 摘要

本发明提供了一种牙科口腔件,其可附接到高抽吸牙科转接器以便在牙科手术期间通过椅旁免提抽吸和隔离来帮助牙科工作人员。这种口腔件可包括主体部分、颊牵开器部分以及抽吸连接器部分。在一些实施方案中,所述主体部分、颊牵开器部分以及抽吸连接器部分(及其子部分)可优选通过注射成型模制成单件。在示例性实施方案中,所述口腔件可以由柔性、半透明、有助于注射成型、高耐热性且高压灭菌的材料制成。这种材料可包含硅酮。因为所述口腔件可以由高耐热且高压灭菌的材料制成,所以这种口腔件可以重复使用。



1. 一种由材料构成的牙科口腔件,所述牙科口腔件包括:

主体部分,所述主体部分包括具有前壁、后壁以及在所述前壁与所述后壁之间的侧壁的限定凹腔,其中所述前壁、所述后壁以及所述侧壁限定所述限定凹腔的内部部分;

颊牵开器部分,所述颊牵开器部分被配置来当被放置在患者的口腔中时压靠所述患者的脸颊,其中所述材料的弹性导致所述颊牵开器部分使所述患者的脸颊缩进而远离所述患者的牙齿;以及

抽吸连接器部分,所述抽吸连接器部分用于将所述主体部分的所述内部部分连接到真空抽吸源。

2. 根据权利要求1所述的口腔件,其中所述侧壁包括多个穿孔。

3. 根据权利要求1所述的口腔件,其中所述前壁和所述后壁各自包括多个穿孔。

4. 根据权利要求1所述的口腔件,其中所述前壁还包括沿中心轴线的狭缝。

5. 根据权利要求1所述的口腔件,其还包括从所述后壁的内表面突出的稳定杆,其中所述稳定杆的厚度使所述颊牵开器部分在弯曲过程中的弹性增加。

6. 根据权利要求1所述的口腔件,其中所述主体部分、所述颊牵开器部分以及所述抽吸连接器部分注射成型为单件。

7. 根据权利要求1所述的口腔件,其中在所述注射成型中使用的所述材料是柔性、半透明、高耐热、高压灭菌的硅酮基材料。

8. 根据权利要求1所述的口腔件,其还包括从所述后壁的内表面突出的桥接结构,所述桥接结构包括在抽吸期间保持所述前壁与所述后壁分离的多个隔开的接触点。

9. 根据权利要求8所述的口腔件,其中所述桥接结构从所述后壁的所述内表面以波形突出,并且其中所述接触点是在所述波形的波峰处。

10. 根据权利要求9所述的口腔件,其中所述波形的波谷被配置成允许穿过所述桥接结构的抽吸。

11. 根据权利要求1所述的口腔件,其中所述抽吸连接器部分包括有助于定位真空抽吸源或真空转接器的内部止挡件。

12. 根据权利要求1所述的口腔件,其还包括可拆卸的口腔支撑件。

13. 根据权利要求12所述的口腔件,其中所述可拆卸的口腔支撑件包括被配置来配合在所述抽吸连接器部分周围的绑带,其中所述抽吸连接器部分的外表面包括对应于所述绑带的缺口区,并且其中当所述绑带处于所述缺口区中时,所述绑带的外表面与所述抽吸连接器部分的剩余外表面基本上齐平。

14. 根据权利要求13所述的口腔件,其中所述绑带与所述口腔支撑件注射成型为单件。

15. 根据权利要求1所述的口腔件,其中所述抽吸连接器部分还包括对应于与所述绑带相关联的口腔支撑件中的开口的外部插塞凸起。

16. 根据权利要求15所述的口腔件,其中所述插塞凸起配合到所述开口中以便在被所述患者咬住时提供附加的抗压性和减少的压缩性。

17. 根据权利要求1所述的口腔件,其中所述抽吸连接器部分包括对应于真空转接器上的凸起的保险开关以用于联锁配合。

18. 根据权利要求1所述的口腔件,其中所述前壁和所述后壁具有不同的厚度。

口内牙科抽吸和隔离系统

技术领域

[0001] 本发明总体上涉及牙科口腔件领域。更具体地说,本发明涉及口内牙科抽吸和隔离口腔件。

背景技术

[0002] 当前,牙科领域的牙科健康专业人员、牙科保健员以及牙科助理使用各种口腔件。在过去,由包括牙科专业人员和牙科助手的传统二人团队对牙科患者进行治疗。此外,所述团队可以使用许多不同类型的牙科设备和材料来提供牙科治疗。此类牙科设备和材料可包括以下物品:如口腔镜、牙垫、慢速抽吸喷射器、高速抽吸喷射器、纱布、棉卷和干燥角状物。牙科设备的每种物品可用于不同目的,但一些物品可以组合使用以用于一些类型的牙科服务。由此,试图提供此类牙科服务的牙科专业人员可能需要使用此类牙科设备的多种物品。因此,牙科助理的一个重要的任务是帮助牙科专业人员协调不同设备和材料的这些多个物品的使用。

[0003] 因此,本领域中需要以更高效、更舒适且更安全的方式为牙科患者提供牙科服务的改进的系统和方法。

发明内容

[0004] 本发明的实施方案可包括一种口腔件,所述口腔件可附接到高抽吸牙科转接器以便在牙科手术期间通过椅旁免提抽吸和隔离来帮助牙科工作人员。这种口腔件可包括主体部分、颊牵开器部分以及抽吸连接器部分。在一些实施方案中,所述主体部分、颊牵开器部分以及抽吸连接器部分(及其子部分)可优选通过注射成型模制成单件。在示例性实施方案中,所述口腔件可以由柔性、半透明、有助于注射成型、高耐热性且高压灭菌的材料制成。这种材料可包含硅酮。因为所述口腔件可以由高耐热且高压灭菌的材料制成,所以这种口腔件可以重复使用。

[0005] 所述主体部分可包括由前壁、后壁以及在前壁与后壁之间的侧壁构成的封闭凹腔。所述侧壁可以被穿透成具有多个穿孔。此类穿孔可构成筛孔。附加的穿孔可定位在前壁和后壁上。主体部分还可包括沿着前壁上的纵向中心轴线的狭缝。此类开口(例如,穿孔和狭缝)允许从患者口腔抽吸空气、流体以及小的杂物,穿过所述开口进入内部部分并且进入朝向抽吸源的抽吸连接器部分。因为所述口腔件是由柔性和弹性材料(例如,硅酮)制成,所以所述口腔件当被放置在患者的口腔中时可以弯曲以符合口腔的形状。当正确定位时,所述抽吸连接器部分可从患者口腔的一侧突出,同时主体抵靠患者口腔的后部,并且颊牵开器在患者口腔的相对侧上压靠患者的脸颊。

[0006] 主体部分还可包括在后壁的内表面上的突出桥接结构。这种桥接结构可以具有波峰和波谷的波形从所述内表面突出。所述波峰提供与前壁的多个接触点以便在抽吸期间保持前壁与后壁分离。同时,所述波谷提供允许穿过桥接结构抽吸空气、流体以及小的杂物的间隙。

附图说明

- [0007] 图1A是具有可拆卸的口腔支撑件的示例性口腔件的透视图。
- [0008] 图1B是图1A的示例性口腔件和可拆卸的口腔支撑件的顶视图。
- [0009] 图1C是图1A的示例性口腔件和可拆卸的口腔支撑件的底视图。
- [0010] 图1D是图1A的示例性口腔件和可拆卸的口腔支撑件的侧视图。
- [0011] 图1E是图1A的示例性口腔件和可拆卸的口腔支撑件的截面图。
- [0012] 图2A是图1A的示例性口腔件的透视图,其中可拆卸的口腔支撑件已被拆除。
- [0013] 图2B是图2A的示例性口腔件的顶视图。
- [0014] 图2C是图2A的示例性口腔件的底视图。
- [0015] 图2D是图2A的示例性口腔件的侧视图。
- [0016] 图2E是图2A的示例性口腔件的截面图。
- [0017] 图3A是示例性口腔支撑件的前视图。
- [0018] 图3B是图3A的示例性口腔支撑件的后视图。
- [0019] 图3C是图3A的示例性口腔支撑件的底视图。
- [0020] 图3D是图3A的示例性口腔支撑件的透视图。
- [0021] 图3E是图3A的示例性口腔支撑件的侧视图。
- [0022] 图3F是图3A的示例性口腔支撑件的顶视图。
- [0023] 图4是示例性口腔件中的示例性筛孔侧的近距离视图。
- [0024] 图5是示例性口腔件中的内部桥接件的近距离视图。
- [0025] 图6A是示例性口腔件中的示例性加强杆的近距离视图。
- [0026] 图6B是图6A的示例性加强杆的截面图。
- [0027] 图7A示例性口腔件中的示例性颊牵开器部分的近距离视图。
- [0028] 图7B是图7A的示例性颊牵开器部分的截面图。

具体实施方式

[0029] 本发明的实施方案提供了一种口腔件,其包括主体部分、颊牵开器部分以及抽吸连接器部分。在一些实施方案中,主体部分、颊牵开器部分以及抽吸连接器部分(及其子部分)可优选地通过注射成型而模制成单件。在示例性实施方案中,所述口腔件可以由柔性、半透明、有助于注射成型、高耐热性且高压灭菌的材料制成。这种材料可包含硅酮。因为所述口腔件可以由高耐热的且高压灭菌的材料制成,所以这种口腔件可以重复使用。

[0030] 图1A-E是具有可附接的口腔支撑件160的示例性口腔件的不同视图,而图2A-E是图1A的示例性口腔件的不同视图,其中可附接的口腔支撑件160已被拆除。这种口腔件可包括主体部分110、抽吸连接器部分120以及颊牵开器部分130。

[0031] 主体部分110可包括筛孔或穿孔140、稳定杆150、开口狭缝170以及内部桥接件180。主体部分110可在一端连接到抽吸连接器部分120并且在另一端连接到颊牵开器部分130。这种颊牵开器部分130可被配置来压靠在患者的脸颊上并且使其缩进而远离患者的牙齿。当被放置在患者口腔中时,抽吸连接器部分120可以从患者口腔的一侧突出,同时主体部分110抵靠患者口腔的后部,并且颊牵开器部分130使在患者口腔的相对侧上的患者脸颊

缩进。当所述口腔件被放置在患者口腔中时,用于形成所述口腔件的材料的柔韧性允许一定程度的弯曲。然而,所述材料具有足够弹性,以使得颊牵开器部分利用足以使患者脸颊远离患者牙齿移动的压力来压靠患者脸颊的内侧。

[0032] 当被放置在口腔中时,示例性主体部分110可包括面向口腔前部的前壁(例如,具有狭缝170的一侧)和面向口腔后部的后壁。两个壁可以在上壁和下壁处连接,从而形成至少部分地被封闭的本体。

[0033] 在本文中,上可用于指代当被放置在患者口腔中时抵靠患者口腔的顶部的一侧,并且下可用于指代抵靠患者口腔的底部的一侧。上侧和下侧可同样地形成,这允许所述口腔件改变方向,从而使得在新取向上上侧可以表现为下侧并且反之亦然。在使用时,主体部分110的相应侧可以用来保护口腔的顶部和口腔/舌头的底部并将它们分开。另外,主体部分110还可以用来保护口腔的后部(例如,咽喉和气道)避开掉落的杂物。

[0034] 所述口腔件的主体部分110的大部分可成形为直线形箭头或护盾,其基座大体符合患者口腔的口内形状。可提供不同尺寸的口腔件以用于成年人和儿童的不同大小的口腔。与主体的其余部分相比,所述箭头的基座侧的部分可形成为具有更厚的壁。这种增厚可提供附加的稳定性。

[0035] 另外,所述口腔件的主体部分110可包括沿前壁和后壁的上侧和下侧分布的多个孔140,以便有助于从口腔抽吸水、唾液以及杂物。在一些实施方案中,一组孔还可以沿上边缘和下边缘的壁形成筛孔。图4是示例性口腔件中的示例性筛孔壁的近距离视图。

[0036] 在所述箭头的连接到颊牵开器部分130的窄端处,主体部分110可包括矩形部分。所述矩形比所述箭头的基座更窄,可另外包括加强杆(或稳定杆)150(下文进一步详细进行描述),并且可以至少部分地与进入主体部分110的凹腔内部的狭缝170(下文进一步详细进行描述)相交。

[0037] 稳定杆150可以是凸起或另外增厚区域,其加强矩形部分的稳定性并且有助于使这个区形成患者口腔的口内后部形状。图6A是示例性口腔件的示例性稳定杆150的近距离视图。图6B是图6A的颊牵开器连接器部分中的示例性加强杆的截面图。

[0038] 在一些实施方案中,所述内部矩形加强杆或稳定杆150可定位在内部波形桥接结构180的远侧并且附接到主体和矩形部分的后表面内侧。这种稳定杆150可定位在以下区域:其中所定位的口腔件开始从最后部下颌颊齿的舌侧、围绕最后部牙齿的远极面到最后部下颌颊齿的前侧进行包裹,从而有助于使所述口腔件成形为患者口腔的大体口内形状。

[0039] 所述口腔件的各种实施方案还可包括在前表面上延伸超过主体的约三分之二的纵向开口狭缝170。沿着主体的中心延伸穿过所述矩形和所述箭头的大部分,这种狭缝170可有助于俘获并且抽吸水、唾液以及杂物,并且有助于清洗和维修。

[0040] 此外,所述口腔件的主体可包括在内表面上的桥接结构180以确保前表面和后表面在抽吸期间保持分离。图1E是所述口腔件的截面图,其中示出了桥接结构180。图5是桥接结构180的近距离视图,其中不具有主体部分的周壁。这种桥接结构180可形成为波状凸起,其大体上对应于前壁与后壁之间的距离,从而在其波峰处基本上(例如,在1mm内)延伸全部距离并且在其波谷处基本上与所述表面齐平。在一些实施方案中,桥接结构180可居中定位在所述口腔件的主体部分110中。桥接结构180的波形之间的间隙(或波谷)有助于将水和唾液抽吸驱动转移到抽吸连接器部分120并且最终进入中央抽吸真空室。在一些实施方案中,

桥接结构180可遵循标志(例如,箭头或护盾)的形状。

[0041] 抽吸连接器部分120可以是卵形并且也可以附接到主体部分110。抽吸连接器部分120可以形成为具有比主体部分110更厚的壁并且被配置来附接到高抽吸真空转接器并且有助于将水、唾液以及杂物从口腔转移到外部转接器以便移除。抽吸连接器部分120还可包括有助于将所述口腔件滑动到转接器上达所期望深度的内部止挡件。抽吸连接器部分120可另外具有对应于可移除绑带(strap)的外部凹面缺口区210,以便当所述绑带处于适当位置时,所述绑带的外壁和连接器部的其余部分可以齐平。

[0042] 颊牵开器部分130被示出为锤头形远侧区,其可以附接到主体部分110。图7A是示例性口腔件中的示例性颊牵开器部分130的近距离视图。图7B是图7A的示例性颊牵开器部分130的截面图。

[0043] 所述口腔件可以与口腔支撑件160一起使用,如图1(具有口腔支撑件160)和图2(示出为不具有口腔支撑件160)所示。图3A-E提供了示例性口腔支撑件160的不同的近距离视图。可移除绑带310可以附接到口腔支撑件160,所述口腔支撑件160可用于撑开患者的口腔和牙齿。在这方面,抽吸连接器部分120可另外具有从抽吸连接器部分120的后侧突出的外部插塞220(图2C)。这种插塞220可对应于口腔支撑件160中的开口并且用于与所述开口连接。口腔支撑件160可由于开口中存在插塞220而得到加强,从而得到更抗压的、几乎不可压缩的且稳定的口腔支撑件160。在一些实施方案中,抽吸连接器部分120还可具有提供与外部高抽吸真空转接器上的对应凸起(例如,其也可成形为标志)额外连锁的保险开关230(例如,其可成形为标志)。

[0044] 口腔支撑件160可以由增厚的硅酮材料制成,所述硅酮材料与对应于抽吸连接器部分的圆周的弹性绑带注射成型为单件。口腔支撑件160具有内部矩形凹槽,其被设计成与所述口腔件的抽吸连接器部分120的外部矩形凸塞220紧密配合。口腔支撑件可以被制成具有不同尺寸以用于不同大小的口腔。因为口腔支撑件和口腔件是彼此可拆卸的,所以可以根据特定患者口腔的需要来配合和匹配每一个的不同尺寸。

[0045] 本文所述的口腔件可以与单件式可高压灭菌的高抽吸真空转接器一起使用。这种高抽吸真空转接器可以由单一的均质材料制成。具有单杆设计的这种真空转接器可以与所有当前的高抽吸真空装置和吸涎器相同的方式作用来控制水、唾液以及杂物从口腔到外部真空源的移除。所述单杆可以被设计来控制水、唾液以及杂物穿过抽吸连接器部分内的单一大的排泄管道从至少部分地被这样封闭的主体移除。

[0046] 尽管上文已描述了各种实施方案,但应了解所述实施方案仅是以举例的方式呈现而不具限制性。本说明书并不意图将本发明的范围限制于本文所述的特定形式。因此,优选实施方案的广度和范围不应受任何上述示例性实施方案的限制。应了解以上描述是说明性的而不是限制性的。相反地,本说明书意图涵盖可包含在如所附权利要求限定的和以其他方式由本领域普通技术人员所理解的本发明的精神和范围内的此类替代、修改和等效物。因此,不应参照上面的描述来确定本发明的范围,而是应参照所附的权利要求和其等效物的全部范围来确定本发明的范围。

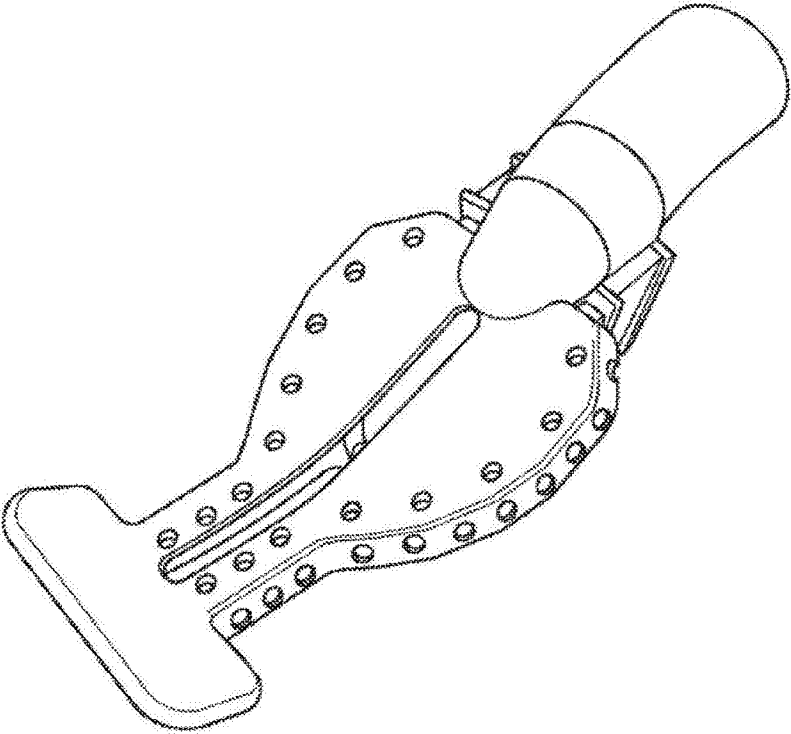


图1A

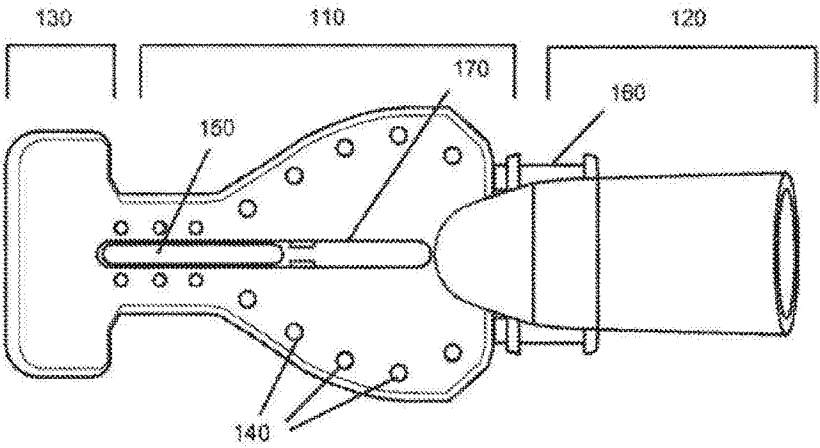


图1B

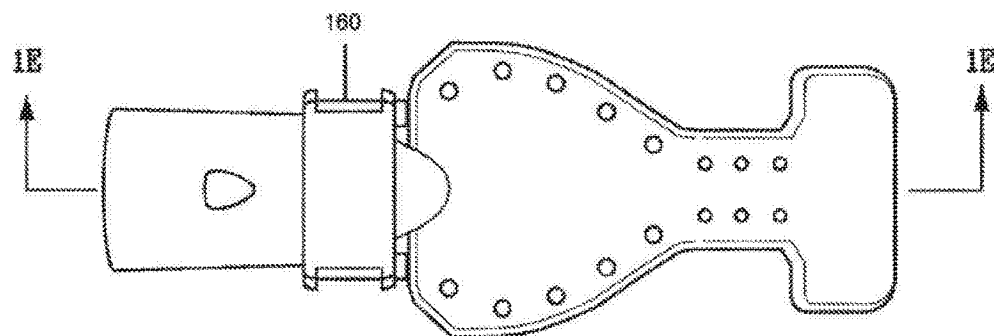


图1C

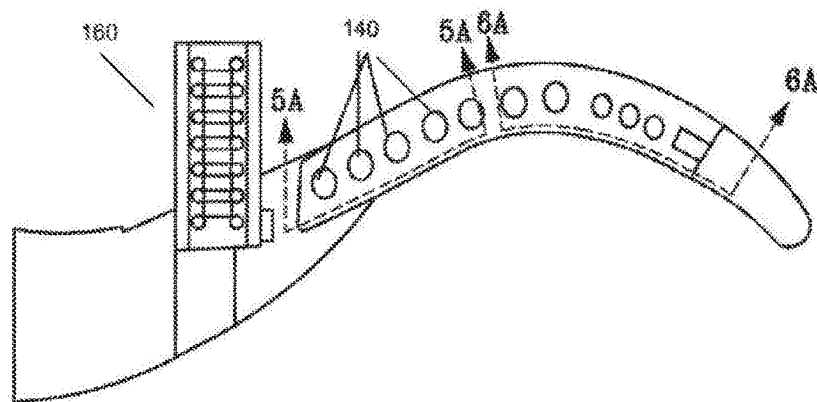


图1D

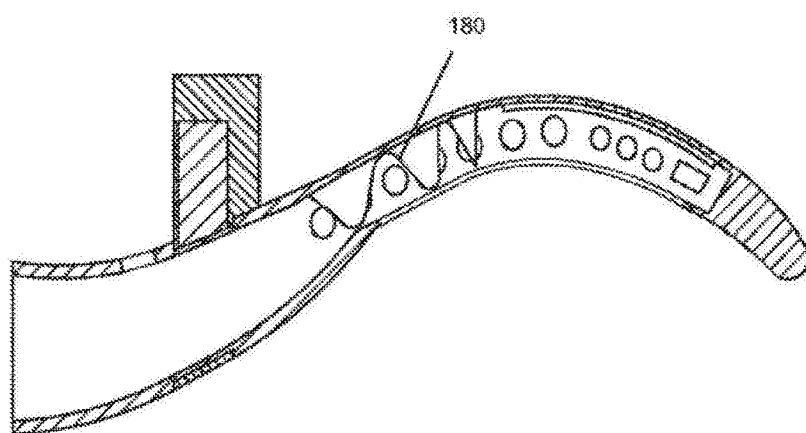


图1E

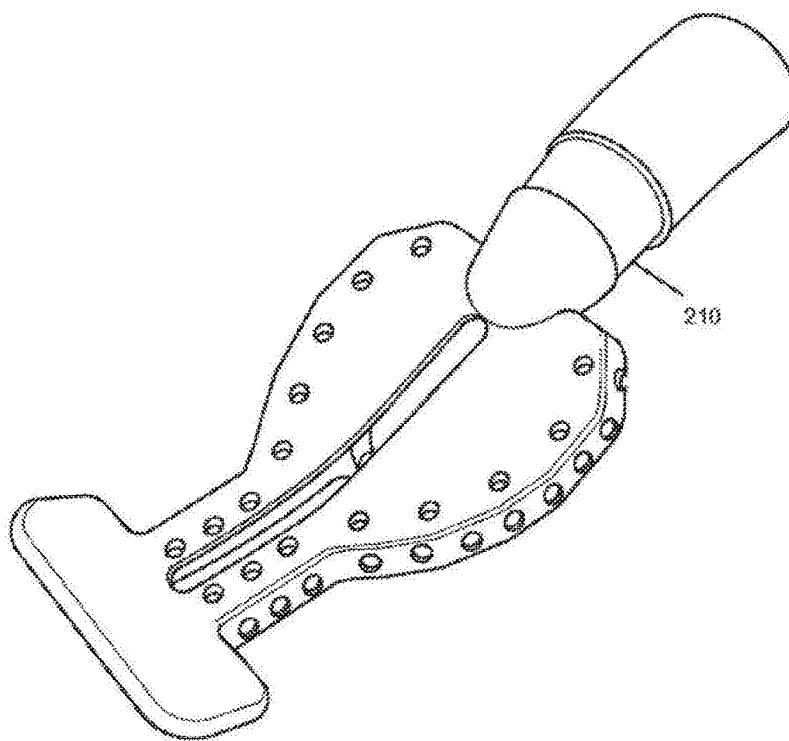


图2A

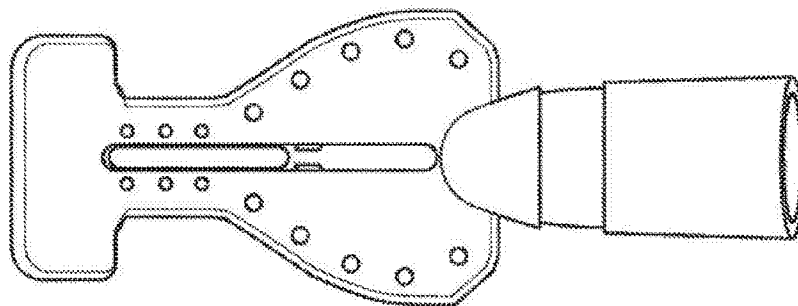


图2B

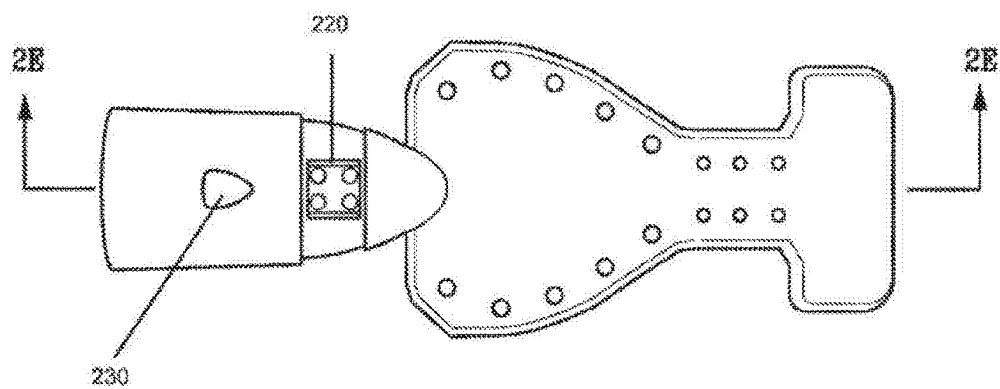


图2C

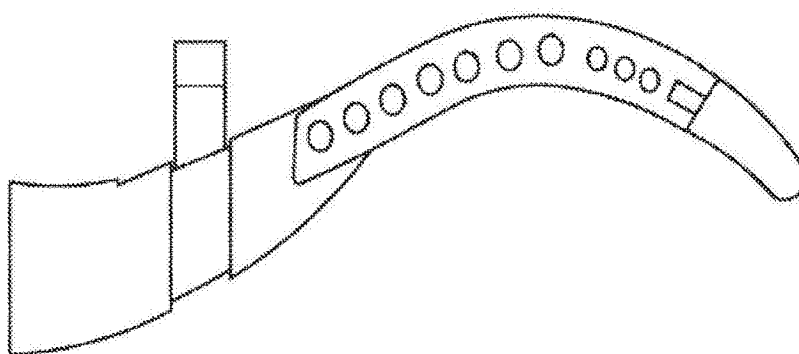


图2D

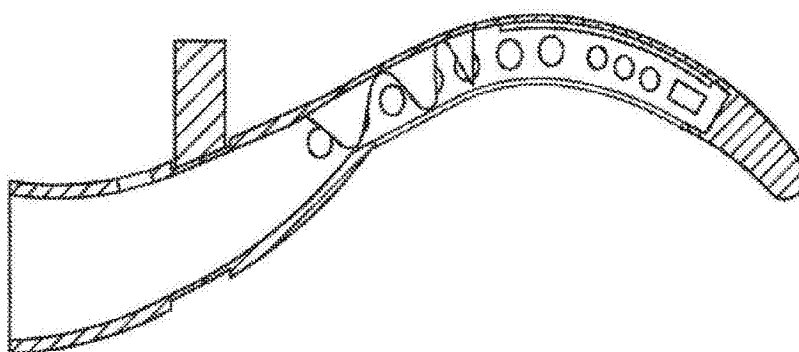


图2E

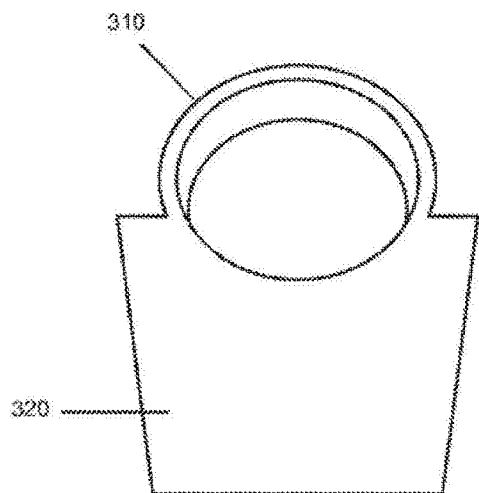


图3A

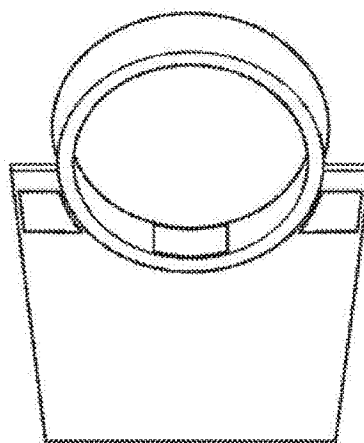


图3B

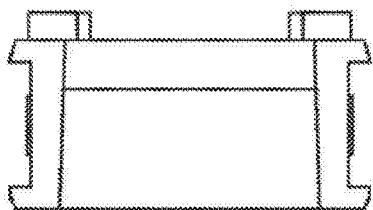


图3C

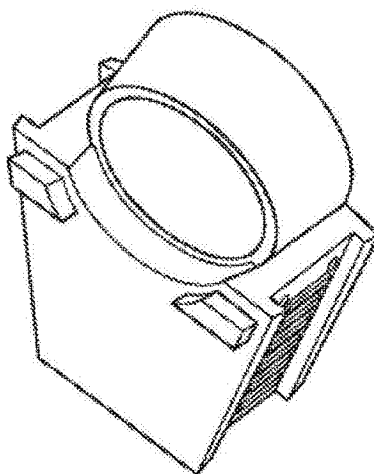


图3D

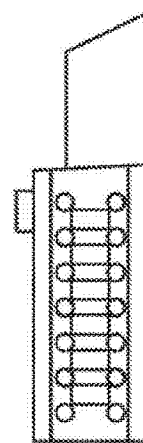


图3E

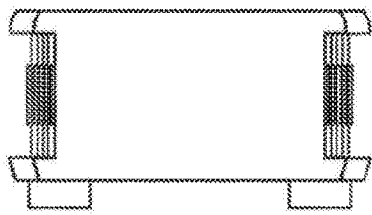


图3F

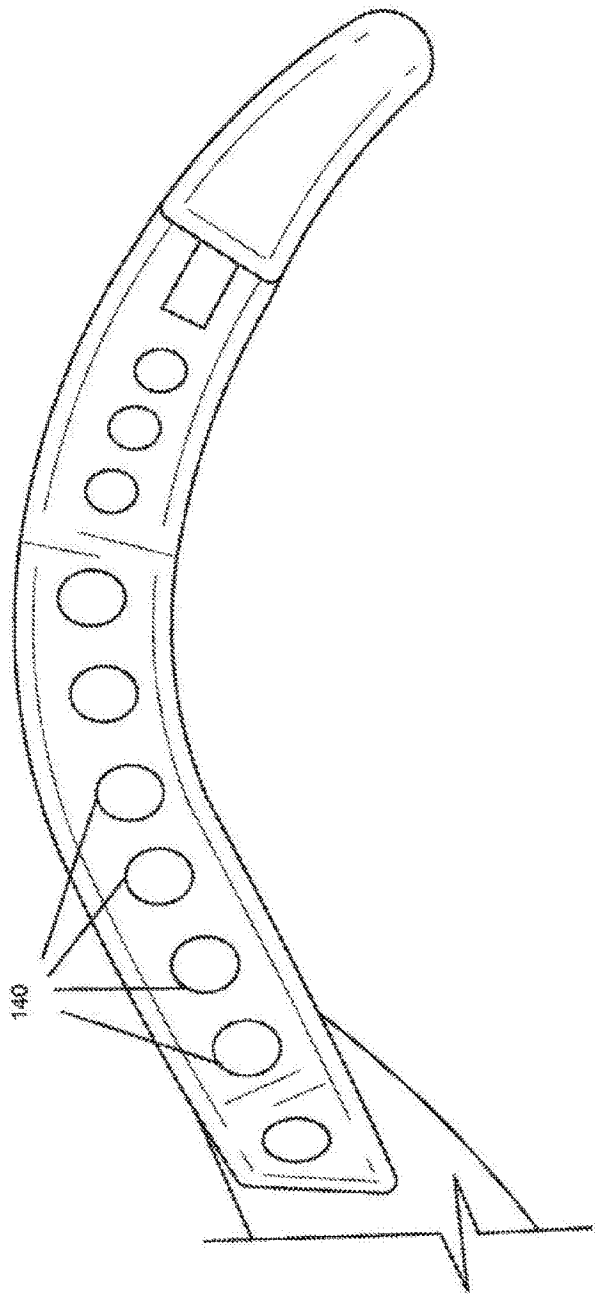


图4

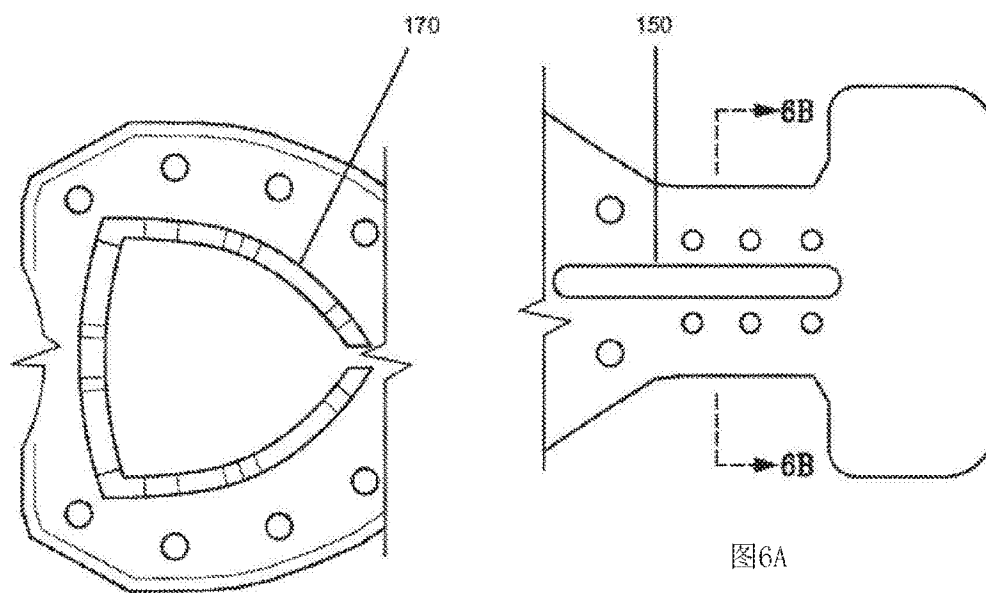


图5

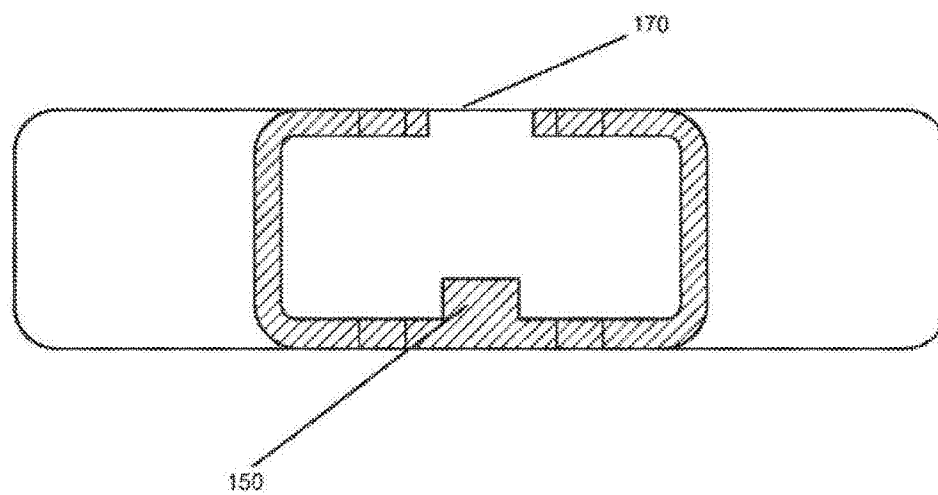


图6B

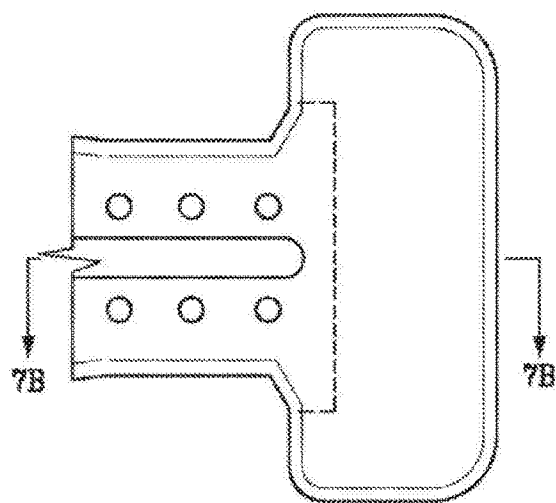


图7A

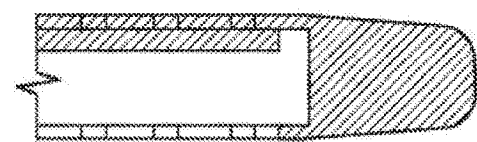


图7B

**Espacenet****Bibliographic data: EP2903557 (A1) — 2015-08-12**

INTRAORAL DENTAL SUCTION AND ISOLATION SYSTEM

Inventor(s): NGUYEN THIEN [US]; PHAM TAM THANH [US] $\pm$ (NGUYEN, THIEN, ; PHAM, TAM, THANH)

Applicant(s): INCEPT INC [US] $\pm$ (INCEPT, INC)

Classification: - international: **A61C17/00; A61C17/06**
- cooperative: **A61C17/0208; A61C17/04; A61C17/043**

Application number: EP20140721736 20140403

Priority number(s): US201314100323 20131209 ; WO2014US32892 20140403

Also published as: USD734851 (S1) AU2014202637 (A1)

Abstract not available for EP2903557 (A1)



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
28.06.2017 Bulletin 2017/26

(51) Int Cl.:
A61C 17/00 (2006.01) A61C 17/06 (2006.01)

(21) Application number: **17150671.0**

(22) Date of filing: **03.04.2014**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **09.12.2013 US 201314100323**

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:
14721736.8 / 2 903 557

(71) Applicant: **Incept, Inc.**
Fountain Valley, CA 92708 (US)

(72) Inventors:
• **Nguyen, Thien**
Fountain Valley, California 92708 (US)

• **Pham, Tam Thanh**
Fountain Valley, California 92708 (US)

(74) Representative: **Käck, Stefan**
Kahler Käck Mollekopf
Partnerschaft von Patentanwälten mbB
Vorderer Anger 239
86899 Landsberg/Lech (DE)

Remarks:

This application was filed on 09-01-2017 as a divisional application to the application mentioned under INID code 62.

(54) **INTRAORAL DENTAL SUCTION AND ISOLATION SYSTEM**

(57) A dental mouthpiece is provided that may be attached to a high-suction dental adapter for the purpose of assisting the dental staff during dental procedures through chair-side, hands-free suction, and isolation. Such a mouthpiece may comprise a main body portion (110), a cheek retractor portion (130), and a suction connector portion (120). In some embodiments, the main body portion (110), cheek retractor portion (130), and suction connector portion (120) (and sub-portions thereof) may be molded in one piece, preferably by injection molding. In an exemplary embodiment, the mouthpiece may be made of a material that is flexible, translucent, conducive to injection molding, high heat-resistant, and autoclavable. Such a material may include silicone. Because the mouthpiece may be made of a high heat-resistant and autoclavable material, such a mouthpiece may be reusable.

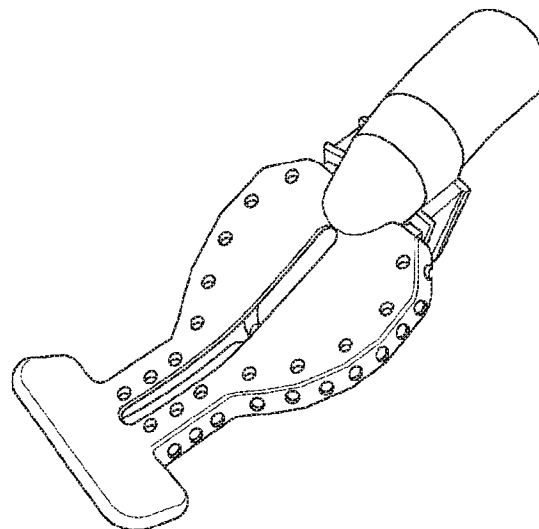


FIG. 1A

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention generally relates to the field of dental mouthpieces. More specifically, the present invention relates to intraoral dental suction and isolation mouthpieces.

2. Description of Related Art

[0002] Various mouthpieces are currently used by dental health professionals, dental hygienists, and dental assistants in the field of dentistry. In the past, a dental patient has been treated by a traditional two-person team that comprises a dental professional and a dental assistant. Further, dental treatment may be provided by the team using many different types of dental equipment and materials. Such dental equipment and materials may include such items as an intraoral mirror, a bite block, a slow speed suction ejector, a high speed suction ejector, gauzes, cotton rolls, and dry angles. Each item of dental equipment may be used for different purposes, though some may be used in combination for some types of dental services. As such, a dental professional seeking to provide such dental services may need to use multiple items of such dental equipment. An important role of the dental assistant is therefore to assist the dental professional in coordinating the use of these multiple items of different equipment and materials.

[0003] There is, therefore, a need in the art for improved systems and methods of providing dental services in a more efficient, comfortable, and safe manner to the dental patient.

[0004] Different intraoral devices are known. For example, U.S. Patent Application Publication No. 2012/0015320 A1 discloses a bite block, an illumination device having a saliva suction function, and a TIPS (twist isolated plates of suction) for protecting the tongue of a patient. The described solution guides the tongue of the patient such that when dental treatment is performed, the tongue of the patient can be safely and comfortably protected. Furthermore, saliva collected around the throat of the patient can be rapidly removed so that the patient feels little foreign-body like sensations. In addition, the TIPS can isolate the tongue from one side of the mouth cavity to be treated so as to ensure space for treatment. Moreover, the entirety of the mouth cavity of the patient can be illuminated to enable a doctor to conveniently conduct the dental treatment.

[0005] Further, U.S. Patent No. 6,974,321 relates to dental appliances for illuminating and/or vacuum suction of the mouth of a dental patient for examination and/or operative purposes.

[0006] U.S. Patent Application Publication No. US 2009/0274991 A1 teaches devices and methods for pro-

viding intra-oral operative isolation, fluid and debris aspiration, and tongue and cheek retraction.

SUMMARY OF THE CLAIMED INVENTION

[0007] The invention is defined in claims 1 and 15, respectively. Particular embodiments are set out in the dependent claims.

[0008] In particular, a dental mouthpiece is described herein. The mouthpiece may be attached to a high-suction dental adapter for the purpose of assisting the dental staff during dental procedures through chair-side, hands-free suction, and isolation. Such a mouthpiece comprises a main body portion, a cheek retractor portion, and a suction connector portion. In some embodiments, the main body portion, cheek retractor portion, and suction connector portion (and sub-portions thereof) may be molded in one piece, preferably by injection molding. In an exemplary embodiment, the mouthpiece may be made of a material that is flexible, translucent, conducive to injection molding, high heat-resistant, and autoclavable. Such a material may include silicone. Because the mouthpiece may be made of a high heat-resistant and autoclavable material, such a mouthpiece may be reusable.

[0009] The main body portion comprises an enclosed pocket made up of an anterior wall, a posterior wall, and a side wall in between the anterior and posterior walls. The side wall may be perforated with a plurality of perforations. Such perforations may constitute a mesh. Additional perforations may be located on the anterior and posterior walls. The main body portion may further include a slit along a longitudinal, central axis on the anterior wall. Such openings (e.g., perforations and slit) allow for suction of air, fluids, and small debris from the patient's mouth, through the openings into the interior portion, and into the suction connector portion towards a suction source. Because the mouthpiece is made of a flexible and resilient material (e.g., silicone), the mouthpiece is bendable when placed in a patient's mouth to conform to the shape of the mouth. When properly positioned, the suction connector portion may protrude from one side of the patient's mouth, while the main body lies against the back of the patient's mouth, and the cheek retractor presses against the patient's cheek on the opposite side of the patient's mouth.

[0010] The main body further includes an protruding bridge structure on the interior surface of the posterior wall. Such a bridge structure protrudes from the interior surface in a wave shape with crests and troughs. The crests provide a plurality of contact points with the anterior wall to keep the anterior wall separated from the posterior wall during suction. Meanwhile, the troughs provide gaps that allow for suction of air, fluids, and small debris through the bridge structure.

BRIEF DESCRIPTION OF THE FIGURES

[0011]

FIG. 1A is a perspective view of an exemplary mouthpiece with a detachable mouth prop.

FIG. 1B is a top view of the exemplary mouthpiece and detachable mouth prop of FIG. 1A.

FIG. 1C is a bottom view of the exemplary mouthpiece and detachable mouth prop of FIG. 1A.

FIG. 1D is a side view of the exemplary mouthpiece and detachable mouth prop of FIG. 1A.

FIG. 1E is a cross-sectional view of the exemplary mouthpiece and detachable mouth prop of FIG. 1A.

FIG. 2A is a perspective view of the exemplary mouthpiece of FIG. 1A where the detachable mouth prop has been detached.

FIG. 2B is a top view of the exemplary mouthpiece of FIG. 2A.

FIG. 2C is a bottom view of the exemplary mouthpiece of FIG. 2A.

FIG. 2D is a side view of the exemplary mouthpiece of FIG. 2A.

FIG. 2E is a cross-sectional view of the exemplary mouthpiece of FIG. 2A.

FIG. 3A is a front view of an exemplary mouth prop.

FIG. 3B is a back view of the exemplary mouth prop of FIG. 3A.

FIG. 3C is a bottom view of the exemplary mouth prop of FIG. 3A.

FIG. 3D is a perspective view of the exemplary mouth prop of FIG. 3A.

FIG. 3E is a side view of the exemplary mouth prop of FIG. 3A.

FIG. 3F is a top view of the exemplary mouth prop of FIG. 3A.

FIG. 4 is a close-up view of exemplary mesh sides in an exemplary mouthpiece.

FIG. 5 is a close-up view of an internal bridge in an exemplary mouthpiece.

FIG. 6A is a close-up view of an exemplary reinforcing bar in an exemplary mouthpiece.

FIG. 6B is a cross-sectional view of the exemplary reinforcing bar of FIG. 6A.

FIG. 7A is a close-up view of an exemplary cheek retractor portion in an exemplary mouthpiece.

FIG. 7B is a cross-sectional view of the exemplary cheek retractor portion of FIG. 7A.

DETAILED DESCRIPTION

[0012] Embodiments of the present invention provide for a mouthpiece comprising a main body portion, a cheek retractor portion, and a suction connector portion. In some embodiments, the main body portion, cheek retractor portion, and suction connector portion (and sub-portions thereof) may be molded as one-piece, preferably by injection molding. In an exemplary embodiment, the

mouthpiece may be made of a material that is flexible, translucent, conducive to injection molding, high heat-resistant, and autoclavable. Such a material may include silicone. Because the mouthpiece may be made of a high heat-resistant and autoclavable material, such a mouthpiece may be reusable.

[0013] FIGs. 1A-E are different views of an exemplary mouthpiece with an attachable mouth prop 160, while FIGs. 2A-E are different views of the exemplary mouthpiece of FIG. 1A where the attachable mouth prop 160 has been detached. Such a mouthpiece includes a main body portion 110, a suction connector portion 120, and a cheek retractor portion 130.

[0014] The main body portion 110 may include mesh or perforations 140, a stability bar 150, an open slit 170, and an internal bridge 180. The main body portion 110 connects to a suction connector portion 120 on one end and a cheek retractor portion 130 at the other end. Such a cheek retractor portion 130 may be configured to press against and retract a patient's cheek away from the patient's teeth. When placed in a patient's mouth, the suction connector portion 120 may protrude from one side of the patient's mouth, while the main body portion 110 lies against the back of the patient's mouth, and the cheek retractor portion 130 retracts the patient's cheek on the opposite side of the patient's mouth. The flexibility of the material used to form the mouthpiece allows for some bending when placed in the patient's mouth. The material is, however, resilient enough that the cheek retractor portion presses against the inside of the patient's cheek with such pressure being sufficient to move the cheek away from the patient's teeth.

An exemplary main body portion 110, when placed in a mouth, may include an anterior wall facing the front of the mouth (e.g., the side with slit 170) and a posterior wall facing the back of the mouth. The two walls may connect at a superior wall and an inferior wall forming a body that is at least partially enclosed.

[0015] Superior may be used herein to refer to the side that rests against a roof of a patient's mouth when placed therein, and inferior may be used to refer to the side that rests against the floor of the patient's mouth. The superior and inferior sides may be formed identically, which may allow for the mouthpiece to change orientation such that the superior side may appear as the inferior side and vice versa, in the new orientation. When in use, the respective sides of the main body portion 110 may serve to protect and separate the top of the mouth and the bottom of the mouth/tongue. In addition, the main body portion 110 may also serve to protect the back of the mouth (e.g., throat and airway) from falling debris.

[0016] Much of the main body portion 110 of the mouthpiece may be shaped as a straight-line arrowhead or shield whose base generally conforms to the intraoral shape of a patient's mouth. Differently-sized mouthpieces may be provided for differently-sized mouths of adults and children. Part of the base side of the arrowhead may be formed with thicker walls than the rest of the main

body. Such thickening may provide additional stability.

[0017] In addition, the main body portion 110 of the mouthpiece may include a plurality of holes 140 distributed along the superior and inferior sides of the anterior and posterior walls to assist in suctioning of water, saliva and debris from the oral cavity. In some embodiments, a set of holes may also form a mesh along the walls of the superior and inferior edges. FIG. 4 is a close-up view of an exemplary mesh wall in an exemplary mouthpiece.

[0018] At the narrow end of the arrowhead that connects to the cheek retractor portion 130, the main body portion 110 may include a rectangular portion. Narrower than the base of the arrowhead, the rectangular portion may additionally include a reinforcing bar (or stability bar) 150 (described in further detail below) and may be at least partially crossed by a slit 170 (described in further detail below) into the interior of the pocket of the main body portion 110.

[0019] Stability bar 150 may be a protrusion or otherwise a thickened area that reinforces the stability of the rectangular portion and assist in shaping this region to the intraoral posterior shape of a patient's mouth. FIG. 6A is a close-up view of an exemplary stability bar 150 of an exemplary mouthpiece. FIG. 6B is a cross-sectional view of the exemplary reinforcing bar in the cheek retractor connector portion of FIG. 6A.

[0020] In some embodiments, the internal, rectangular-shaped reinforcing or stability bar 150 may be located distally to the internal wavelike bridge structure 180 and attached to both the interior side of the posterior surface of the main body and the rectangular portion. Such a stability bar 150 may be located in the area where a positioned mouthpiece begins to wrap from the lingual side of the most posterior mandibular tooth, around the distal side of the most posterior tooth, and to anterior side of the most posterior mandibular tooth, thereby assisting in shaping the mouthpiece to the general intraoral shape of a patient's mouth.

[0021] Various embodiments of the mouthpiece may further include a longitudinal, open slit 170 extending over approximately two-thirds of the main body on the anterior surface. Running along the center of the main body across the rectangle and most of the arrowhead, such a slit 170 may assist in capture and suction of water, saliva and debris, as well as assisting in cleaning and maintenance.

[0022] Additionally, the main body of the mouthpiece may include a bridge structure 180 on an interior surface to ensure that the anterior and posterior surfaces remain separated during suction. FIG. 1E is a cross-sectional view of the mouthpiece in which the bridge structure 180 is illustrated. FIG. 5 is a close-up view of the bridge structure 180 without the surrounding walls of the main body portion. Such a bridge structure 180 may be formed as an wave-like protrusion that generally corresponds to the distance between the anterior and posterior walls extending substantially (e.g., within 1 mm) the full distance at its crest and substantially flush to the surface at its trough.

In some embodiments, the bridge structure 180 may be centrally-located in the main body portion 110 of the mouthpiece. The gaps (or troughs) between the waves of the bridge structure 180 assist in the suction-driven transfer of water and saliva to the suction connector portion 120 and ultimately, into a central suction vacuum. In some embodiments, the bridge structure 180 may follow the shape of a logo (e.g., an arrowhead or shield).

[0023] The suction connector portion 120 may be oval-shaped and also attached to the main body portion 110. The suction connector portion 120 may be formed with thicker walls than the main body portion 110 and configured to attach to a high-suction vacuum adapter and to assist in transferring water, saliva, and debris from the oral cavity to the external adapter for removal. The suction connector portion 120 may also include an internal stop to assist in sliding the mouthpiece onto the adapter to a desired depth. The suction connector portion 120 may additionally have an external, concave, notched region 210 that corresponds to a removable strap such that when the strap is in place, the external walls of the strap and the rest of the connector portion may be flush.

The cheek retractor portion 130 is illustrated as a hammerhead distal region, which may be attached to the main body portion 110. FIG. 7A is a close-up view of an exemplary cheek retractor portion 130 in an exemplary mouthpiece. FIG. 7B is a cross-sectional view of the exemplary cheek retractor portion 130 of FIG. 7A.

[0024] The mouthpiece may be used with a mouth prop 160, as illustrated in FIGs. 1 (with a mouth prop 160) and FIGs. 2 (illustrated without the mouth prop 160). FIGs. 3A-E provide different close-up views of an exemplary mouth prop 160. The removable strap 310 may be attached to mouth prop 160, which may be used to prop open a patient's mouth and teeth. In this regard, the suction connector portion 120 may additionally have an external plug 220 (FIG. 2C) protruding from the posterior side of the suction connector portion 120. Such a plug 220 may correspond to and serve to connect with an opening in the mouth prop 160. The mouth prop 160 may be reinforced by the presence of the plug 220 in the opening, thereby resulting in a more crush-resistant, nearly incompressible, and stable mouth prop 160. In some embodiments, the suction connector portion 120 may further have a cutout 230 (e.g., which may be shaped as a logo) providing extra interlocking with a corresponding protrusion (e.g., which may also be shaped as a logo) on an external high-suction vacuum adapter.

[0025] The mouth prop 160 may be made of thickened silicone material injection molded in a single piece with an elastic strap corresponding to the circumference of the suction connector portion. The mouth prop 160 has an internal, rectangular-shaped female slot designed to fit snugly with the external, rectangular-shaped male plug 220 of the suction connector portion 120 of the mouthpiece. Mouth props may be made in different sizes for differently sized mouths. Because the mouth prop and mouthpiece are detachable from each other, different siz-

es of each may be mixed and matched as needed for a particular patient's mouth.

[0026] The mouthpiece as described herein may be used with a one-piece, autoclavable, high-suction vacuum adapter. Such a high-suction vacuum body adapter may be made of a single homogenous material. Having a single lever design, such a vacuum adapter may function in the same manner as all the current high-suction vacuum evacuators and saliva ejectors in controlling the removal of water, saliva, and debris from the oral cavity to the outside vacuum source. The single lever may be designed to control the removal of water, saliva, and debris from the at least partially enclosed so main body through a single, large evacuation conduit within the suction connector portion.

[0027] Particular aspects of the present disclosure are set out in the following numbered clauses:

1. A dental mouthpiece composed of a material, the dental mouthpiece comprising: a main body portion comprising a defined pocket having an anterior wall, a posterior wall, and a side wall in between the anterior wall and the posterior wall, wherein the anterior wall, the posterior wall, and the side wall define an interior portion of the defined pocket; a cheek retractor portion configured to press against a cheek of a patient when placed in a mouth of the patient, wherein resilience of the material causes the cheek retractor portion to retract a cheek of the patient away from the teeth of the patient; and a suction connector portion for connecting the interior portion of the main body to a vacuum suction source.

2. The mouthpiece of clause 1, wherein the side wall includes a plurality of perforations.

3. The mouthpiece of clause 1, wherein the anterior wall and the posterior wall each includes a plurality of perforations.

4. The mouthpiece of clause 1, wherein the anterior wall further includes a slit along a central axis.

5. The mouthpiece of clause 1, further comprising a stability bar protruding from an interior surface of the posterior wall, wherein a thickness of the stability bar increases resilience of the cheek retractor portion during bending.

6. The mouthpiece of clause 1, wherein the main body portion, the cheek retractor portion, and the suction connector portion are formed by injection-molded as one piece.

7. The mouthpiece of clause 1, wherein the material used in the injection-molding is a flexible, translucent, high heat-resistant, autoclavable silicone-based material.

8. The mouthpiece of clause 1, further comprising a bridge structure protruding from an interior surface of the posterior wall, the protruding bridge structure comprising a plurality of spaced contact points that keep the anterior wall separated from the posterior wall during suction.

9. The mouthpiece of clause 8, wherein the bridge structure protrudes from the interior surface of the posterior wall in a wave shape, and wherein the contact points are at crests of the wave shape.

10. The mouthpiece of clause 9, wherein troughs of the wave shape are configured to allow suction through the bridge structure.

11. The mouthpiece of clause 1, wherein the suction connector portion comprises an internal stop to assist in positioning of a vacuum suction source or a vacuum adaptor.

12. The mouthpiece of clause 1, further comprising a detachable mouth prop.

13. The mouthpiece of clause 12, wherein the detachable mouth prop comprises a strap configured to fit around the suction connector portion, wherein an external surface of the suction connector portion comprises a notch region corresponding to the strap, and wherein an external surface of the strap is substantially flush with a remaining external surface of the suction connector portion when the strap sits in the notch region.

14. The mouthpiece of clause 13, wherein the strap is injection-molded in a single piece with the mouth prop.

15. The mouthpiece of clause 1, wherein the suction connector portion further comprises an external plug protrusion corresponding to an opening in a mouth prop associated with the strap.

16. The mouthpiece of clause 15, wherein the plug protrusion fits into the opening to provide additional crush-resistance and decreased compressibility during biting by the patient.

17. The mouthpiece of clause 1, wherein the suction connector portion comprises a cutout corresponding to a protrusion on a vacuum adapter for an interlocking fit.

18. The mouthpiece of clause 1, wherein the anterior wall and the posterior wall have different thicknesses.

[0028] While various embodiments have been described above, it should be understood that they have been presented by way of example only, and not limitation. The descriptions are not intended to limit the scope of the invention to the particular forms set forth herein. Thus, the breadth and scope of a preferred embodiment should not be limited by any of the above-described exemplary embodiments. It should be understood that the above description is illustrative and not restrictive. To the contrary, the present descriptions are intended to cover such alternatives, modifications, and equivalents as may be included within the scope of the invention as defined by the appended claims.

[0029] The scope of the invention should, therefore, be determined not with reference to the above description, but instead should be determined with reference to the appended claims.

Claims

1. A dental mouthpiece composed of a bendable material, the dental mouthpiece comprising:
 - a main body portion (110) comprising a defined pocket having an anterior wall, a posterior wall, and a side wall in between the anterior wall and the posterior wall, wherein the anterior wall, the posterior wall, and the side wall define an interior portion of the defined pocket, wherein the posterior wall comprises a bridge structure protruding from an interior surface of the posterior wall in a wave shape, the protruding bridge structure comprising a plurality of spaced contact points that keep the anterior wall separated from the posterior wall during suction, wherein the spaced contact points are at crests of the wave shape, and wherein a plurality of troughs of the wave shape allow for suction through the bridge structure;
 - a cheek retractor portion (130) connected to the main body portion (110); and
 - a suction connector portion (120) configured to connect the interior portion of the main body portion (110) to a vacuum suction source, wherein the suction connector portion (120) is connected to the main body portion (110) on an end opposite the cheek retractor portion (130).
2. The mouthpiece of claim 1, wherein the side wall includes a plurality of perforations (140).
3. The mouthpiece of claim 1 or 2, wherein the anterior wall and the posterior wall each includes a plurality of perforations (140).
4. The mouthpiece of claim 1, 2 or 3, wherein the anterior wall further includes a slit (170) along a central axis.
5. The mouthpiece of any of the preceding claims, wherein the main body portion (110) is shaped as a straight-line arrowhead and includes a rectangular portion at a narrow end of the arrowhead, wherein the narrow end of the arrowhead is connected to the cheek retractor portion (130), wherein the mouthpiece further comprises a stability bar (150) protruding from an interior surface of the posterior wall, and wherein a thickness of the stability bar (150) is adapted to reinforce stability of the rectangular portion of the main body portion (110).
6. The mouthpiece of any of the preceding claims, wherein the main body portion (110), the cheek retractor portion (130), and the suction connector portion (120) are mold in one piece, preferably by injection molding.
7. The mouthpiece of any of the preceding claims, wherein the material is a flexible, translucent, high heat-resistant, autoclavable silicone-based material.
8. The mouthpiece of any of the preceding claims, wherein the suction connector portion (120) comprises an internal stop to assist in positioning of the vacuum suction source.
9. The mouthpiece of any of the preceding claims, further comprising a detachable mouth prop (160), wherein the detachable mouth prop (160) comprises a strap (310) configured to fit around the suction connector portion (120), wherein an external surface of the suction connector portion (120) comprises a notch region (210) corresponding to the strap (310), and wherein an external surface of the strap (310) is substantially flush with a remaining external surface of the suction connector portion (120) when the strap (310) sits in the notch region.
10. The mouthpiece of claim 9, wherein the strap (310) and other portions of the mouth prop (160) are injection-molded as a single piece.
11. The mouthpiece of claim 9 or 10, wherein the suction connector portion (120) further comprises an external plug protrusion (220) corresponding to an opening in the mouth prop (160).
12. The mouthpiece of claim 11, wherein the plug protrusion (220) fits into the opening to provide additional crush-resistance and decreased compressibility.
13. The mouthpiece of any of the preceding claims, wherein the anterior wall and the posterior wall have different thicknesses.
14. The mouthpiece of any of the preceding claims, wherein the cheek retractor portion (130) is configured to press against a cheek of a patient when placed in a mouth of the patient, wherein resilience of the material causes the cheek retractor portion (130) to retract a cheek of the patient away from the teeth of the patient.
15. A combination comprising:
 - a mouthpiece according to any of the preceding claims; and
 - a vacuum adapter; wherein the suction connector portion (120) of the mouthpiece comprises an internal stop to assist in positioning of the vacuum adapter; and/or
 - wherein the suction connector portion (120) of the mouthpiece comprises a cutout (230) corre-

spending to a protrusion on the vacuum adapter
for an interlocking fit.

5

10

15

20

25

30

35

40

45

50

55

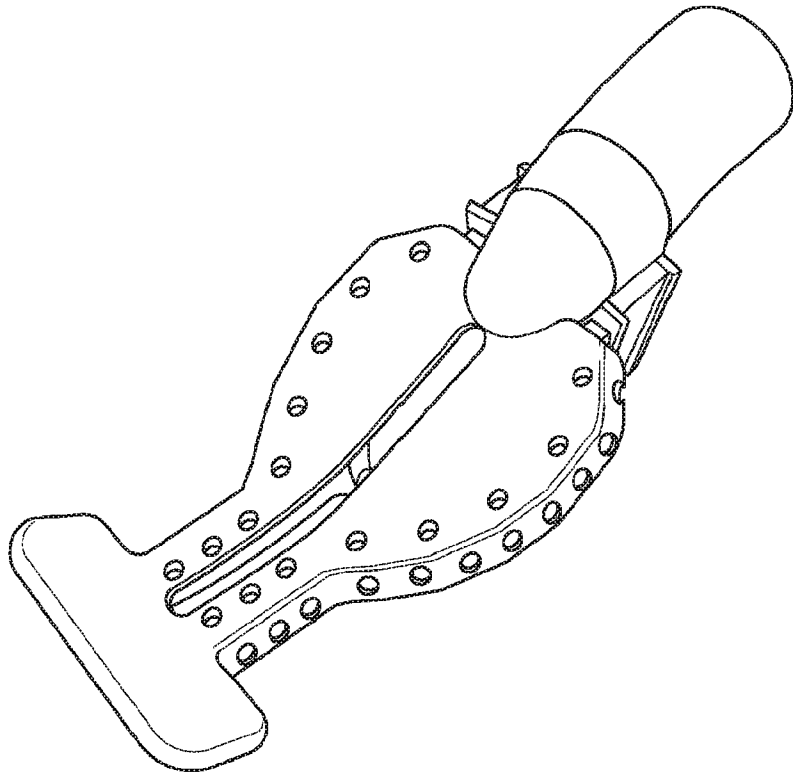


FIG. 1A

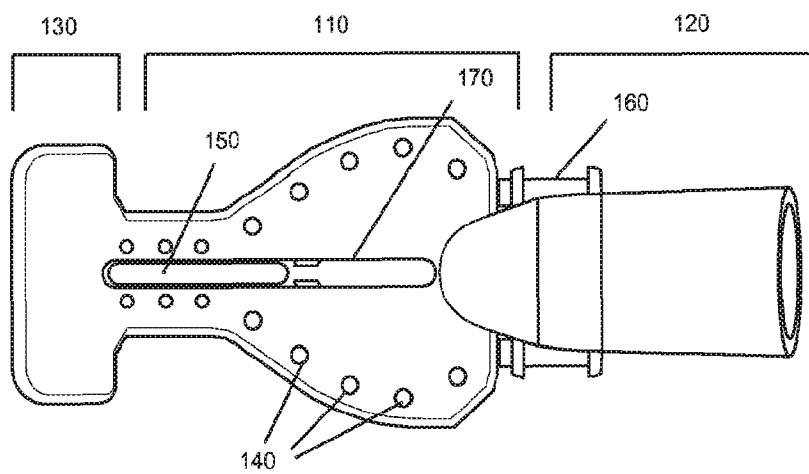


FIG. 1B

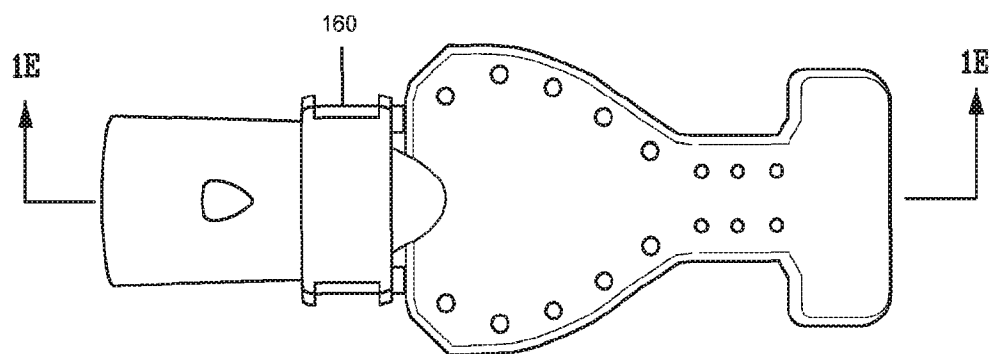
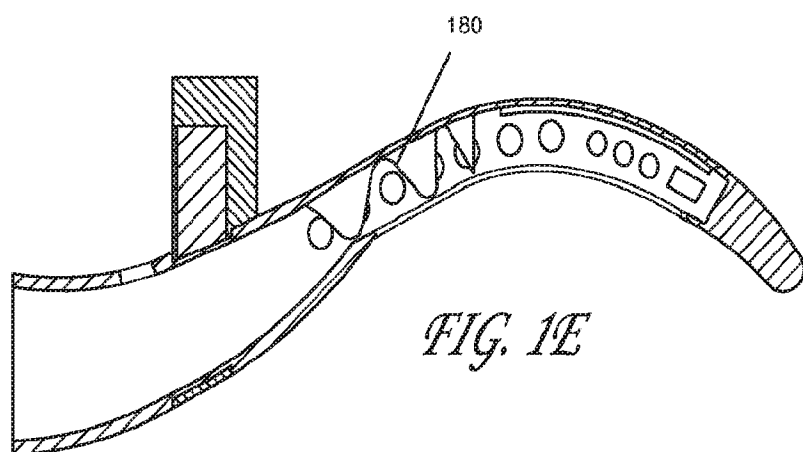
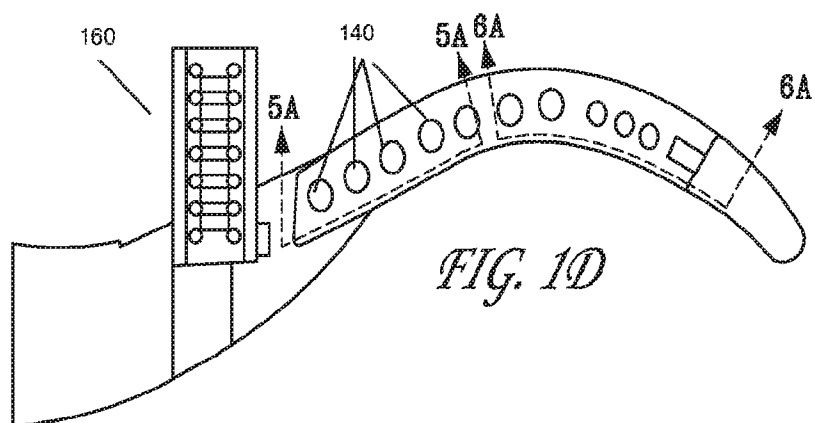


FIG. 1C



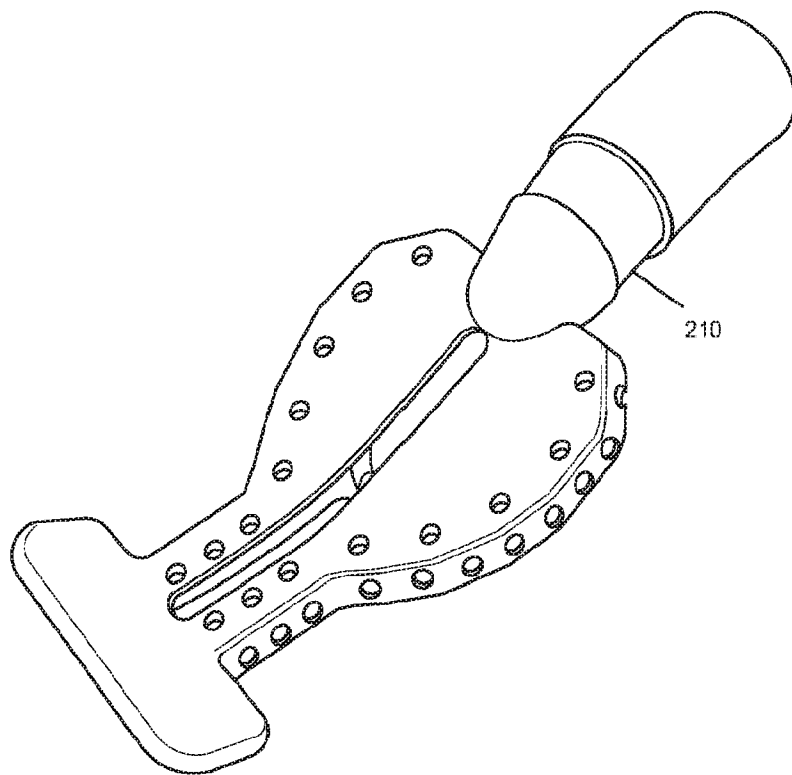


FIG. 2A

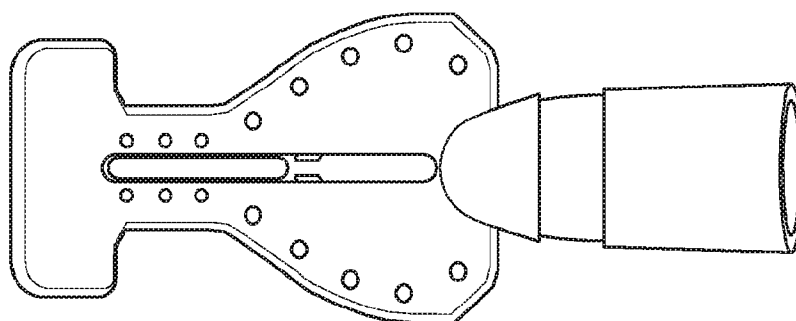


FIG. 2B

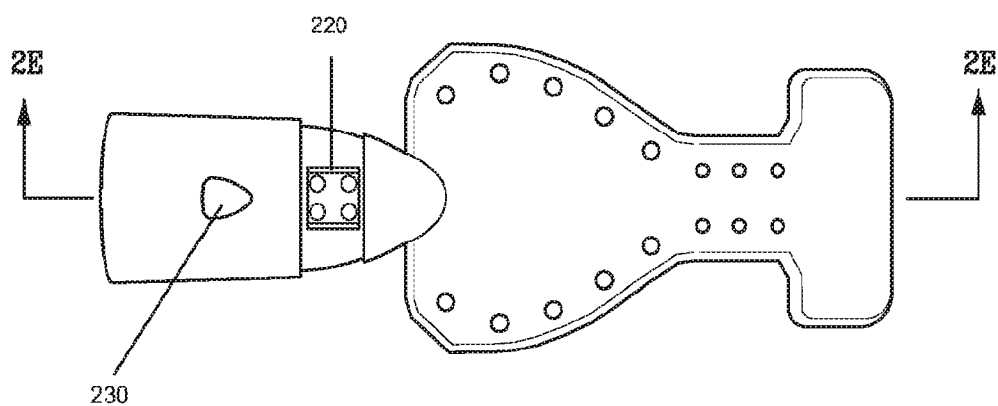


FIG. 2C

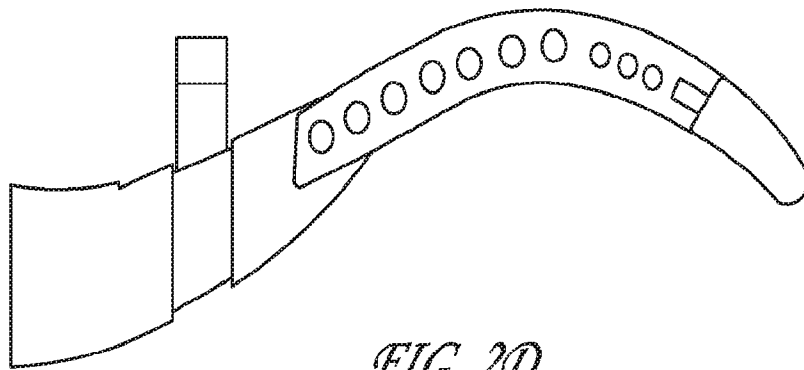


FIG. 2D

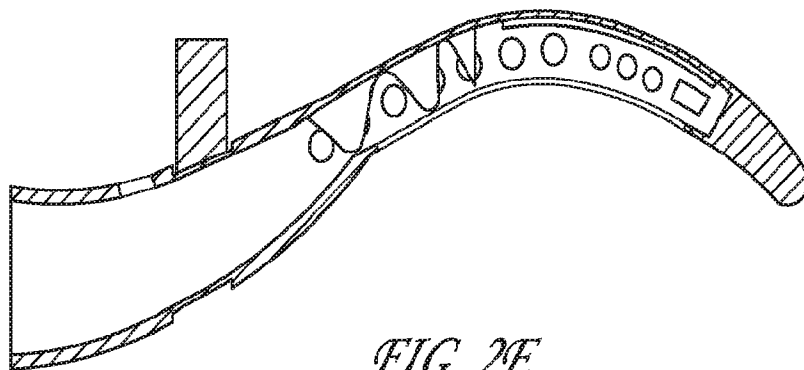


FIG. 2E

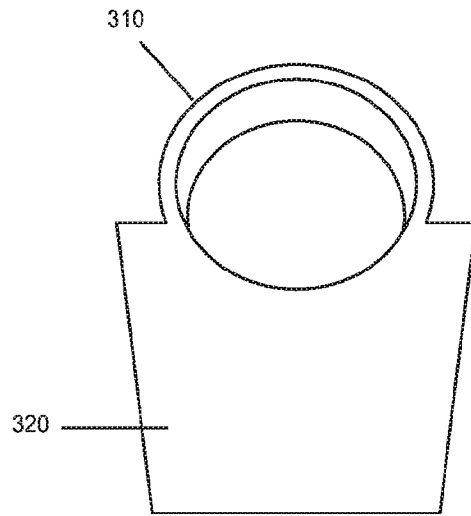


FIG. 3A

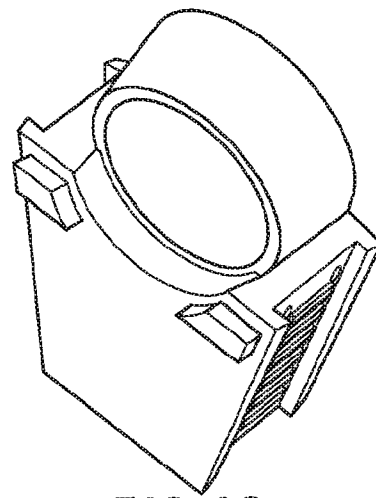


FIG. 3D

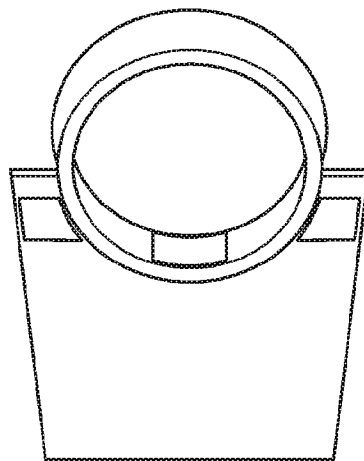


FIG. 3B

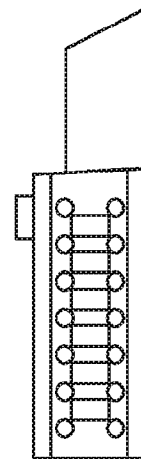


FIG. 3E

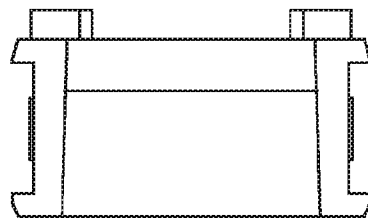


FIG. 3C

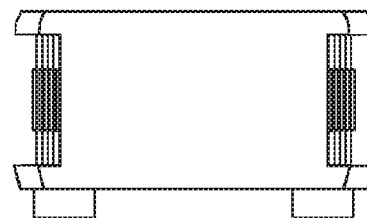
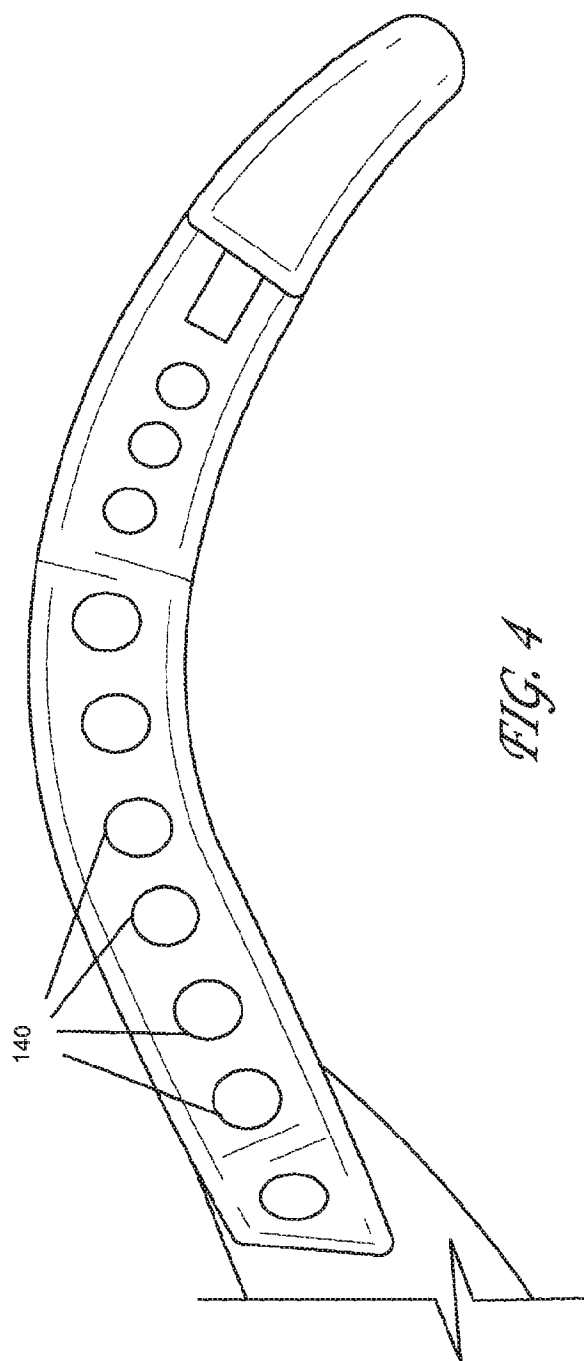


FIG. 3F



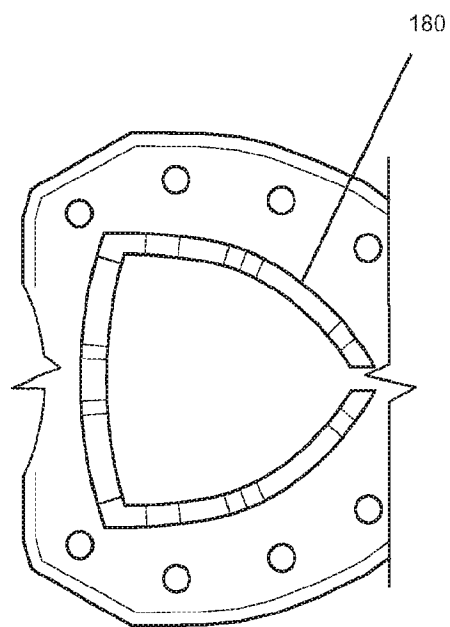


FIG. 5

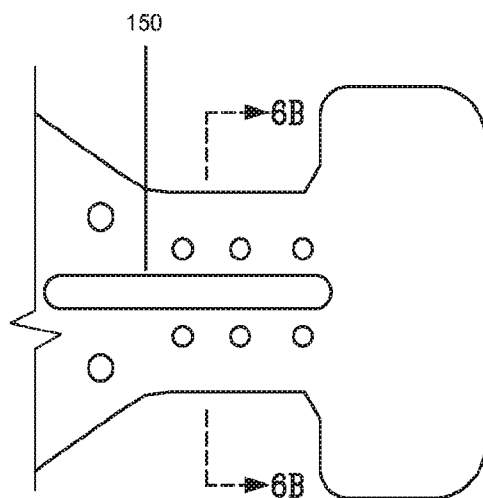


FIG. 6A

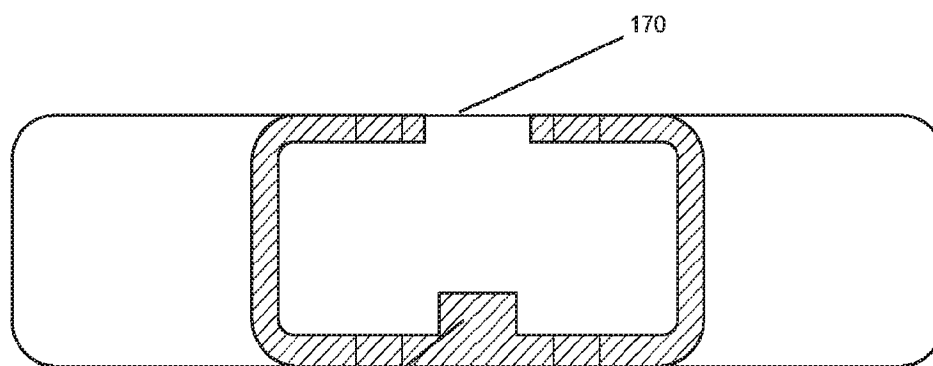


FIG. 6B

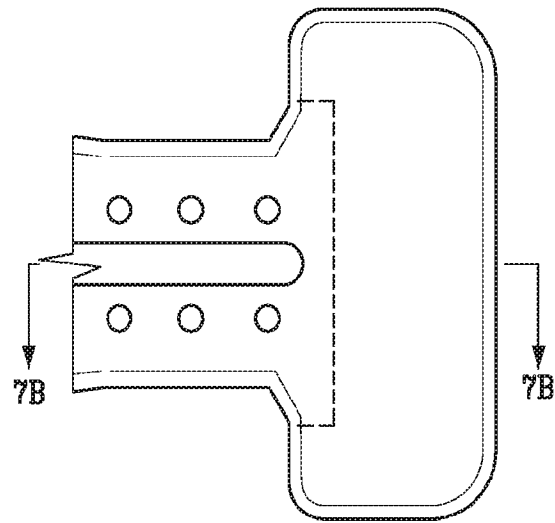


FIG. 7A

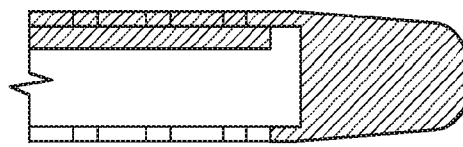


FIG. 7B



EUROPEAN SEARCH REPORT

 Application Number
 EP 17 15 0671

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2009/274991 A1 (BLACK BRIAN P [US] ET AL) 5 November 2009 (2009-11-05) * paragraphs [0080], [0122], [0101]; figures 3b,23c * * the whole document *	1-3,5-8, 14,15	INV. A61C17/00 A61C17/06
A	US 6 213 772 B1 (COSTELLO WILLIAM J [US]) 10 April 2001 (2001-04-10)	1-15	
A	US 6 022 214 A (HIRSCH JAMES A [US] ET AL) 8 February 2000 (2000-02-08)	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			A61C
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		16 May 2017	Salvatore, Claudio
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 (03.02) (P04501)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 15 0671

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

16-05-2017

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2009274991 A1	05-11-2009	US 2009274991 A1	05-11-2009
		US 2011311942 A1	22-12-2011
		WO 2009134295 A1	05-11-2009
US 6213772 B1	10-04-2001	AU 4462700 A	14-11-2000
		US 6213772 B1	10-04-2001
		WO 0061031 A1	19-10-2000
US 6022214 A	08-02-2000	AT 349969 T	15-01-2007
		AU 764984 B2	04-09-2003
		BR 9915455 A	17-07-2001
		CA 2349301 A1	25-05-2000
		DE 69934710 T2	08-11-2007
		EP 1131015 A1	12-09-2001
		ES 2280129 T3	01-09-2007
		JP 4153664 B2	24-09-2008
		JP 2002529191 A	10-09-2002
		US 6022214 A	08-02-2000
		US 2001008752 A1	19-07-2001
		US 2002039715 A1	04-04-2002
		US 2003143512 A1	31-07-2003
		WO 0028916 A1	25-05-2000

25

30

35

40

45

50

55

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 20120015320 A1 [0004]
- US 6974321 B [0005]
- US 20090274991 A1 [0006]

(12) UK Patent Application (19) GB (11) 2 170 106 A

(43) Application published 30 Jul 1986

(21) Application No 8502037

(22) Date of filing 28 Jan 1985

(71) Applicant
Dr. Kenneth B. Liegner,
8 Barnard Road, Armonk, New York 10504, United States
of America

(72) Inventor
Dr. Kenneth B. Liegner

(74) Agent and/or Address for Service
Abel & Imray, Northumberland House, 303-306 High
Holborn, London WC1V 7LH

(51) INT CL⁴
A61B 1/24 // A61M 16/00

(52) Domestic classification (Edition H):
A5R DMB EG

(56) Documents cited
GB 1566020 GB 0698570
GB 0699950 GB 0299457

(58) Field of search
A5R

(54) Bite block

(57) A bite block which is usefully employed in conjunction with endoscopy, bronchoscopy, endotracheal intubation and like medical-surgical procedures comprises a U shape plate (12) having grooves (18) which engage the upper and lower teeth keeping them apart and a ridge piece (60) attached to the bottom of the U shaped to engage the upper and lower lips and at least one bore hole (70, 72, 74) passing through the plate and the ridge capable of passing an endoscope, bronchoscope or endotracheal tube into the mouth of the patient. The device prevents the patient from biting through the tube inserted through the mouth and from displacing the tube.

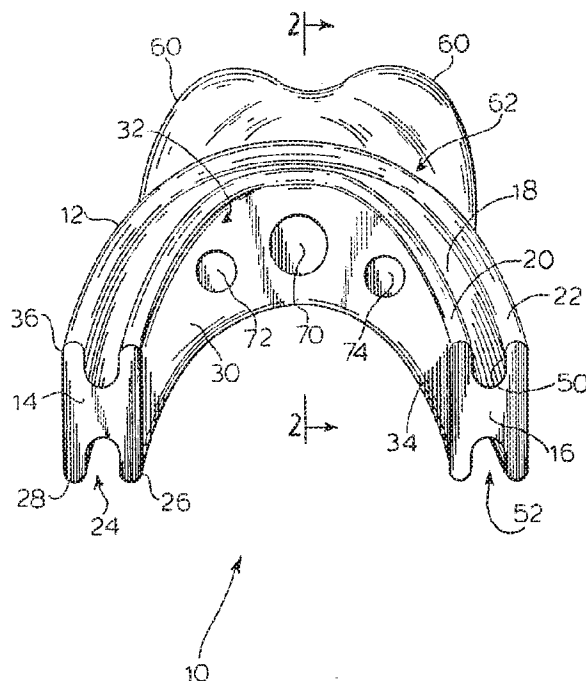


FIG.1

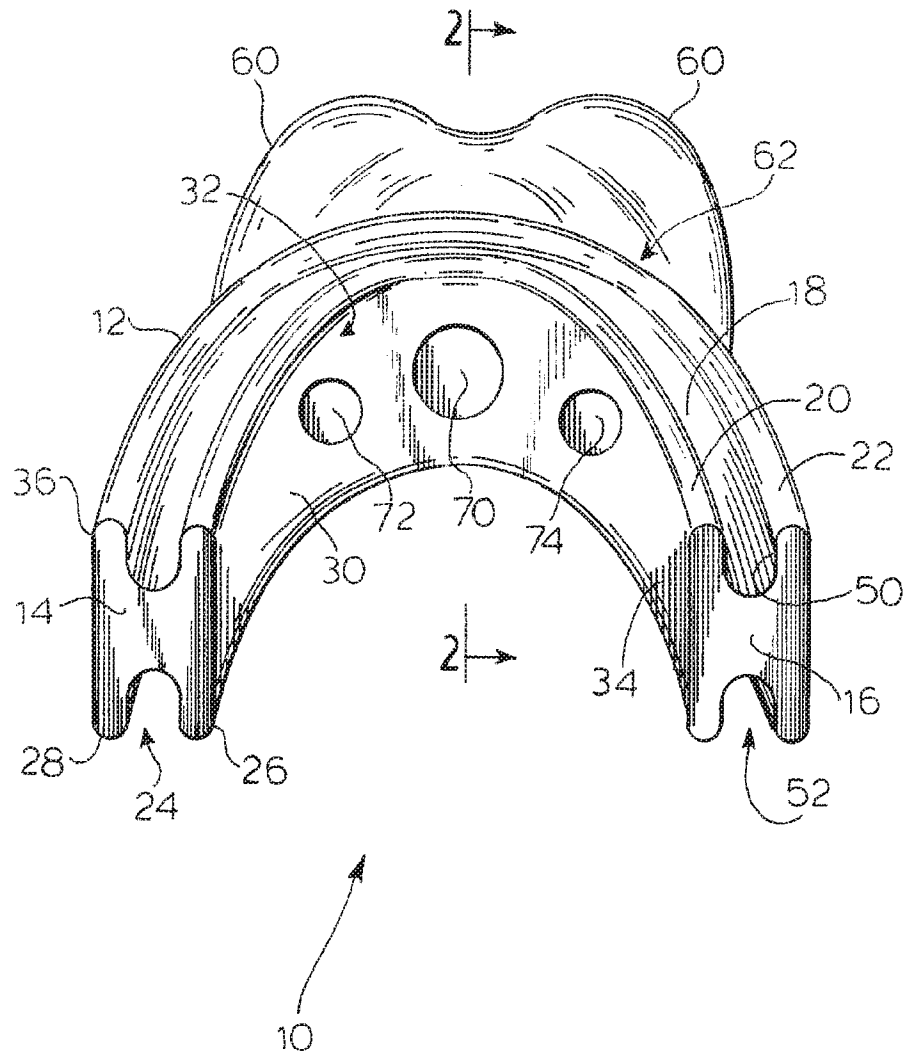


FIG.1

2/2

FIG.2

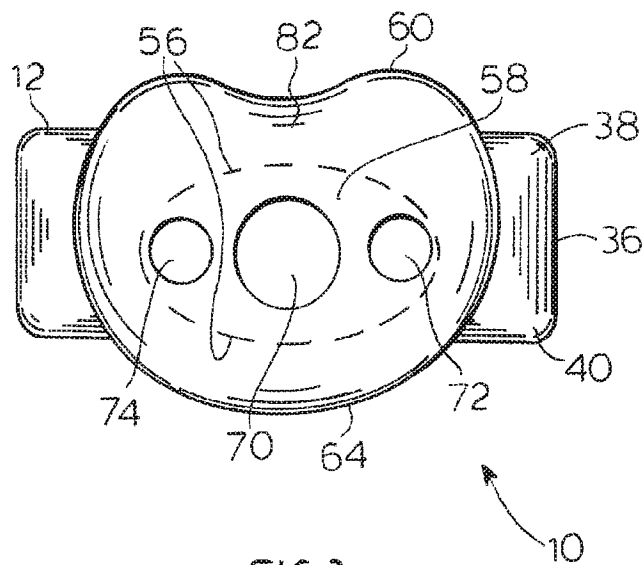
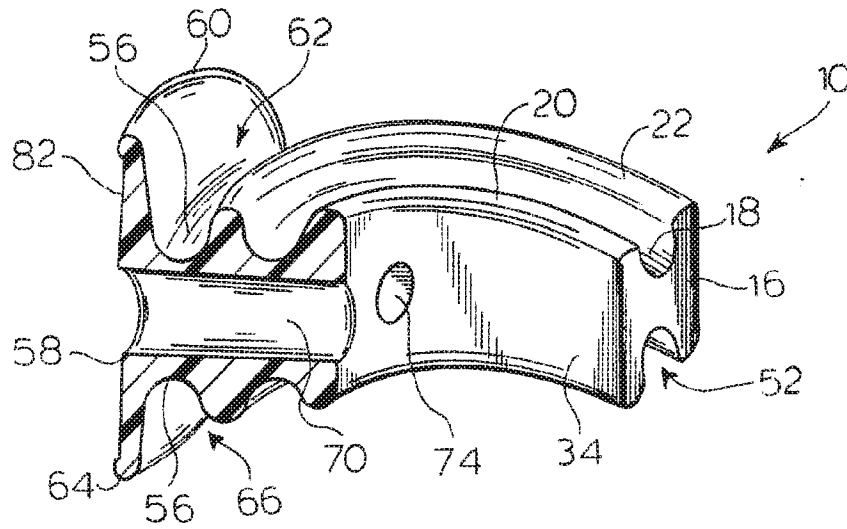


FIG.3

SPECIFICATION

Bite block

5 The invention relates to a bite block and more particularly relates to a bite block which is usefully employed in conjunction with endoscopy, bronchoscopy, endotracheal intubation and like medical-surgical procedures.

10 Not infrequently, patients in hospital emergency rooms and intensive care units require endotracheal intubation for mechanical ventilatory support during acute respiratory failure. Endotracheal tubes are formed of cylindrical pliable plastic,

15 ranging in internal diameter from 4 to 9 millimeters.

Such patients are often unresponsive initially, but frequently struggle against both the endotracheal tube and the ventilator as their condition is stabilized and improves. Often they bite down with their teeth against the endotracheal tube such that necessary suctioning of pulmonary secretions is made difficult or impossible or occasionally the endotracheal tube or its pilot balloon is bitten in two,

25 leading to potentially life threatening loss of control of the airway.

Small bite blocks or oropharyngeal airways that are now commercially available are unstable in maintaining position and are readily displaced by the patient's tongue or jaw movements. The present invention provides a bite block molded to fit the teeth, gums, jaw, palate, and lips in such a way that expulsion by the patient is unlikely. Structure is provided to permit stabilization of the endotracheal tube and allow catheter suctioning of oropharyngeal secretions or regurgitated gastric contents and drainage of gastric contents. The bite block prevents the patient from biting down on the endotracheal tube or suction catheters.

40 Other uses of the invention include assisting fiberoptic endoscopy and prevent the patient from biting down on the scopes thereby preventing costly damage to the fiberoptic components.

The invention comprises a bite block which is useful in conjunction with endoscopy, bronchoscopy, endotracheal intubation and like procedures, which comprises;

(a) a "U" shaped plate having first and second ends, each end being at the terminus of a separate upright leg of the "U", said plate comprising a plate body intermediate between and joining the first and second ends, said plate body having

(1) an upper surface delineated by the ends and inner and outer marginal zones;

55 (2) a lower surface delineated by the ends and inner and outer marginal zones;

(3) an inner side delineated by the ends and upper and lower marginal zones; and

(4) an outer side delineated by the ends and upper and lower marginal zones; the inner side joining at its upper marginal zone with the inner marginal zone of the upper surface and at its lower marginal zone with the inner marginal zone of the lower surface; the outer side joining at its upper

60 marginal zone with the outer marginal zone of the

upper surface and at its lower marginal zone with the outer marginal zone of the lower surface; said plate body further having

(5) a groove in the upper surface, between the inner and the outer marginal zones of the upper surface adapted by size and configuration to receive therein the upper teeth (or, in the absence of teeth, the associated gums) of a human being; and

(6) a groove in the lower surface, between the inner and the outer marginal zones of the lower surface, adapted by size and configuration to receive therein the lower teeth (or in the absence of teeth, the associated gums) of human being; whereby the plate is inserted into the vestibulum oris of a human being, the upper teeth or gums will be received in the upper surface groove and held apart by the plate body from the lower teeth or gums which are received in the lower surface groove;

(b) a ridge on the outer side of the plate body, positioned between the upper and lower marginal zones of the outer side at the bottom of the "U" and extending outwardly from the outer side to a ridge terminus;

(c) an upper flange on and projecting upwardly from the ridge terminus, providing an open space between the upper flange, the upper marginal zone of the outer side and the upper side of the ridge, said space being of a size and configuration to receive the labium superioris oris of a human in sealing engagement with said flange, outer side and ridge;

(d) a lower flange on and projecting downwardly from the ridge terminus, providing an open space between the lower flange, the lower marginal zone of the outer side and the lower side of the ridge, said space being of a size and configuration to receive the labium inferioris oris of a human in sealing engagement with said lower flange, outer side and ridge;

(e) a bore traversing the plate and ridge at the bottom of the "U", communicating between the inner side of the plate and the ridge terminus, said bore being of a dimension to pass an endoscope, a bronchoscope, an endotracheal tube or the like; and

(f) optionally at least one additional bore traversing the plate and ridge adjacent the bottom of the "U", communicating between the inner side of the plate and the ridge terminus, said additional bore being of a dimension to pass an oropharyngeal endotracheal, or orogastric tube; said bite block being of a size and configuration permitting insertion of the "U" shaped plate component into the vestibulum oris of a human as described above and whereby the bridge and flange components sealingly engage the labium oris so that the oral cavity is restricted to communication to the exterior through the bore and optional bore.

A bite block constructed in accordance with the invention will now be described by way of example only with reference to the accompanying drawings, in which:

Figure 1 is an elevational view of an embodied bite block of the invention, showing the inner

or posterior structure.

Figure 2 is a cross-sectional view along lines 2-2 of Figure 1.

Figure 3 is a front view of the embodiment of Figure 1.

Referring first to Figure 1, there is seen an elevational view of an embodiment bite block 10 of the invention, showing the inner or posterior structure. The bite block 10 is a generally "U" shaped plate 12 having a first end 14 and a second end 16. Each of the ends 14, 16 are at the terminus of a separate upright leg of the "U", and represents the end of plate 12 which will be inserted first into the vestibulum oris of a human being during use. The plate 12, intermediate between and joining ends 14, 16, has an upper surface 18 delineated by the ends and inner marginal zone 20 and outer marginal zone 22. The lower surface 24 of plate 12 is also delineated by the ends 14, 16 and by an inner margin 26 and an outer margin 28. The plate 12 is also bounded by an inner side 30 which has an upper 32 and a lower 34 marginal zone. An outer side 36 of the plate 12 is delineated by corresponding upper and lower marginal zones 38, 40 respectively (not seen in Figure 1; see Figure 3). The outer side 36 joins at the upper marginal zone 38 with the outer marginal zone 22 of upper surface 18 and at the lower marginal zone 40 with the outer marginal zone 28 of lower surface 24. The inner side 30 joins at its upper marginal zone 32 with the inner marginal zone 20 of upper surface 18 and at its lower margin zone 34 with the inner marginal zone 26 of lower surface 24.

The plate 12 further has a groove 50 in the upper surface 18 between the inner and outer marginal zones 20, 22 of the upper surface 18, said groove 50 being adapted by size and configuration to receive therein the upper teeth, or in the absence of teeth, the associated gums of a human being. A similar groove 52 is in the lower surface 24, between inner and outer marginal zones 26, 28 of the lower surface 24. The groove 52, like groove 50 is adapted by size and configuration to receive therein the lower teeth or associated gums of a human being when plate 12 is inserted in the vestibulum oris of the human being. When the plate 12 is so inserted, the upper teeth or gums of the human being will be received in the upper surface groove 50 and held apart by the plate body from the lower teeth or gums which are received in the lower surface 24 groove 52.

Referring now to Figure 2, there is seen a cross-sectional side elevation along lines 2-2 of Figure 1. As shown in the Figure 2, there is a ridge 56 on the outer side 36 of plate 12, positioned between the upper outside marginal zone 38 and the lower outside marginal zone 40, at the bottom of the "U" and extending outwardly from the outer side 36 to a ridge terminus 58. An upper flange 60 on and projecting upwardly from the ridge terminus 58 provides an open space 62 between the upper flange 60 and the upper marginal zone 38 of the outer side 36 and the upper side of ridge 56. The space 62 is of a size and configuration to receive the labium superior oris of a human in sealing en-

agement with said flange 60, outer side 36 and ridge 56. A lower flange 64 on and projecting downwardly from the ridge terminus 58 provides an open space 66 between the lower flange 64, the lower marginal zone 40 of the outer side 36 and the lower side of the ridge 56. Space 66 is of a size and configuration to receive the labium inferior oris of a human in sealing engagement with said lower flange 64, outer side 36 and ridge 56. A bore 70 traverses plate 12 and ridge 56 at the bottom of the "U", communicating between the inner side 30 of plate 12 and the ridge terminus 58, the bore 70 being of a dimension to pass an endoscope, a bronchoscope, an endotracheal tube or the like. In the preferred embodiment of bite block 10, there are additionally bores 72 and 74 transversing the body of plate 12 and ridge 56 at the bottom of the "U", communicating between the inner side 30 of plate 12 and the ridge terminus 58. The bores 72, 74 are of a dimension to pass endotracheal, oropharyngeal, or orogastric tubes and also provide airways into the oral cavity of a patient when the bite block 10 is inserted therein. The entire bite block 10 is of a size and configuration permitting its use by insertion of ends 14, 16 into the mouth of a human as described above, leaving the ridge 56 and flanges 60, 64 external to the mouth. When bite block 10 is so inserted into the vestibulum oris of a patient, the ridge 56 and flanges 60, 64 cooperate to sealingly engage the labium oris so that the oral cavity of the patient is restricted in communication to the exterior, through the bores 70, 72 and 74. The bite block 10 may be fabricated in a range of standard sizes, selected to fit a range of humans, i.e.; children through adults.

Figure 3 is a front view of the embodiment bite block 10 shown in Figure 1 and shows further details of the bite block 10. The front surface 82 on terminus 58 may be used to hold an adhesive tape, for securing tubes passing through the bores 70, 72 or 74. A length of such tape passing around the back of the patient's neck and adhering in front to surface 82 would prevent voluntary expulsion of bite block 10.

The bite block 10 is employed when desired by insertion into the vestibulum oris of a human being. Secured in place by the patient's natural reflex to bite down on it, the patient is prevented from injury to self by the biting reflex. Since the bite block 10 fully conforms to the shape of the maxillary and mandibular arcades, it will not shift in position and is securely maintained in the vestibulum oris. The bite block 10 is stable in regard to movement and comfortable to the wearer. While stably maintained in place, such medical-surgical procedures as endoscopy or bronchoscopy, and the like may be carried out by insertion of the appropriate instrument through the bore hole 70. The proximal end of a previously placed endotracheal tube may be passed through bores 70, 72 or 74 as the bite block is inserted. When required, oral-pharyngeal or gastric suctioning of natural secretions may be carried out through the bores 72, 74. All of these procedures may be carried out without interference from the patient biting down upon the in-

strument, tubing or the like. Upon termination of a particular procedure, the bite block may be maintained in place to function as an airway and/or it may be removed as desired.

- 5 The bite block 10 may be fabricated from any conventional materials, preferably a polymeric resin which has sufficient strength to resist a patient biting through but which is resilient enough that injury to the patient's teeth and/or gums goes
10 not occur. Preferably, the bite block 10 is fabricated from polyethylene, polypropylene and like polymeric resins.

In one example of the invention, the bite block 10 may be fabricated from an ethylene-vinyl acetate or like material which softens at a temperature of about 45 to 100°C. This bite block 10 may be made to conform and mold to the exact configuration of a particular patient's maxillary and mandibular arches, including the teeth and gums, by softening the bite block 10 in a hot water immersion. After removing the bite block 10 with its softened ethylene-vinyl acetate surface, from the immersion, it may be inserted into the vestibulum oris of a particular human individual (allowing it to cool first as necessary to avoid a burn injury to the individual). The human then brings his jaws together in a normal closing manner to displace softened thermoplastic material. In this way, the grooves 50 and 52 are made to conform to the anatomical structure of the individual's teeth and/or gums. The bite block 10 is then removed and allowed to rearden. It may then be used subsequently in the above described medical-surgical procedures wherein the bite block 10 will fit perfectly in the vestibulum oris of the individual patient.

CLAIMS

- 40 1. A bite block which is useful in conjunction with endoscopy, bronchoscopy, endotracheal intubation and like procedures, which comprises;
(a) a "U" shaped plate having first and second ends, each end being at the terminus of a separate
45 upright leg of the "U", said plate comprising a plate body intermediate between and joining the first and second ends, said plate body having
(1) an upper surface delineated by the ends and inner and outer marginal zones;
50 (2) a lower surface delineated by the ends and inner and outer marginal zones;
(3) an inner side delineated by the ends and upper and lower marginal zones; and
(4) an outer side delineated by the ends and upper and lower marginal zones;
55 the inner side joining its upper marginal zone with the inner marginal zone of the upper surface and at its lower marginal zone with the inner marginal zone of the lower surface; the outer side joining at
60 its upper marginal zone with the outer marginal zone of the upper surface and at its lower marginal zone with the outer marginal zone of the lower surface; said plate body further having
(5) a groove in the upper surface, between the inner and the outer marginal zones of the upper sur-

face suited by size and configuration to receive therein the upper teeth (or, in the absence of teeth, the associated gums) of a human being; and

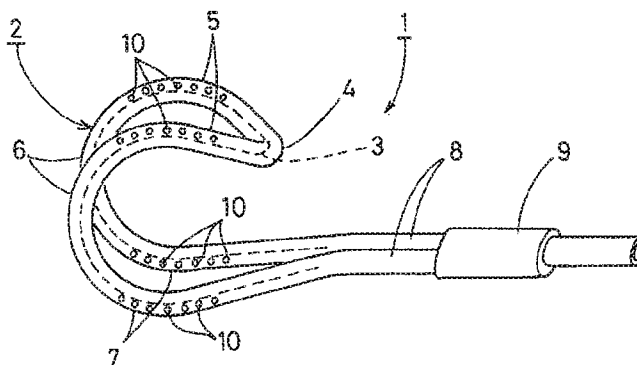
- (6) a groove in the lower surface, between the inner and the outer marginal zones of the lower surface, suited by size and configuration to receive therein the lower teeth (or in the absence of teeth, the associated gums) of a human being; whereby when the plate is inserted into the vestibulum oris of a human being, the upper teeth or gums will be received in the upper surface groove and held apart by the plate body from the lower teeth or gums which are received in the lower surface groove;
70 (b) a ridge on the outer side of the plate body positioned between the upper and the lower marginal zones of the outer side at the bottom of the "U" and extending outwardly from the outer side to a ridge terminus;
75 (c) an upper flange on and projecting upwardly from the ridge terminus, providing an open space between the upper flange, the upper marginal zone of the outer side and the upper side of the ridge, said space being of a size and configuration to receive the labium superioris oris of a human in sealing engagement with said flange, outer side and ridge;
80 (d) a lower flange on and projecting downwardly from the ridge terminus, providing an open space between the lower flange, the lower marginal zone of the outer side and the lower side of the ridge, said space being of a size and configuration to receive the labium inferioris oris of a human in sealing engagement with said lower flange, outer side and ridge;
85 (e) a bore traversing the plate and ridge at the bottom of the "U", communicating between the inner side of the plate and the ridge terminus, said bore being of a dimension to pass an endoscope, a bronchoscope, an endotracheal tube or the like; and
90 (f) optionally at least one additional bore traversing the plate and ridge adjacent to the bottom of the "U", communicating between the inner side of the plate and the ridge terminus, said additional bore being of a dimension to pass an endotracheal tube, oropharyngeal or orogastric tube; said bite block being of a size and configuration permitting insertion of the "U" shaped plate component into the vestibulum oris of a human as described above and whereby the ridge and flange components sealingly engage the labium oris so that the oral cavity is restricted to communication to the exterior through the bore and optional bores.
95 2. A block as claimed in claim 1 having at least two additional bores as defined in paragraph (f) of claim 1.
100 3. A bite block substantially as herein described with reference to, and as illustrated by, the accompanying drawings.
105 4. A block as claimed in claim 3, wherein the block is fabricated from a material which softens at a temperature in the range 45 to 100°C.



(51) 国際特許分類6 A61C 17/08	A1	(11) 国際公開番号 WO99/37238 (43) 国際公開日 1999年7月29日(29.07.99)
(21) 国際出願番号 PCT/JP98/00316 (22) 国際出願日 1998年1月27日(27.01.98) (71) 出願人；および (72) 発明者 大口 弘(OHGUCHI, Hiroshi)[JP/JP] 〒500 岐阜県岐阜市曙町2丁目2番地の2 Gifu, (JP) (74) 代理人 弁理士 秋元輝雄(AKIMOTO, Teruo) 〒107 東京都港区南青山1丁目1番1号 Tokyo, (JP)		(81) 指定国 US, 欧州特許 (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE) 添付公開書類 国際調査報告書

(54)Title: SALIVA ASPIRATOR FOR DENTAL TREATMENT

(54)発明の名称 歯科医療用唾液吸引具



(57) Abstract

A saliva aspirator for dental treatment which can suck and discharge saliva and dirty water and at the same time can separate the tongue, the buccal mucosa and the like from the teeth as a treatment site merely by setting the aspirator within the mouth. An aspirator (1) is set in an opened oral cavity (22), and a vacuum pump (28) is turned on. This permits the interior of the aspirator (1) to be put under negative pressure, ensuring the suction and discharge, through a plurality of saliva suction holes (10) provided in a deep section (5) and a front returning section (7), of the saliva secreted from the submandibular gland, parotid gland, and sublingual gland during dental treatment, dirty water within the oral cavity created during the treatment, and cooling water injected into the oral cavity when a rotary cutting tool (29) is used at the time of cutting the tooth. In this case, the patient's intraoral organs, such as the tongue (30) and the buccal mucosa, are impeded by the deep section (5), a curved continuous section (6), and the front returning section (7), thus permitting the organs to be prevented from approaching the tooth portion to be treated.

口腔内に装着するだけで唾液や汚水を吸引排出するとともに、治療部位の歯牙から舌や頬粘膜等を隔離できる歯科医療用唾液吸引具を提供する。

開口した口腔22内に吸引具1を装着して、バキュームポンプ28をオンすると、吸引具1内が負圧になって奥行き部5及び前方帰還部7に設けた複数の唾液吸引孔10から、歯科治療中に顎下腺、耳下腺及び舌下腺から生じる唾液や、治療中に生じる口腔内の汚水及び歯牙切削時に回転切削具29の使用で注水される冷却水を確実に吸引排出できる。このとき、患者の舌30や頬粘膜の口腔内器官が、奥行き部5、湾曲連続部6及び前方帰還部7に妨げられて、治療を施す歯牙部分に近づかないように隔離できる。

PCTに基づいて公開される国際出願のパンフレット第一頁に掲載されたPCT加盟国を同定するために使用されるコード(参考情報)

AE	アラブ首長国連邦	ES	スペイン	LI	リヒテンシュタイン	SG	シンガポール
AL	アルバニア	FI	フィンランド	LK	スリ・ランカ	SI	スロヴェニア
AM	アルメニア	FR	フランス	LR	リベリア	SK	スロヴァキア
AT	オーストリア	GA	ガボン	LS	レソト	SL	シエラ・レオネ
AU	オーストラリア	GB	英国	LT	リトアニア	SN	セネガル
AZ	アゼルバイジャン	GD	グレナダ	LU	ルクセンブルグ	SZ	スワジランド
BA	ボスニア・ヘルツェゴビナ	GE	グルジア	LV	ラトヴィア	TD	チャード
BB	バルバドス	GH	ガーナ	MC	モナコ	TG	トーゴ
BE	ベルギー	GM	ガンビア	MD	モルドヴァ	TJ	タジキスタン
BF	ブルキナ・ファソ	GN	ギニア	MG	マダガスカル	TM	トルクメニスタン
BG	ブルガリア	GW	ギニア・ビサウ	MK	マケドニア旧ユーゴスラヴィア	TR	トルコ
BJ	ベナン	GR	ギリシャ		共和国	TT	トリニダード・トバゴ
BR	ブラジル	HR	クロアチア	ML	マリ	UA	ウクライナ
BY	ベラルーシ	HU	ハンガリー	MN	モンゴル	UG	ウガンダ
CA	カナダ	ID	インドネシア	MR	モーリタニア	US	米国
CF	中央アフリカ	IE	アイルランド	MW	マラウイ	UZ	ウズベキスタン
CG	コンゴ	IL	イスラエル	MX	メキシコ	VN	ヴェトナム
CH	スイス	IN	インド	NE	ニジェール	YU	ユーゴスラビア
CI	コートジボアール	IS	アイスランド	NL	オランダ	ZA	南アフリカ共和国
CM	カメルーン	IT	イタリア	NO	ノルウェー	ZW	ジンバブエ
CN	中国	JP	日本	NZ	ニュージーランド		
CU	キューバ	KE	ケニア	PL	ポーランド		
CY	キプロス	KG	キルギスタン	PT	ポルトガル		
CZ	チェコ	KP	北朝鮮	RO	ルーマニア		
DE	ドイツ	KR	韓国	RU	ロシア		
DK	デンマーク	KZ	カザフスタン	SD	スーダン		
EE	エストニア	LC	セントルシア	SE	スウェーデン		

1

明細書

歯科医療用唾液吸引具

技術分野

- 5 本発明は、歯科医療用唾液吸引具に関するものである。

背景技術

歯科医療においては、治療中に口腔内に生じる唾液や汚水を吸引排出するとともに、治療部位の歯牙から舌や頬粘膜等を隔離する必要がある。このため従来は
10 、歯科用ユニットのフレキシブルアームに取り付けたバキュームチップを用いて行ったり、アシスタントや衛生士が歯科用バキュームチップを用いて行っていた。

しかしながら、口腔内におけるバキュームチップの固定性や安定性が悪いため、歯科治療中に予期せぬ動きをする舌等の口腔内器官を、確実に治療部位の歯牙
15 から隔離させておくことはできなかった。また、歯科医師の治療に応じて、バキュームチップを操作することは、アシスタントや衛生士にとって極めて熟練を要する作業であった。

本発明は上記に鑑みてなされたものであり、口腔内に装着するだけで唾液や汚水を吸引排出するとともに、治療部位の歯牙から舌や頬粘膜等を隔離できる歯科
20 医療用唾液吸引具を提供することを目的とする。

発明の開示

上記の目的を達成するため請求項 1 に記載された本発明の歯科医療用唾液吸引具は、保形用の線材により保形される一本のチューブを用いて、該チューブの略
25 中央部に上顎歯若しくは下顎歯の何れかに係止する略 U 字形の係止部と、該係止部から上顎堤若しくは下顎堤の両側に沿わせて口腔奥部に向かって略平行に延び

2

る奥行き部と、該奥行き部から前記下顎堤若しくは上顎堤の両側に沿って口腔の外方に向かって略平行に延びる前方帰還部と、該前方帰還部の前端から口腔外部に延びる吸引用連結部とを形成するとともに、少なくとも前記奥行き部若しくは前方帰還部に複数の唾液吸引孔を設けたことを特徴とする歯科医療用唾液吸引具

5。

また、請求項2に記載された本発明の歯科医療用唾液吸引具は、請求項1に記載の構成において、前記保形用の線材を前記奥行き部から前方帰還部に至る部位においてコイル状に巻回したことを特徴とする。

請求項3に記載された本発明の歯科医療用唾液吸引具は、請求項1及び請求項
10 2に記載の構成において、前記保形用の線材に弾力性の線材を用いて、可撓性を付与したことを特徴とする。

請求項4に記載された本発明の歯科医療用唾液吸引具は、請求項1乃至請求項3に記載の構成において、前記保形用の線材に可撓性若しくは弾力性が異なる部位を設けたことを特徴とする。

15 請求項5に記載された本発明の歯科医療用唾液吸引具は、請求項1乃至請求項4に記載の構成において、前記保形用の線材に金属線を用いて熱処理により可撓性若しくは弾力性を付与したことを特徴とする。

請求項6に記載された本発明の歯科医療用唾液吸引具は、請求項1乃至請求項5に記載の構成において、前記保形用の線材にステンレス合金線材を用いたこと
20 を特徴とする。

請求項7に記載された本発明の歯科医療用唾液吸引具は、請求項1乃至請求項5に記載の構成において、前記保形用の線材にニッケル・チタン合金線材を用いたことを特徴とする。

請求項8に記載された本発明の歯科医療用唾液吸引具は、請求項1乃至請求項
25 7に記載の構成において、前記係止部位で前記チューブを切断して前記略U字形に屈曲させた保形用の線材を露出させるとともに、前記チューブの切断端部を気

密に封止したことを特徴とする。

請求項 9 に記載された本発明の歯科医療用唾液吸引具は、請求項 1 乃至請求項 8 に記載の構成において、前記保形用の線材の露出部を軟質部材により被覆したことを特徴とする。

- 5 請求項 10 に記載された本発明の歯科医療用唾液吸引具は、可撓性及び保形性を有するパイプ材を用いて、上顎歯若しくは下顎歯の何れかに係止する略 U 字形の係止部と、該係止部から上顎堤若しくは下顎堤の両側に沿わせて口腔奥部に向かって略平行に延びる奥行き部と、該奥行き部から前記下顎堤若しくは上顎堤の両側に沿って口腔の外方に向かって略平行に延びる前方帰還部と、該前方帰還部
10 の前端に吸引用連結部とを形成するとともに、少なくとも前記下顎堤に沿う前記奥行き部若しくは前方帰還部に複数の唾液吸引孔を設けたことを特徴とする歯科医療用唾液吸引具。

- 請求項 11 に記載された本発明の歯科医療用唾液吸引具は、請求項 1 乃至請求項 10 に記載の構成において、前記前方帰還部の何れか一方の前端を気密に封止
15 して、何れか他方の前端に前記吸引用連結部を形成したことを特徴とする。

- 請求項 12 に記載された本発明の歯科医療用唾液吸引具は、請求項 1 乃至請求項 11 に記載の構成において、前記前方帰還部の何れか一方の前端を気密に封止するとともに、該封止部から突出させた線材により略 U 字形の屈曲部を形成して、何れか他方の前記前方帰還部の前端部に掛け渡すとともに、該前端部に前記吸
20 引用連結部を形成したことを特徴とする。

請求項 13 に記載された本発明の歯科医療用唾液吸引具は、請求項 1 乃至請求項 10 に記載の構成において、前記前方帰還部の何れか一方の前端部に屈曲部を形成して、前記上顎歯若しくは下顎歯の何れかを跨がせるとともに、前記前方帰還部の何れか他方に吸引可能に連結したことを特徴とする。

- 25 請求項 14 に記載された本発明の歯科医療用唾液吸引具は、請求項 1 乃至請求項 13 に記載の構成において、前記前方帰還部若しくは奥行き部の何れか一方に

4

咽喉部を塞ぐネット若しくはスクリーンを設けたことを特徴とする。

請求項 1 5 に記載された本発明の歯科医療用唾液吸引具は、請求項 1 乃至請求項 1 4 に記載の構成において、片側若しくは両側の前記奥行き部と前方帰還部間に口腔内器官を隔離する隔離部材を差し渡したことを特徴とする。

5

図面の簡単な説明

第 1 図は吸引具 1 の斜視図である。

第 2 図は吸引具 1 の口腔 2 2 内への装着状態を示した斜視図である。

第 3 図は変形例を示した吸引具 1 の斜視図である。

10

第 4 図は他の変形例を示した吸引具 1 の斜視図である。

第 5 図は吸引具 1 変形例を示す一部切欠斜視図である。

第 6 図は吸引具 1 の下向き湾曲部 6 を撓ませた状態の斜視図である。

第 7 図は吸引具 3 1 の斜視図である。

第 8 図は吸引具 3 1 の変形例を示した要部の斜視図である。

15

第 9 図は吸引具 4 1 の斜視図である。

第 1 0 図は吸引具 5 1 の口腔 2 2 内への装着状態を示した斜視図である。

第 1 1 図は吸引具 5 1 の変形例を示した斜視図である。

第 1 2 図は吸引具 6 1 の口腔 2 2 内への装着状態を示した斜視図である。

第 1 3 図はネット 7 1 の平面図である。

20

第 1 4 図は吸引具 8 1 の斜視図である。

第 1 5 図はネット状の隔離部材 9 1 を張設した吸引具 8 1 の口腔 2 2 内への装着状態を示した斜視図である。

第 1 6 図は吸引具 1 0 1 の斜視図である。

第 1 7 図は吸引具 1 (4 1) の口腔 2 2 内への装着例を示した斜視図である。

25

5

発明を実施するための最良の形態

- 請求項 1 に記載の本発明の歯科医療用唾液吸引具によれば、係止部を上顎歯若しくは下顎歯の何れかに係止するとともに、開口した口腔内に装着することにより、該係止部から略平行に延びる奥行き部が上顎堤若しくは下顎堤の両側に沿い
- 5 、口腔外部に向かって略平行に延びる前方帰還部が下顎堤若しくは上顎堤の両側に沿う。そして、前方帰還部の前端から口腔外部に延びる吸引用連結部に吸引チューブを連結して吸引することにより、少なくとも奥行き部若しくは前方帰還部に設けた複数の唾液吸引孔から、歯科治療中に耳下腺、顎下腺及び舌下腺から生じる唾液や、治療中に生じる口腔内の汚水を確実に吸引排出できる。また、奥行
- 10 き部及び前方帰還部により、舌や頬粘膜の口腔内器官が治療を施す歯牙部分に近づくのを妨げたり、治療器具等に触れないように隔離できるから、治療の安全性を確保できる。さらに、保形用の線材に保形される一本のチューブを用いて係止部及び全体形状を形成したことにより、口腔内への装着及び取り外しが容易となるとともに、上顎歯の何れかに係止部を係止し、開口状態の上下の歯牙若しく
- 15 は顎堤で保持して安定させることができるから、アシスタントを必要とすることなく歯科医師 1 人で治療が可能となるとともに、天地を逆にしても装着できる等の効果を有する。

- 請求項 2 に記載の本発明の歯科医療用唾液吸引具は、奥行き部から前方帰還部に至る部位の保形用の線材をコイル状に巻回したから、巻径やコイルピッチ等を
- 20 変えることにより撓み力を調整することができる。従って、装着したときに口腔に作用する撓み反力により、治療のため患者が開口状態を維持する際の疲労を軽減することができ長時間の治療が可能になる。

- 請求項 3 に記載された本発明の歯科医療用唾液吸引具は、保形用の線材に弾力性を有する線材を用いたから、奥行き部と前方帰還部とが互いに接近離間するよ
- 25 うに撓ませることができ、口腔内への装着及び取り外しを容易にできる。

請求項 4 に記載された本発明の歯科医療用唾液吸引具は、保形用の線材に弾力

6

性が異なる部位を設けたから、歯科医師が患者の口腔部の大小や歯並び等に応じて形状を変化させることができ、口腔内への装着性を高めることができる。

請求項5に記載された本発明の歯科医療用唾液吸引具は、保形用の金属線に熱処理を施して弾力性を付与するもので、所定部位に所定の弾力性を持たせることができ、歯科医師が患者の口腔部の大小や歯並び等に応じて形状を変化させることが容易となり、より優れた装着性を実現できる。

請求項6に記載された本発明の歯科医療用唾液吸引具は、保形用の線材にステンレス合金線材を用いたから、熱処理条件や線径を調整することにより、部位に応じて容易に所定の弾力性を付与することができ、歯科医師が患者の口腔部の大小や歯並び等に応じて形状を変化させることが容易となり、より優れた装着性を実現できる。

請求項7に記載された本発明の歯科医療用唾液吸引具は、保形用の線材にニッケル・チタン合金線材を用いたもので、該ニッケル・チタン合金線材は成分比と焼鈍条件により使用温度領域において、超弾性特性、加工硬化型特性及び形状記憶特性等の好ましい特性を付与できる。従って、これらの特性を単独又は組み合わせて用いることにより、優れた使い勝手や装着性をもたらすことができる。

請求項8に記載された本発明の歯科医療用唾液吸引具は、係止部位で露出する略U字形に屈曲した保形用の線材を、上顎歯若しくは下顎歯の何れかに係止して口腔内に装着するようにしたから、係止部を容易かつ確実に係止できる。

請求項9に記載された本発明の歯科医療用唾液吸引具は、前記保形用の線材の露出部を軟質部材により被覆したから、露出した線材が直接上顎歯若しくは下顎歯に接触することがなく、装着時の患者の違和感を軽減できる。

請求項10に記載された本発明の歯科医療用唾液吸引具は、可撓性及び保形性を有するパイプ材を用いて形成したものであり、前方帰還部の前端に形成した吸引連結部に吸引パイプを連結して用いる。パイプ内部に保形用の線材を有しないから、製作が容易であるとともに、洗浄や消毒が簡単にできる。

請求項 1 1 に記載された本発明の歯科医療用唾液吸引具は、前方帰還部の何れか一方の前端を封止して、何れか他方の前端に前記吸引用連結部を形成したもので、口腔外へ延びる吸引連結部、又は吸引用連結部に連結する吸引パイプが何れか一方のみとなるから、装着時の患者の違和感を軽減することができる。

5 請求項 1 2 に記載された本発明の歯科医療用唾液吸引具は、前方帰還部の何れか一方の前端を気密に封止するとともに、該封止部から突出させた線材により略 U 字形の屈曲部を形成して、何れか他方の前記前方帰還部の前端部に掛け渡したもので、係止部とこの屈曲部とにより上顎歯と下顎歯の双方に係止することができ、口腔内で位置がずれることがない確実な装着を施すことができる。

10 請求項 1 3 に記載された本発明の歯科医療用唾液吸引具は、前方帰還部の何れか一方の前端部に屈曲部を形成して、上顎歯若しくは下顎歯の何れかを跨がせるとともに、前方帰還部の何れか他方に吸引可能に連結したものであり、口腔外へ延びる吸引連結部、又は吸引用連結部に連結する吸引パイプが何れか一方のみとなるから、装着時患者の違和感を軽減することができる。また、屈曲部を上顎歯
15 若しくは下顎歯の何れかを跨がせているから、係止部とこの屈曲部とにより上顎歯と下顎歯の双方に係止することができ、口腔内で位置がずれることがない確実な装着を施すことができる。

請求項 1 4 に記載された本発明の歯科医療用唾液吸引具は、前方帰還部若しくは奥行き部の何れかに咽喉部を塞ぐネット若しくはスクリーンを設けたから、治療中に誤って治療用小器具等が口腔内に外れ落ちても、飲み込んでしまうことが
20 ない。

請求項 1 5 に記載された本発明の歯科医療用唾液吸引具は、片側若しくは両側の奥行き部と前方帰還部間に、口腔内器官を隔離する隔離部材を差し渡したから、治療を施す歯牙部分に舌や頬粘膜の口腔内器官が近づくことを防止できる。

〔実施例〕

- 本発明の実施の形態を添付図面を参照して説明する。図1は、本発明に係る歯科医療用唾液吸引具（以下単に吸引具という）1の斜視図である。この吸引具1は、軟質のゴム、合成樹脂若しくは高分子樹脂製のチューブ2内に保形用の線材3を挿入して屈曲及び曲成することにより形成される。先ず、チューブ2の略中央部を二つ折状に屈曲して略U字形の係止部4が形成される。そして、該係止部4から略平行に連続させるとともに、上方に向かって膨らむように緩やかに湾曲させた奥行き部5と、該奥行き部5と略同じ曲率で湾曲させた湾曲連続部6と、該湾曲連続部6に続けて、下方に向かって膨らむように緩やかに湾曲させた前方帰還部7とが順次曲成される。チューブ2内の保形用の線材3は、該前方帰還部7まで挿入されていて、上記各部を保形している。前方帰還部7に続くチューブ2には、吸引用連結部8が形成され、その吸引用連結部8の二つの端部を合わせて連結する吸引用連結管9が接続されている。また、上記奥行き部5及び前方帰還部7には、所定の間隔を置いて複数個の唾液吸引孔10が形成されている。
- 15 尚、上記吸引具1は、予め各部を屈曲成形した保形用の線材3の一端部から、チューブ2を挿し通すことによっても形成できる。また、保形用の線材3は、チューブ2の製造時に一体にインサートしたものであってもよい。さらに、チューブ2の外周面の形状は、円形の外に四角形、楕円形等任意の形状とすることができる。
- 20 上記吸引具1は図2に示すように、係止部4を上顎歯21の何れかに係止して開口した口腔22内に装着したとき、略平行な奥行き部5が上顎堤23の両側に沿って口腔奥部に向かう。このとき、患者の頬側の奥行き部5の頂部5aは、齦頬移行部（頬粘膜と歯肉の境界部）付近に位置し、舌側の奥行き部5の頂部5bは、口蓋と歯肉の境界部付近に位置する。そして、奥行き部5に連続する湾曲連続部6は、上顎堤23に対向する下顎堤24の奥部両側に向かって略平行に下がっている。湾曲連続部6に連続する前方帰還部7は、下顎堤24の両側に沿って
- 25

口腔の外方に向かう。このとき、患者の頬側の前方帰還部 7 の最低部 7 a は、齦
頬移行部に位置し、舌側の前方帰還部 7 の最低部 7 b は、口腔底と歯肉の境界部
に位置する。下唇 2 5 を越えて口腔 2 2 外に導き出された頬側の吸引用連結部 8
と、下顎前歯 2 6 を乗り越えて口腔 2 2 外に導き出された舌側の吸引用連結部 8
5 の端部を連結した吸引用連結管 9 には、吸引チューブ 2 7 を介してバキュームポ
ンプ 2 8 が接続されている。

上記したように開口した口腔 2 2 内に吸引具 1 を装着して、バキュームポンプ
2 8 をオンすると、吸引具 1 内が負圧になって奥行き部 5 及び前方帰還部 7 に設
けた複数の唾液吸引孔 1 0 から、歯科治療中に顎下腺、耳下腺及び舌下腺から生
10 じる唾液や、治療中に生じる口腔内の汚水及び歯牙切削時に回転切削具 2 9 の使
用で注水される冷却水を確実に吸引排出できる。このとき、患者の舌 3 0 や頬粘
膜の口腔内器官が、奥行き部 5、湾曲連続部 6 及び前方帰還部 7 に妨げられて、
治療を施す歯牙部分に近づかないように隔離できる。従って、治療の邪魔にな
らないばかりでなく、予期せぬ動きを生じる患者の舌 3 0 が、回転切削具 2 9 等
15 に触れて傷付くようなこともない。また、口腔 2 2 内では、上顎歯 2 1 の何れか
に係止部 4 を係止し、開口状態の上下の顎堤 2 3、2 4 が保持できるから、アシ
スタントを必要とすることなく歯科医師 1 人で治療が可能となる。

尚、バキュームポンプを用いない吸引排出装置を使用してもよい。

また、上記吸引具 1 は、係止部 4 を下顎歯の何れかに係止して、奥行き部 5 を
20 下顎堤 2 4 の両側に、前方帰還部 7 を上顎堤 2 3 の両側とする天地を逆にした装
着形態とすることもできる。そして、上顎堤 2 3 に沿う奥行き部 5 若しくは前方
帰還部 7 に、唾液吸引孔 1 0 を設けなくて、下顎堤 2 4 に沿う奥行き部 5 若しく
は前方帰還部 7 の唾液吸引孔 1 0 から、下顎堤 2 4 の付近に溜まる唾液や、治療
中に生じる口腔内の汚水等を吸引排出するようにしてもよい。

25 本発明の吸引具 1 は、前方帰還部 7 だけ若しくは奥行き部 5 及び前方帰還部 7
の両方を湾曲しない直線形状にすることもできる（図 3（a），（b））。さら

に、図4に示すように、直線状の奥行き部5と前方帰還部7を連続させて、唾液吸引孔10を全体に亘って形成することもできる。

また、図5に示すように奥行き部5から前方帰還部7に至る湾曲連続部6のチューブ2内の位置に、保形用の線材3を巻回したコイル状部3aを設けて可撓性を付与することもできる。これにより、該コイル状部3aを撓ませて、図6に示すように奥行き部5と前方帰還部7とを互いに接近離間させることができ、口腔22内への装着及び取り外しが容易にできる。また、巻径やコイルピッチ等を変化させて撓み力を調整することが可能となり、装着したときに作用する撓み反力により、治療のため患者が開口状態を維持する際の疲労を軽減することができる10。

さらに、保形用の線材3として、全長に亘って小径のコイル状に巻回したものや、ピアノ線等の弾力性を有する線材を用いることにより、奥行き部5と前方帰還部7とが互いに接近離間するように大きく撓ませることができる。これにより、上記と同様な利点を生じさせることが可能になる。

15 図7に示す吸引具31は、係止部34でチューブ32を切断して、略U字形に屈曲成形した保形用の線材33を露出させ、上顎歯の何れかに係止するようにするとともに、チューブ32の両切断端部32aを気密に封止したものである。露出した略U字形に屈曲した保形用の線材33により、容易かつ確実に上顎歯21の何れかに係止することができる。さらに、図8に示すように、保形用の線材320 3が露出した係止部34aにゴムや合成樹脂等の軟質部材35を被覆して、係止する際金属線が直接歯牙に当たる際の違和感を軽減することができる。その他、保形用の線材3に被覆線材を用いることもできる。

また、保形用の線材3の所定部位毎に可撓性を異ならせて、歯科医師が患者の口腔部の大小や歯並び等に応じて吸引具1、31の形状を変化させて、装着性を25 高めることができる。構造的に弾力性を異ならせるには、所定部位を延伸加工などで線材径を変えたり、細い線材の外周にパイプを嵌めてかしめたりねじ込んで

接続したり、或いはろう付け加工等を施して補強したりすることで弾力性を異ならせることが可能となる。さらに、保形用の線材の所定部位を合成樹脂製の線材により代用することもできる。又、金属線を用いる場合、予め所定部位を通電加熱急冷等の熱処理を施すことで弾力性を他の部位と異ならせることができる。

- 5 保形用の線材3にステンレス合金線材を用いて、所定部位毎に可撓性を異ならせることもできる。例えば、オーステナイト組織のステンレス鋼は、塑性加工によって一部マルテンサイト組織に変態し硬くなる。また、約1100℃まで加熱し急冷する固溶化処理を施すと、全体が完全なオーステナイト組織となり、極めて柔らかくなる。従って、所定の部位に必要な可撓性を付与でき、吸引具1を
- 10 歯科医師が患者の口腔部の大小や歯並び等に応じて変形させることができ、優れた装着性を実現することができる。そして、ステンレス合金線材は、保形用の線材3の特定の部位のみに用いることもできる

- 保形用の線材3にニッケル・チタン合金線材を用いてもよい。ニッケル・チタン合金には、超弾性特性や加工硬化型特性、或いは形状記憶特性を示すものが知られている。これらの特性を単独又は組み合わせて用いることにより、優れた使い勝手や装着性を実現できる。ニッケル・チタン合金線材はその組成比にもよるが、350℃～400℃近傍で長時間熱処理することにより超弾性特性を示すが、短時間の熱処理では加工硬化特性を示す。従って、熱処理条件や線径を調整することにより、簡単に弾力性を変化させることができる。従って、保形用の線材
- 20 3の特に奥行き部5及び前方帰還部7に相当する部位を、固溶化処理などの熱処理により柔軟にして、患者の上顎堤23若しくは下顎堤24の高さに合わせて吸引具1、31を形作ることができるから、口腔内への装着がより確実となり、使い勝手が向上するとともに、装着時の患者の違和感を軽減することができる。

- 尚ニッケル・チタン合金の他に、例えば形状記憶合金等の銅－アルミニウム－
- 25 ニッケル系合金、銅－亜鉛－アルミニウム系合金等も保形用の線材に用いることができる。そして、該ニッケル・チタン合金線材等は、保形用の線材3の特定の

部位のみに用いることもできる。

- 図9に示す吸引具41は、可撓性及び保形用を有する金属製或いは高分子樹脂製パイプ42を用いて、係止部44、奥行き部45、湾曲連続部46、前方帰還部47及び口腔内で終わる吸引用連結部48を曲成するとともに、奥行き部45及び前方帰還部47に複数の唾液吸引孔50を形成したものである。そして、吸引用連結部48に、下唇25や下顎前歯26を乗り越える吸引用チューブ49を連結する。素材を可撓性を有する合成樹脂製とした場合は、ソフトな装着感を感得でき患者に違和感を与えることがない。また、金属製或いは合成樹脂製のパイプ42内に保形用の線材を通していないから、洗浄、消毒等が容易となる。
- 10 上記吸引具41も、奥行き部45を下顎堤24の両側に、前方帰還部47を上顎堤23の両側とする天地を逆にした装着形態とすることもできる。そして、上顎堤23に沿う奥行き部45若しくは前方帰還部47に、唾液吸引孔50を設けなくて、下顎堤24に沿う奥行き部45若しくは前方帰還部47の唾液吸引孔50のみから、下顎堤24部分に溜まる唾液や、治療中に生じる口腔内の汚水等を
- 15 吸引排出するようにしてもよい。また、前記図3(a)，(b)で示したのと同様に、奥行き部45及び前方帰還部47の両方若しくは前方帰還部47のみを湾曲しない直線形状にすることもできる。さらに、図4に示したのと同様に、直線状の奥行き部45と前方帰還部47を連続させた形状とすることもできる。その他、左右一对の吸引具1，31，41を、係止部どうし連結したり、吸引用連結
- 20 部どうしを連結する等して、左右の上顎堤21及び下顎堤24に同時に装着して用いることもできる。

- また、図10に示す吸引具51は、上記各吸引具における頬側の前方帰還部57を口腔22内の位置で切断し、その切断端57aを気密に封止したものである。口腔22外へ延びる吸引連結部58が一方のみとなるから、患者の装着感を軽減することができる。切断する前方帰還部57は、舌側のものでもよい。
- 25

図11に示す吸引具51の変形例は、切断端57aの封止部から突出する保形

用の線材53により略U字形の屈曲部59を形成して、他方の前方帰還部57の
前端部に掛け渡したもので、この屈曲部59を下顎歯の何れかに係止する。これ
により、吸引具51の係止位置が、係止部54と屈曲部59による2カ所となり
、口腔内への装着をより確実に行うことができる。この場合も切断する前方帰還
5 部57は、舌側のものでよい。また、屈曲部59は保形用の線材ではなく、単
に封止部の先端に固着した線材であってもよい。

図12に示す吸引具61は、略平行な湾曲連続部66間に管軸部材70を差し
渡したもので、該管軸部材70に図13に示すネット71の柄72を挿し込んで
固定することにより、該ネット71により咽喉部を塞ぐことができる。これによ
10 り、治療中に誤って口腔22内に外れ落ちた治療小器具等を飲み込んでしまうこ
とがない。ネット71の代わりに通気性を有するスクリーンであってもよい。

図14に示す吸引具81は、頬側若しくは舌側となる奥行き部85と前方帰還
部87間に、テープ状の隔離部材90を張設したものである。この隔離部材90
を設けることにより、治療を施す歯牙部分に舌や頬粘膜の口腔内器官が近づい
15 て、治療器具等に触れてしまうのを防止できる。従って、歯科医師が治療に集中
できるとともに、患者も治療の邪魔にならない位置に舌を移動させる等、気を使
って緊張することもない。また、図15に示すように、ネット状の隔離部材91
を張設してもよい。テープやネット等の伸縮他の隔離部材を用いることにより、
吸引具81の装着時に隔離部材を緊張させることができ、確実に舌や頬粘膜の口
20 腔内器官を治療部位から隔離することができる。

図16に示す吸引具101は、上記各吸引具における頬側の前方帰還部97を
口腔22内の位置で切断し、その端部に屈曲部107aを形成して下顎歯の何れ
かに跨がせるとともに、舌側の前方帰還部107に吸引可能に連結したものであ
る。口腔22外へ延びる吸引連結部108が一方のみとなるから、患者の装着感
25 を軽減することができる。また、屈曲部107aを下顎歯の何れかに跨がせてい
るから、吸引具101の係止位置が、係止部104と屈曲部107aによる2カ

所となり、口腔内への装着をより確実に行うことができる。この場合、切断する前方帰還部 107 は、舌側のものでもよい。係止部 104 は図 5 及び図 6 に示したように、保形用の線材を露出した形態であってもよい。

尚、図 17 は上記吸引具 1 (41) の口腔 22 内への他の装着例を示し、口腔
5 奥部において前方帰還部 7 (47) を交差させて装着したものである。

また、上記各吸引具 51、61、81 及び 91 も、吸引具 1、31、41 と同様天地を逆にした形態で、口腔内へ装着できる。

また、上記したチューブ 3 やパイプ 42 の素材である高分子樹脂材料としては、ポリ塩化ビニル樹脂、シリコン樹脂、ラテックスゴム、ポリアミド樹脂、ポリ
10 アミドエラストマー、ポリエステル樹脂、ポリエステルエラストマー、ポリプロピレン樹脂、ポリプロピレンエラストマー、ポリエチレン樹脂、FEP (四フッ化エチレン六フッ化プロピレン共重合樹脂)、PFA (パーフルオロアルコキシ樹脂)、PTFE (ポリ四フッ化エチレン樹脂)、PVDF (ポリビニルフルオロライド) 等のフッ素樹脂、形状記憶樹脂、ABS 樹脂、ポリカーボネート樹脂
15 、ポリアセタール樹脂、ポリアクリレート樹脂等を用いることができる。

また、これらの材料を用いて発泡成形にすることで、より違和感を軽減することもできる。

そして、保形性を有する線材を併用する場合は、柔軟性に優れた樹脂材料が好ましい。比較的硬質な樹脂材料により、保形性及び可撓性を有するパイプ材を形
20 成してもよい。これらのチューブやパイプ材を形成する素材は多層構造であったり、2 種類以上の素材を組み合わせたものでもよく、内部に金属やエンブラなどによる編組若しくは補強線、コイル線等の補強材が設けられていても良い。

尚、本唾液吸引具に適用可能な高分子樹脂材料は、上記に例示した樹脂材料に限定されるものではない。

産業上の利用可能性

本発明の歯科医療用唾液吸引具によれば、係止部を上顎歯若しくは下顎歯の何れかに係止するとともに、開口した口腔内に装着することにより、該係止部から略平行に延びる奥行き部が上顎堤若しくは下顎堤の両側に沿い、口腔外部に向か

5 って略平行に延びる前方帰還部が下顎堤若しくは上顎堤の両側に沿う。そして、前方帰還部の前端から口腔外部に延びる吸引用連結部に吸引チューブを連結して吸引することにより、少なくとも奥行き部若しくは前方帰還部に設けた複数の唾液吸引孔から、歯科治療中に耳下腺、顎下腺及び舌下腺から生じる唾液や、治療中に生じる口腔内の汚水を確実に吸引排出できる。また、奥行き部及び前方帰還

10 部により、舌や頬粘膜の口腔内器官が治療を施す歯牙部分に近づくのを妨げたり、治療器具等に触れないように隔離できるから、治療の安全性を確保できる。

さらに、保形用の線材に保形される一本のチューブを用いて係止部及び全体形状を形成したことにより、口腔内への装着及び取り外しが容易となるとともに、上顎歯の何れかに係止部を係止し、開口状態の上下の歯牙若しくは顎堤で保持して

15 安定させることができるから、アシスタントを必要とすることなく歯科医師 1 人で治療が可能となるとともに、天地を逆にしても装着できる等の効果を有する。

請求の範囲

1. 保形用の線材により保形される一本のチューブを用いて、
該チューブの略中央部に上顎歯若しくは下顎歯の何れかに係止する略U字形の
5 係止部と、
該係止部から上顎堤若しくは下顎堤の両側に沿わせて口腔奥部に向かって略平行に延びる奥行き部と、
該奥行き部から前記下顎堤若しくは上顎堤の両側に沿って口腔の外方に向かって略平行に延びる前方帰還部と、
10 該前方帰還部の前端から口腔外部に延びる吸引用連結部と、
を形成するとともに、
少なくとも前記奥行き部若しくは前方帰還部に複数の唾液吸引孔を設けたことを特徴とする歯科医療用唾液吸引具。
- 15 2. 前記保形用の線材を前記奥行き部から前方帰還部に至る部位においてコイル状に巻回したことを特徴とする請求項1に記載の歯科医療用唾液吸引具。
3. 前記保形用の線材に弾力性を有する線材を用いて、可撓性を付与したことを特徴とする請求項1及び請求項2に記載の歯科医療用唾液吸引具。
- 20 4. 前記保形用の線材に可撓性若しくは弾力性が異なる部位を設けたことを特徴とする請求項1乃至請求項3に記載の歯科医療用唾液吸引具。
5. 前記保形用の線材に金属線を用いて熱処理により可撓性若しくは弾力性を付
25 与したことを特徴とする請求項1乃至請求項4に記載の歯科医療用唾液吸引具。

6. 前記保形用の線材にステンレス合金線材を用いたことを特徴とする請求項1乃至請求項5に記載の歯科医療用唾液吸引具。

7. 前記保形用の線材にニッケル・チタン合金線材を用いたことを特徴とする請求項1乃至請求項5に記載の歯科医療用唾液吸引具。

8. 前記係止部位で前記チューブを切断して前記略U字形に屈曲させた保形用の線材を露出させるとともに、前記チューブの切断端部を気密に封止したことを特徴とする請求項1乃至請求項7に記載の歯科医療用唾液吸引具。

10

9. 前記保形用の線材の露出部を軟質部材により被覆したことを特徴とする請求項8に記載の歯科医療用唾液吸引具。

10. 可撓性及び保形性を有するパイプ材を用いて、

15 上顎歯若しくは下顎歯の何れかに係止する略U字形の係止部と、

該係止部から上顎堤若しくは下顎堤の両側に沿わせて口腔奥部に向かって略平行に延びる奥行き部と、

該奥行き部から前記下顎堤若しくは上顎堤の両側に沿って口腔の外方に向かって略平行に延びる前方帰還部と、

20 該前方帰還部の前端に吸引用連結部とを形成するとともに、

少なくとも前記奥行き部若しくは前方帰還部に複数の唾液吸引孔を設けたことを特徴とする歯科医療用唾液吸引具。

11. 前記前方帰還部の何れか一方の前端を気密に封止して、何れか他方の前端
25 に前記吸引用連結部を形成したことを特徴とする請求項1乃至請求項10の何れかに記載の歯科医療用唾液吸引具。

12. 前記前方帰還部の何れか一方の前端を気密に封止するとともに、該封止部から突出させた線材により略U字形の屈曲部を形成して、何れか他方の前記前方帰還部の前端部に掛け渡すとともに、該前端部に前記吸引用連結部を形成したことを特徴とする請求項1乃至請求項11に記載の歯科医療用唾液吸引具。

5

13. 前記前方帰還部の何れか一方の前端部に屈曲部を形成して、前記上顎歯若しくは下顎歯の何れかを跨がせるとともに、前記前方帰還部の何れか他方に吸引可能に連結したことを特徴とする請求項1乃至請求項10の何れかに記載の歯科医療用唾液吸引具。

10

14. 前記前方帰還部若しくは奥行き部の何れか一方に咽喉部を塞ぐネット若しくはスクリーンを設けたことを特徴とする請求項1乃至請求項13に記載の歯科医療用唾液吸引具。

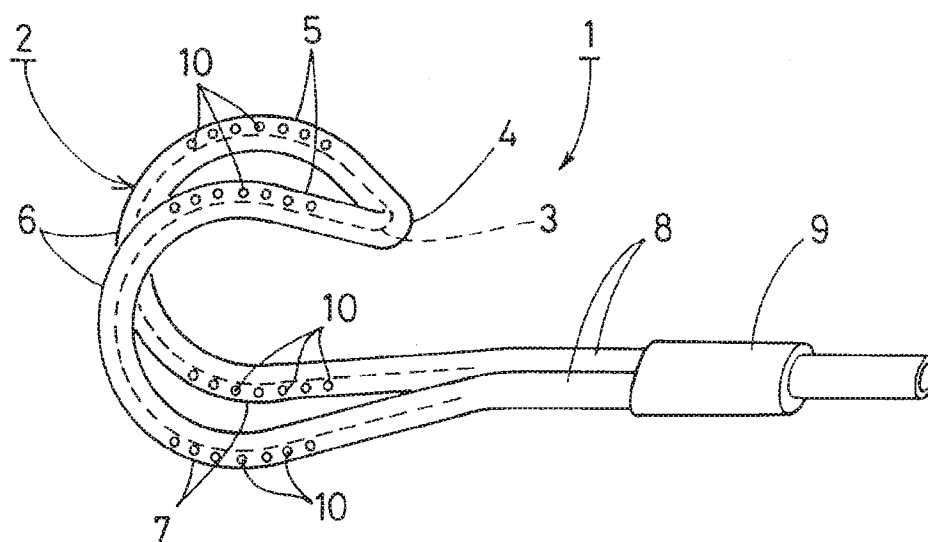
15 15. 片側若しくは両側の前記奥行き部と前方帰還部間に口腔内器官を隔離する隔離部材を差し渡したことを特徴とする請求項1乃至請求項14に記載の歯科医療用唾液吸引具。

20

25

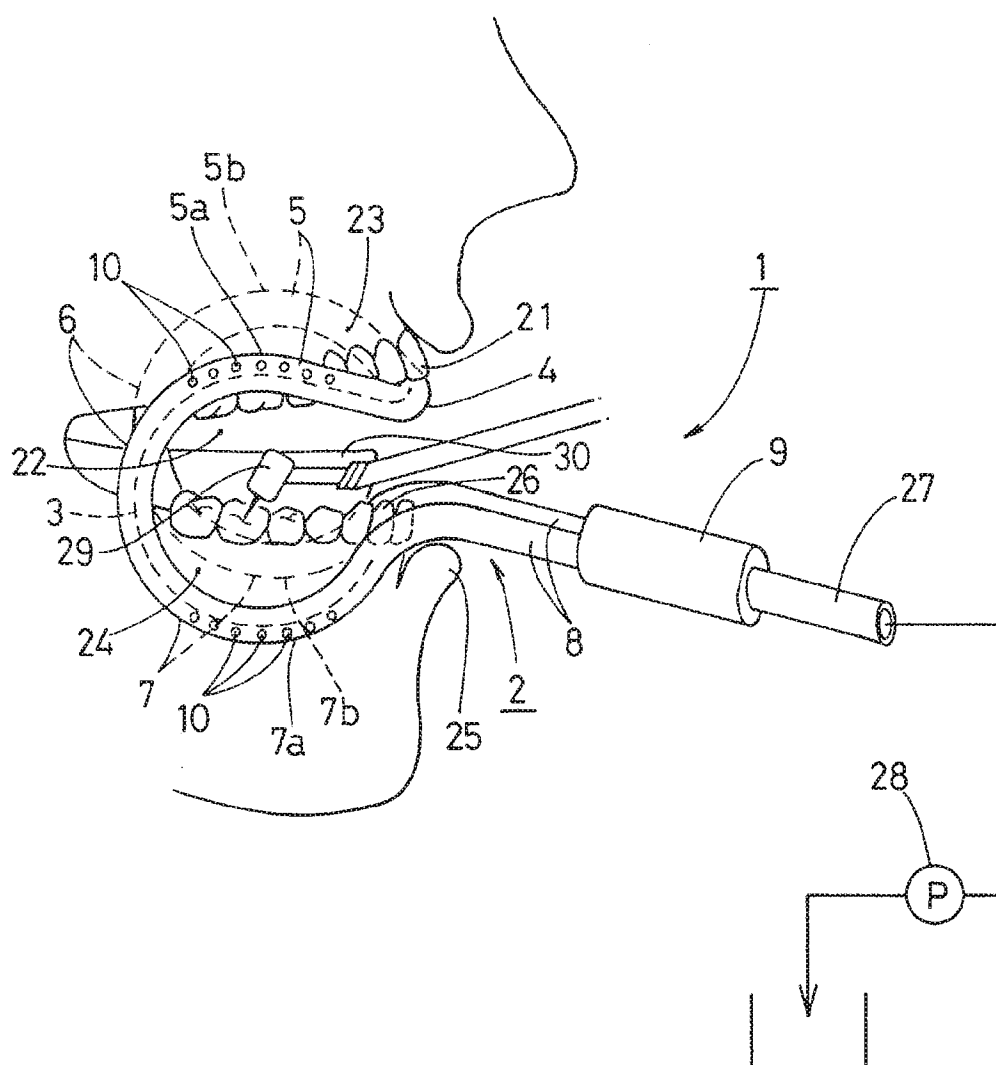
1/10

Fig. 1



2/10

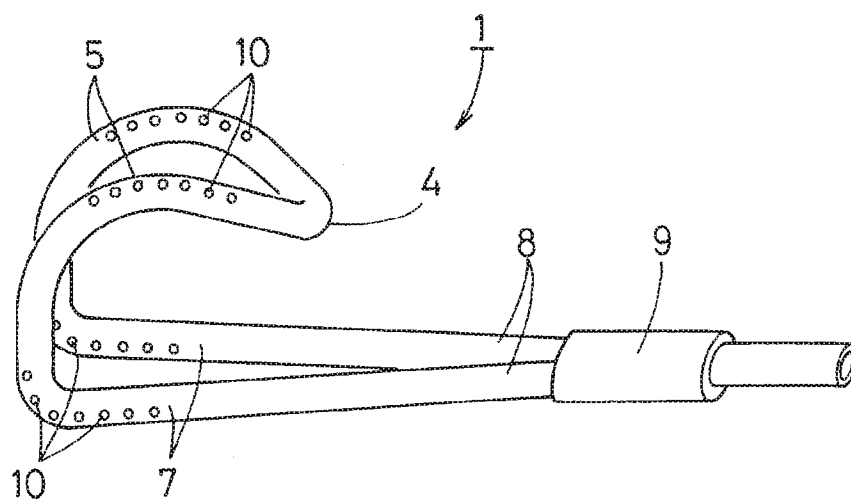
Fig. 2



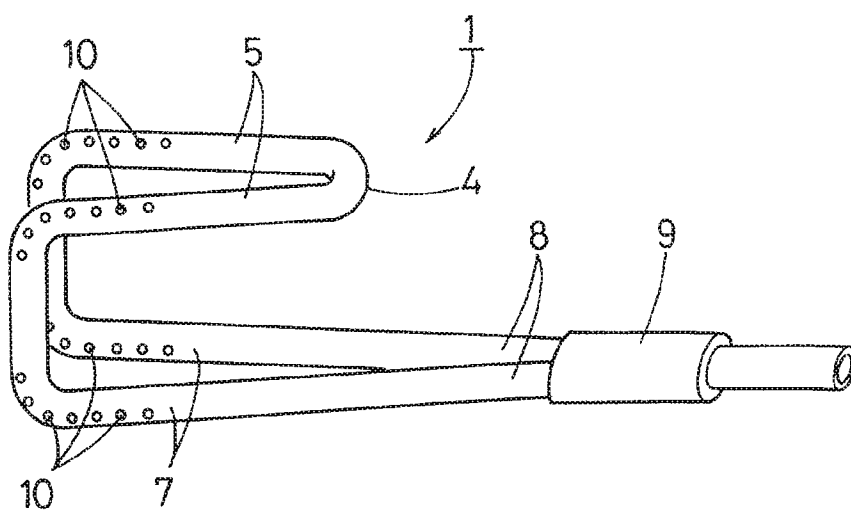
3/10

Fig. 3

(a)



(b)



4/10

Fig. 4

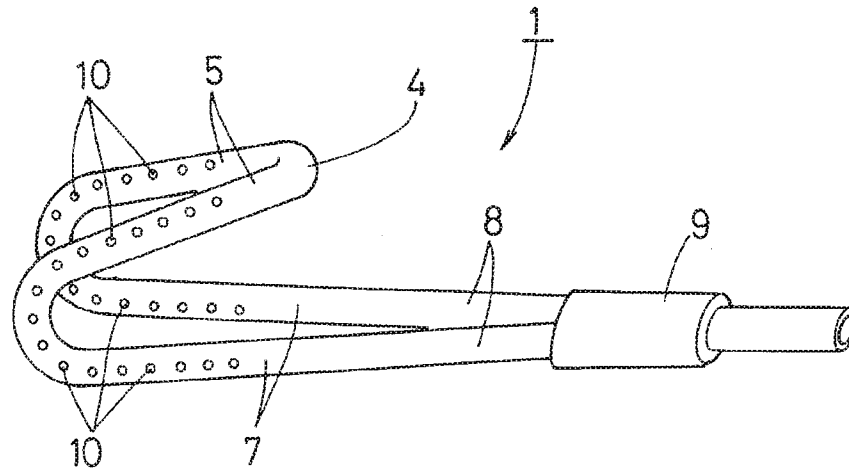
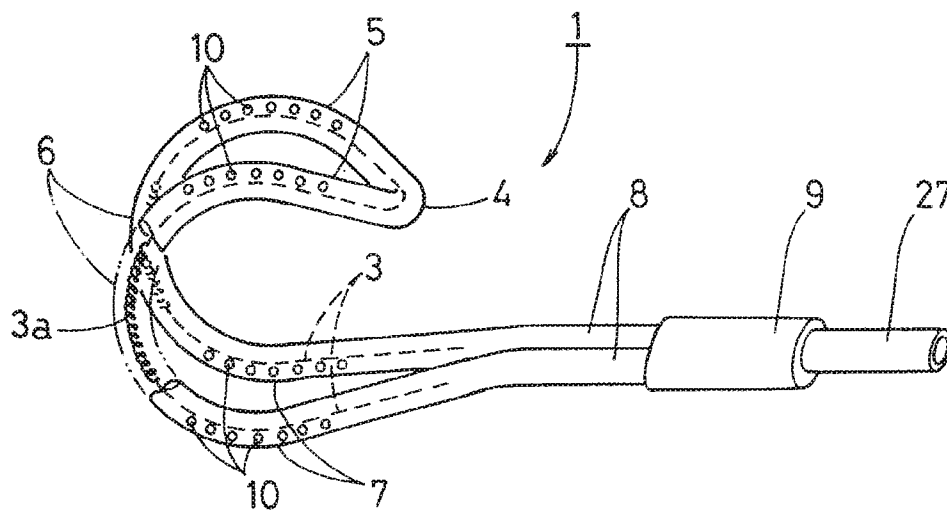


Fig. 5



5/10

Fig. 6

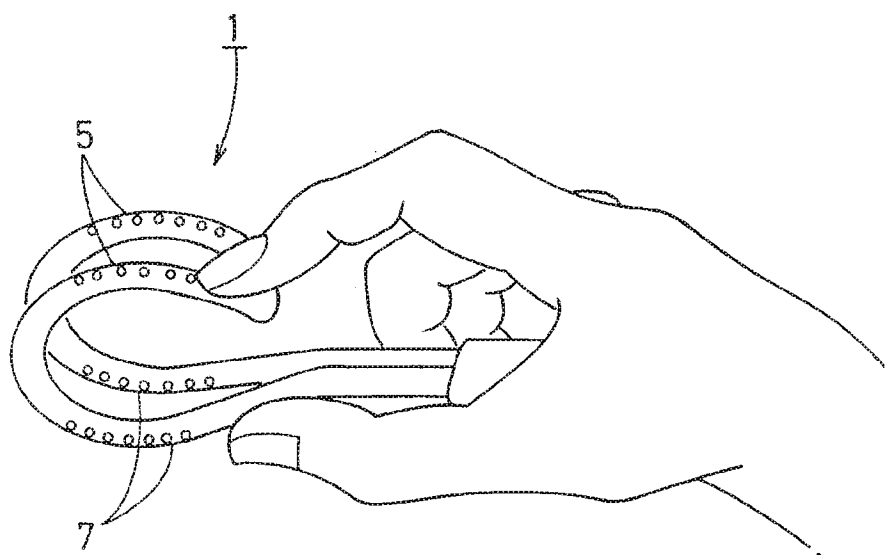
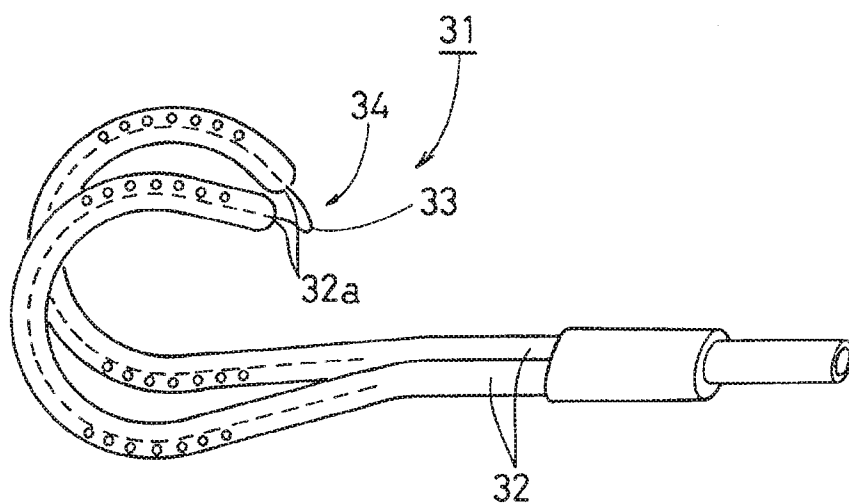


Fig. 7



6/10

Fig. 8

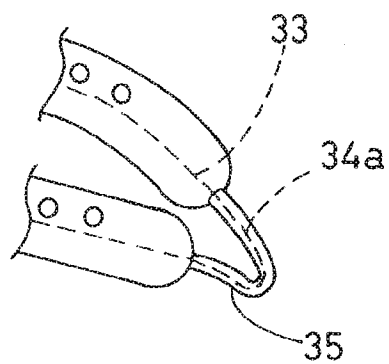
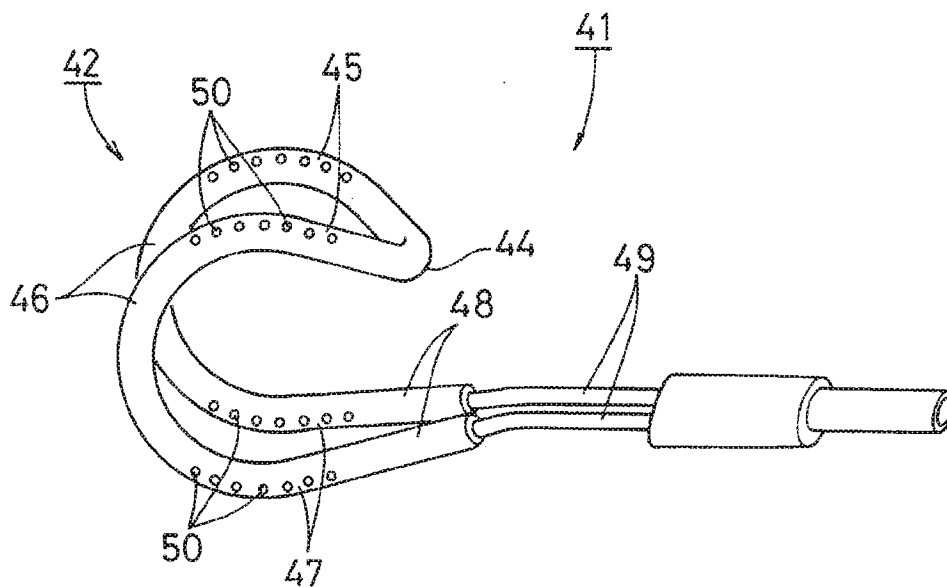


Fig. 9



7/10

Fig. 10

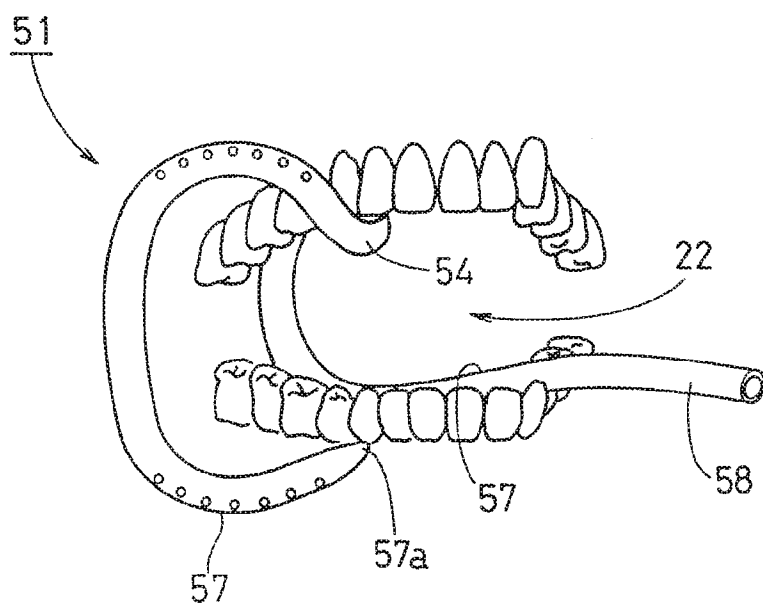
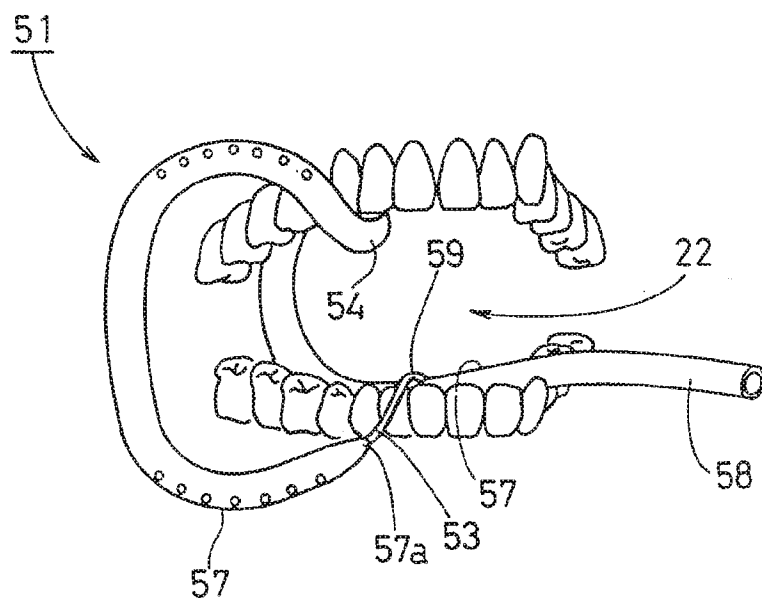


Fig. 11



8/10

Fig. 12

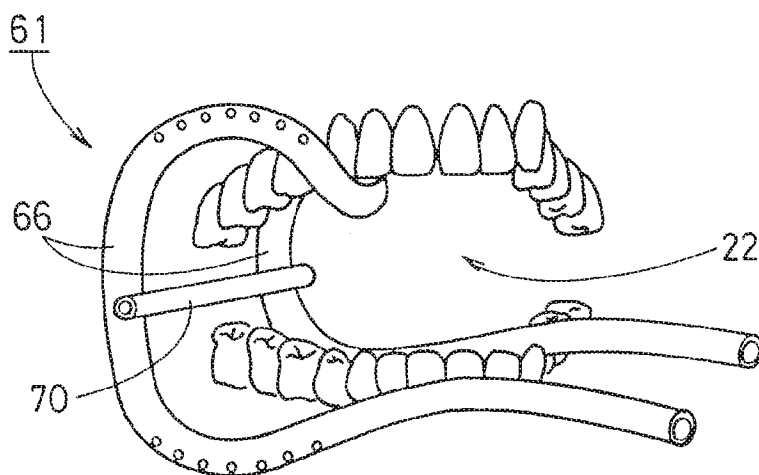
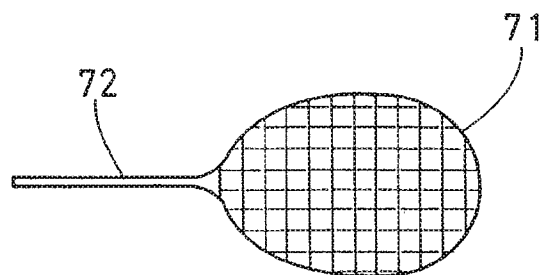


Fig. 13



9/10

Fig. 14

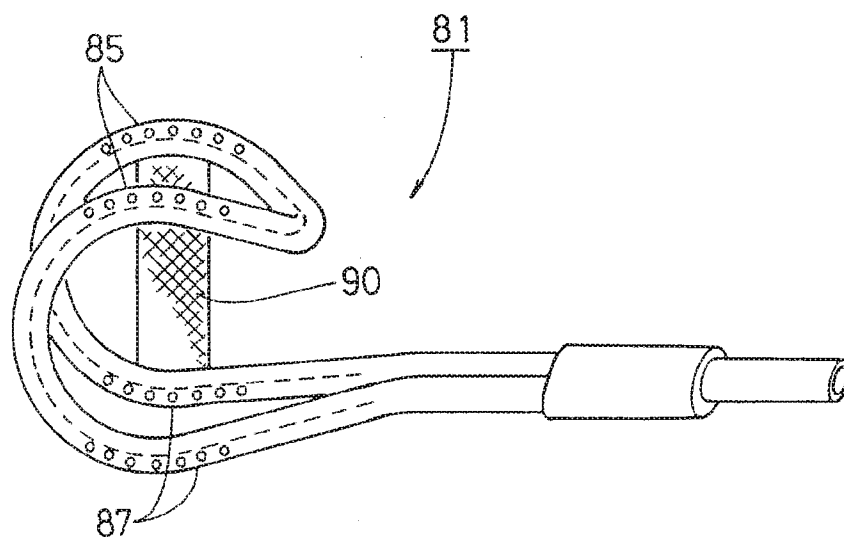
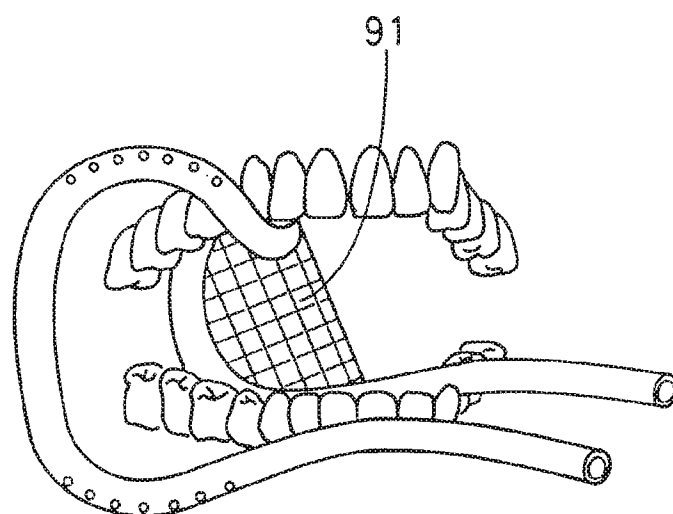


Fig. 15



10/10

Fig. 16

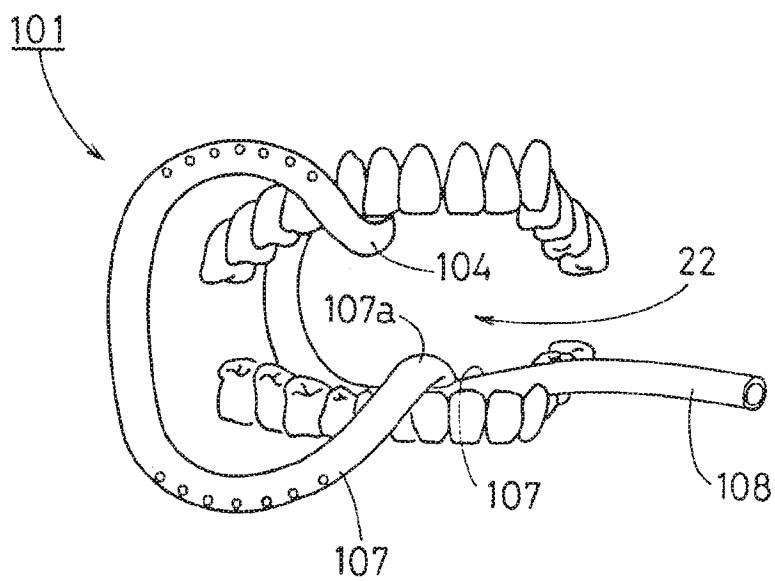
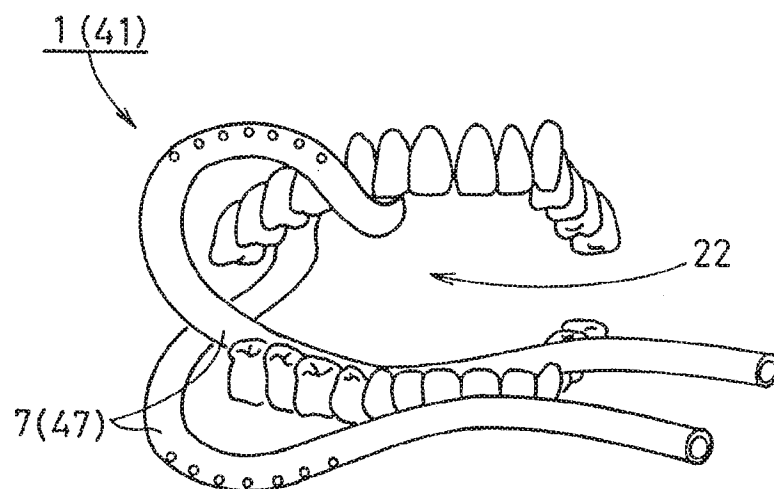


Fig. 17



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP98/00316

A. CLASSIFICATION OF SUBJECT MATTER Int.Cl. ⁶ A61C17/08		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) Int.Cl. ⁶ A61C17/08		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1921-1998 Toroku Jitsuyo Shinan Koho 1994-1998 Kokai Jitsuyo Shinan Koho 1971-1998		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP, 07-204215, A (Takeshi Eiho), August 8, 1995 (08. 08. 95) (Family: none)	1-7, 10, 11
A		8, 9, 12-15
X	JP, 57-501463, A (Anderuson Bururu Akuseru Eringu), August 19, 1982 (19. 08. 82) & WO, 82/00764, A	10, 11
A		1-9, 12-15
A	JP, 57-33849, Y (Morita Seisakusho K.K.), July 26, 1982 (26. 07. 82) (Family: none)	1-15
A	JP, 56-34733, Y (Morita Seisakusho K.K.), August 17, 1981 (17. 08. 81) (Family: none)	1-15
☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "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) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "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 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "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 "&" document member of the same patent family		
Date of the actual completion of the international search April 16, 1998 (16. 04. 98)		Date of mailing of the international search report April 28, 1998 (28. 04. 98)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

国際調査報告		国際出願番号 PCT/JP98/00316	
A. 発明の属する分野の分類 (国際特許分類 (IPC))			
Int. Cl. ⁸ A61C 17/08			
B. 調査を行った分野			
調査を行った最小限資料 (国際特許分類 (IPC))			
Int. Cl. ⁹ A61C 17/08			
最小限資料以外の資料で調査を行った分野に含まれるもの			
日本国実用新案公報 1921-1998年 日本国公開実用新案公報 1971-1998年 日本国登録実用新案公報 1994-1998年			
国際調査で利用した電子データベース (データベースの名称、調査に使用した用語)			
C. 関連すると認められる文献			
引用文献の カテゴリー*	引用文献名 及び一部の箇所が関連するときは、その関連する箇所の表示	関連する 請求の範囲の番号	
X	JP, 07-204215, A (英保 武志) 8. 8月. 1995 (08. 08. 95) (ファミリーなし)	1-7, 10, 11	
A		8, 9, 12-15	
X	JP, 57-501463, A (アンデルソン・ブルール・アク セル・エリング) 19. 8月. 1982 (19. 08. 82) & WO, 82/00764, A	10, 11	
A		1-9, 12-15	
☒ C欄の続きにも文献が列挙されている。 ☐ パテントファミリーに関する別紙を参照。			
* 引用文献のカテゴリー 「A」 特に関連のある文献ではなく、一般的技術水準を示すもの 「E」 先行文献ではあるが、国際出願日以後に公表されたもの 「L」 優先権主張に疑義を提起する文献又は他の文献の発行日若しくは他の特別な理由を確立するために引用する文献 (理由を付す) 「O」 口頭による開示、使用、展示等に言及する文献 「P」 国際出願日前で、かつ優先権の主張の基礎となる出願日の後に公表された文献 「T」 国際出願日又は優先日後に公表された文献であって出願と矛盾するものではなく、発明の原理又は理論の理解のために引用するもの 「X」 特に関連のある文献であって、当該文献のみで発明の新規性又は進歩性がないと考えられるもの 「Y」 特に関連のある文献であって、当該文献と他の1以上の文献との、当業者にとって目明である組合せによって進歩性がないと考えられるもの 「&」 同一パテントファミリー文献			
国際調査を完了した日 16. 04. 98		国際調査報告の発送日 28.04.98	
国際調査機関の名称及びあて先 日本国特許庁 (ISA/JP) 郵便番号100-8915 東京都千代田区霞が関三丁目4番3号		特許庁審査官 (権限のある職員) 鈴木 寛治 印 電話番号 03-3581-1101 内線 3453	

様式PCT/ISA/210 (第2ページ) (1992年7月)

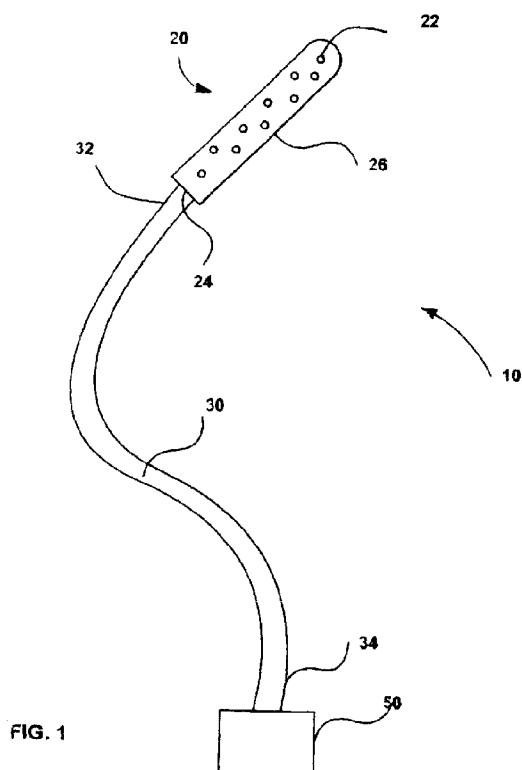
C (続き) . 関連すると認められる文献		
引用文献の カテゴリー*	引用文献名 及び一部の箇所が関連するときは、その関連する箇所の表示	関連する 請求の範囲の番号
A	JP, 57-33849, Y (株式会社モリタ製作所) 26. 7月. 1982 (26. 07. 82) (ファミリーなし)	1-15
A	JP, 56-34733, Y (株式会社モリタ製作所) 17. 8月. 1981 (17. 08. 81) (ファミリーなし)	1-15



- (51) International Patent Classification:
A61C 17/08 (2006.01) *A61C 17/12* (2006.01)
A61C 17/06 (2006.01)
- (21) International Application Number:
PCT/CA2010/001204
- (22) International Filing Date:
4 August 2010 (04.08.2010)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
61/231,262 4 August 2009 (04.08.2009) US
- (71) Applicant (for all designated States except US): **UNIVERSITY OF MANITOBA** [CA/CA]; Technology Transfer Office, 631 Drake Centre, 181 Freedmen Crescent, Winnipeg, Manitoba R3T 2N2 (CA).
- (72) Inventors; and
(75) Inventors/Applicants (for US only): **MAYCHER, David, John** [CA/CA]; c/o 674 Granville Street, Vancouver, British Columbia V6C 1Z6 (CA). **PESUN, Igor** [CA/CA]; c/o D227B - 780 Bannatyne Avenue, Winnipeg, Manitoba R3E 0W2 (CA).
- (74) Agents: **POLONENKO, Daniel** et al.; Gowling Lafleur Henderson LLP, Box 30, 2300-550 Burrard Street, Vancouver, British Columbia V6C 2B5 (CA).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

[Continued on next page]

(54) Title: DENTAL APPARATUS



(57) Abstract: A dental apparatus for removing fluid from a patient's mouth during a dental procedure, the dental apparatus includes an intraoral tip having a wall defining a cavity, the wall having a plurality of apertures and at least one opening, the apertures being distributed over the wall; and a hollow tube coupled to the intraoral tip, the hollow tube for connecting the opening of the intraoral tip to a suction device. The intraoral tip is continuously within the patient's mouth during the dental procedure and the dental apparatus removes fluid from the patient's mouth through the apertures of said intraoral tip. In one embodiment, the dental apparatus further includes a valve for modulating the rate of fluid removal from the patient's mouth. In another embodiment, the dental apparatus further includes a fastener for securing the intraoral tip within the patient's mouth.



(84) **Designated States** *(unless otherwise indicated, for every kind of regional protection available):* ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK,

SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

DENTAL APPARATUS

FIELD OF THE INVENTION

[0001] This invention relates to an apparatus for removing fluid from a patient's mouth during dental procedures.

BACKGROUND OF THE INVENTION

[0002] During dental procedures, a patient must sit still with their mouth open to allow a dental professional access inside the oral cavity using a variety of dental instruments. This open, mouth position allows a build-up of salivary fluids in a patient's mouth. In addition, water may be introduced to rinse the mouth during certain dental procedures. This build-up of moisture must be removed from the patient's mouth to prevent gagging, choking or undesirable swallowing.

[0003] Current moisture control devices, known in the art as moisture evacuators, are designed primarily for operation by a health professional. In some cases, patients may exhibit anxiety over the use of moisture evacuators. One commonly used moisture control device is a saliva ejector, which is generally characterised by large partially-rigid tubing, fixed flow rates and a high degree of suction for quickly removing moisture and debris from a patient's mouth. In operation, a dental professional periodically inserts the tip of the saliva ejector into a patient's mouth to remove fluids and debris. The frequency of insertion is determined by the dental professional and can only occur as opportunities during the dental procedure permit or on an interruption basis when the patient demonstrates obvious discomfort or anxiety. The insertion of a large tube can be uncomfortable and may cause tissue abrasions and bruising. Some currently available dental moisture control device is expensive, and is designed and integrated with other existing dental machinery. Integrated products from sophisticated manufacturers are often not accessible or affordable to all dental practitioners.

SUMMARY OF THE INVENTION

[0004] The embodiments of the present invention relate to an apparatus for moisture control in the oral cavity during dental procedures. The apparatus may be operated by a health professional or a patient. Operation and control of the apparatus by the patient helps reduce anxiety related to oral moisture evacuation by providing the patient with some control over the procedure.

[0005] One embodiment of the dental apparatus relates to a dental apparatus for removing fluid from a patient's mouth during a dental procedure. The dental apparatus includes an intraoral tip having a wall defining a cavity, and a hollow tube coupled to the intraoral tip. The wall has a plurality of apertures distributed over the wall and at least one opening. The hollow tube connects the opening of the intraoral tip to a suction device. The intraoral tip is continuously placed within the patient's mouth during the dental procedure and the dental apparatus removes fluid from the patient's mouth through the apertures of the intraoral tip.

[0006] According to one aspect, the apertures are evenly distributed between a first end and a second end of the intraoral tip. According to another aspect, the apertures 22 are unevenly distributed between the first end and the second end of the intraoral tip.

[0007] According to one aspect, the rate of fluid removal from the patient's mouth may be adjusted to be about equivalent the salivary flow rate.

[0008] Another embodiment of the dental apparatus further includes a valve for modulating the rate of fluid removal from the patient's mouth. According to one aspect, the valve is located between the intraoral tip and the suction device. According to another aspect, the valve is movable between a plurality of operating positions. According to yet another aspect, the valve is operable by the patient.

[0009] Another embodiment of the dental apparatus further includes a flow control switch in communication with the valve for enabling said patient to control said rate of fluid removal from their mouth. According to one aspect, the flow control switch moves the valve between a plurality of operating positions.

[00010] Another embodiment of the dental apparatus further includes a fastener for securing the intraoral tip within the patient's mouth. According to one aspect, the fastener is selected from the group including dental floss, a ring, a clip, and combinations thereof.

[00011] In one embodiment of the dental apparatus, the diameter of the apertures is from about 0.25 mm to about 3 mm.

[00012] In one embodiment of the dental apparatus, the length of the intraoral tip is from about 5 mm to about 40 mm.

[00013] In one embodiment of the dental apparatus, the internal diameter of the intraoral tip is from about 0.25 mm to about 10 mm.

[00014] According to one aspect, the intraoral tip is removably or permanently coupled to the hollow tube.

BRIEF DESCRIPTION OF THE DRAWINGS

[00015] Embodiments of the present invention will be described with reference to the following drawings, in which like reference numerals denote like parts:

[00016] Fig. 1 is a top view of a dental apparatus according to an embodiment;

[00017] Fig. 2 is a top view of a dental apparatus according to another embodiment;

[00018] Fig. 3 is a top view of a dental apparatus according to another embodiment;

[00019] Fig. 4 is a schematic view of a dental apparatus of another embodiment received in a patient's mouth;

[00020] Fig. 5 is a top view of an intraoral tip of a dental apparatus according to another embodiment;

[00021] Fig. 6 is a top view of an intraoral tip of a dental apparatus according to another embodiment;

[00022] Fig. 7 is a top view of an intraoral tip of the dental apparatus of Fig. 1;

[00023] Fig. 8 is a top view of a dental apparatus according to another embodiment; and

[00024] Fig. 9 is a cross-sectional view of an intraoral tip of a dental apparatus according to another embodiment.

DETAILED DESCRIPTION OF THE INVENTION

[00025] The embodiments of the present invention relate to a dental apparatus for moisture control in the oral cavity during dental procedures. The dental apparatus enables moisture removal from a patient's mouth.

[00026] Referring to Fig. 1, a dental apparatus according to an embodiment of the present invention is indicated by reference numeral 10. An intraoral tip 20 of the dental apparatus 10 is coupled to a first end 32 of a hollow tube 30. A second end 34 of the hollow tube 30 is connected to a suction device 50 by any suitable connector known to those skilled in the art. The suction device 50 acts as a vacuum. The intraoral tip 20 comprises a wall 26

defining a cavity 29 and a plurality of apertures 22 (Fig. 9). The apertures 22 of the intraoral tip 20 extend through the wall 26 and are distributed over the wall 26 in a variety of configurations. In one embodiment, the intraoral tip 20 is coupled to the hollow tube 30 by a tube connector (not shown). The tube connector may be a fastener, an adhesive, a sleeve or any other suitable tube connector known to those skilled in the art. Alternatively, the intraoral tip 20 may be coupled to the hollow tube 30 by a fused joint. It would be appreciated by a person skilled in the art that the intraoral tip 20 may be removably coupled to the hollow tube 30 or permanently fixed thereto.

[00027] The apertures 22 are evenly distributed between a first end 27 and a second end 28 of the intraoral tip 20. As shown in Figures 1 and 9, the apertures 22 are provided in a repeating pattern over wall 26 of the intraoral tip 20. The diameter of the apertures 22 may range from about 0.25 mm to about 3 mm.

[00028] The apertures 22 may alternatively be unevenly distributed between the first end 27 and the second end 28 of the intraoral tip 20. The apertures 22 may alternatively be distributed proximate to the first end 27 of the intraoral tip 20. Alternatively, the apertures 22 may be distributed proximate to the second end 28 of the intraoral tip 20.

[00029] The intraoral tip 20 sized for a comfortable fit in a patient's mouth. During a dental procedure, the intraoral tip 20 is placed inside the patient's mouth continuously throughout the duration of the dental procedure. The intraoral tip 20 is generally between about 5 mm and about 40 mm in length and includes an internal diameter of between about 0.25 mm and about 10 mm. The internal diameter may also be referred to as the width for embodiments in which the cross-section of the intraoral tip 20 is not circular. The intraoral tip 20 is made of plastic and is rigid. The intraoral tip 20 may alternatively be made of a collapsible plastic that deforms when pressure is applied to the wall 26 of the intraoral tip 20. The pressure applied may temporarily deform the intraoral tip 20. The intraoral tip 20 is not limited to being made of a plastic material, it may be constructed from any suitable material. In one embodiment, the intraoral tip 20 is made of an autoclavable material. Alternatively, the intraoral tip 20 is made of a non-autoclavable material and is intended for a single use.

[00030] The hollow tube 30 is made of a polymer and is semi-rigid. The hollow tube 30 may alternatively be made of a rigid or flexible polymer material. The hollow tube 30 is not limited to being made of a polymer material, it may be constructed from any suitable material,

such as plastic, polypropylene, PVC, and polystyrene, for example. The internal diameter of the hollow tube 30 is generally between about 0.25 mm and about 10 mm. In one embodiment, the hollow tube 30 is made of an autoclavable material. Alternatively, the hollow tube 30 is made of a non-autoclavable material and is intended for a single use.

[00031] The suction device 50 applies a vacuum force that causes fluids within the mouth of a patient to be drawn through apertures 22 of the intraoral tip 20, into the cavity 29, through opening 24, and into hollow tube 30 thereby allowing the intraoral tip 20 to remove moisture from a patient's mouth during a dental procedure. The hollow tube 30 defines a passageway for the fluid removed from the patient's mouth. In one embodiment, micro-particles smaller than the diameter of the apertures 22 are removed from the mouth of a patient. Suction devices are well known in the art and therefore will not be described further here.

[00032] Referring to Figure 2, another embodiment of a dental apparatus is indicated by reference numeral 12. The dental apparatus 12 is similar to the dental apparatus 10, however, further includes a valve 40 located between the intraoral tip 20 and the suction device 50. More specifically, the valve 40 is located between the first end 32 and the second end 34 of hollow tube 30. The valve 40 modulates the rate of fluid removal from the patient's mouth through the hollow tube 30 by opening, closing, or partially obstructing the passageway. In one embodiment, the valve 40 has a plurality of operating positions: in a closed position, no flow passes through the valve 40, in a partially open position, some flow passes through the valve 40 and in an open position, a maximum flow passes through the valve 40. The valve 40 is movable between the operating positions by a flow control switch 44 that is operable by the patient. The flow control switch 44 is in communication with the valve 40 and enables the patient to control the rate of fluid removal from their mouth during a dental procedure by selecting the desired operating position of the valve 40.

[00033] The operating positions of the valve 40 regulate the rate of fluid removal from the patient's mouth and may be set so that the partially open position allows a pre-determined amount of flow to pass through the valve 40, or alternatively, the operating positions of the valve 40 may be continuous between the closed position and the open position so that any amount of flow may be allowed to pass through the valve 40.

[00034] In one embodiment, the flow control switch 44 is a mechanical switch that physically moves the valve 40 between the plurality of operating positions. In one aspect, the mechanical switch is mounted on the hollow tube 30 and applies pressure directly to the hollow tube 30 adjusting the amount of flow through the hollow tube 30. Mechanical flow control switches are well known in the art and therefore will not be described further here. In another embodiment, the flow control switch is an electrical switch that actuates the valve 40. The electrical switch may include "up" and "down" buttons that actuate the valve 40 between the open and closed positions in increments having a pre-determined size. Electrical flow control switches are well known in the art and therefore will not be described further here.

[00035] In one embodiment the valve 40 is operable by one hand of the patient.

[00036] Referring to Figure 3, another embodiment of the dental apparatus is indicated by reference numeral 14. The dental apparatus 14 is similar to the dental apparatus 10 and the dental apparatus 12, however, further includes a fastener 42 for securing the intraoral tip 20 within the mouth of a patient. The fastener 42 generally maintains the intraoral tip 20 in a constant position within the mouth. By restricting movement of the intraoral tip 20 within the mouth, abrasions or bruising on the floor of the mouth, tongue, and cheek areas are generally prevented.

[00037] In one embodiment, the fastener 42, for example dental floss, a ring, or a clip, enables attachment of the intraoral tip 20 to a tooth. Suitable fasteners are exemplified by a knotted or unknotted loop of dental floss, a ring comprising metal and/or plastics and/or composite materials, a clip comprising metal and/or plastics and/or composite materials, and the like. A suitable ring may be resilient or alternative non-resilient. The ring may additionally comprise two or more resilient prongs fashioned to releasably engage a tooth when pressed thereupon. A suitable clip may comprise two opposing components engaged with a spring, fashioned into a clamp. The fastener 42 is attached to a tooth and the intraoral tip 20 is affixed to the fastener 42 thereby securing the intraoral tip 20 inside the mouth of a patient. Comfortable placement of both the fastener 42 and the intraoral tip 20 may be facilitated by one of the patient or a dental professional. The fastener 42 may be moved from one tooth to another as necessary, depending on the dental procedure and the comfort of the patient. The intraoral tip 20 is continuously fixed by fastener 42 inside the patient's mouth throughout the length of a dental procedure. In one embodiment, the fastener 42 is injection moulded and constructed from resilient synthetic materials. The fastener 42 is alternatively

made of rigid materials. The fastener 42 may be constructed from any suitable material. A person skilled in the art would understand the dimensions of the fastener 42 are suitable for affixing the fastener 42 to a tooth of a patient. In one embodiment, the fastener 42 is made of an autoclavable material. Alternatively, the fastener is made of a non-autoclavable material and is intended for a single use. In one embodiment, the fastener 42 is securely coupled to the intraoral tip 20. In another embodiment, the fastener 42 may be removably coupled to the intraoral tip 20. In still another embodiment, the fastener 42 may be securely or removably coupled to the tube 30.

[00038] A single-use hollow tube, intraoral tip, and fastener may be sterilized by one of a suitable radiation procedure, exemplified by gamma irradiation or a suitable chemical gas infiltration, exemplified by ethylene oxide infiltration and steam autoclave sterilization.

[00039] When an embodiment of the dental apparatus is in operation, the rate of fluid removal from a patient's mouth is generally at a low rate of fluid removal and does not over-dry the mouth. The rate of fluid removal is the rate at which saliva is being sucked out of the patient's mouth. More desirably, the rate of fluid removal from the patient's mouth is about equivalent the salivary flow rate. Typical salivary flow rates range from between about 0.1 ml/minute and about 0.6 ml/minute, however, a person skilled in the art would understand that salivary flow rates vary between patients. A low rate for fluid removal from a patient's mouth may be achieved by using: a small internal diameter hollow tube 30, where the diameter is between about 0.25 mm and about 10 mm; a valve 40, to control the rate of fluid removal through the hollow tube; a suction device known to those skilled in the art; and combinations thereof.

[00040] Alternative embodiments of the intraoral tip 20 are shown in Fig. 5, Fig. 6 and Fig. 7. The intraoral tip 20 may be circular as shown in Fig. 5, square as shown in Fig. 6, and cylindrical as shown in Fig. 6. The intraoral tip 20 may alternatively be rectangular, ovular, and bulbous. It will be appreciated by a person skilled in the art that the intraoral tip 20 may be any suitable shape and size. In general, the dimensions fall about within the ranges described in relation to the intraoral tip 20 of Fig. 1.

[00041] Referring to Figure 8, another embodiment of a dental apparatus 100 includes a first intraoral tip 200 and a second intraoral tip 202. As shown, the first intraoral tip 200 of the dental apparatus 100 is coupled to a first end 302 of a first hollow tube 300 and the second intraoral tip 202 of the dental apparatus 100 is coupled to a first end 312 of a

second hollow tube 310. A second end 304 of the first hollow tube 300 and a second end 314 of second hollow tube 310 are connected together and joined to a third hollow tube 320. The third hollow tube 320 is connected to a suction device (not shown) by any suitable connector known to those skilled in the art. Each of the first and second intraoral tips 200, 202 comprise a wall 260 defining a cavity (not shown) and a plurality of apertures 220. The apertures 220 of the intraoral tips 200, 202 extend through the wall 260 and are distributed over the wall 260 in a variety of configurations. In one embodiment, the intraoral tip 200, 202 is coupled to the hollow tube 300, 310 by a tube connector (not shown). It would be appreciated by a person skilled in the art that the intraoral tip 200, 202 may be removably coupled to the hollow tube 300, 310 or permanently fixed thereto.

[00042] In an alternative embodiment, the second end 304 of the first hollow tube 300 connects to a first suction device and the second end 314 of the second hollow tube 310 connects to a second suction device.

[00043] In preparation for use in a dental procedure, the intraoral tip 20 of the dental apparatus of Figure 4 is placed inside a patient's mouth. The intraoral tip 20 is secured within the mouth by fastener 42 continuously for the duration of the dental procedure. The intraoral tip 20 is connected through opening 24 to a suction device 50 by a hollow tube 30. The hollow tube 30 protrudes from the patient's mouth and a length of the hollow tube extends across the body of the patient. The second end 34 of the hollow tube 30 is connected to a suction device 50 by any suitable connector. On beginning the dental procedure, the suction device 50 is turned on and applies suction indirectly to the intraoral tip 20. This suction pressure enables the removal of moisture from the patient's mouth at a low rate of fluid removal, more specifically at a rate of fluid removal about the salivary flow rate of the patient. Fluid within a patient's mouth flows through the apertures 22 and into the cavity 29 of the intraoral tip 20. Fluid exits the intraoral tip 20 through opening 24 and flows into the hollow tube 30. In the event an aperture 22 of the intraoral tip 20 becomes blocked, the plurality of other apertures 22 distributed over the wall 26 of the intraoral tip 20 enable the dental apparatus to function effectively. Where the blockage of an aperture 22 of the intraoral tip 20 is due to the intraoral tip 20 touching the cheek tissue of the patient, the low rate of fluid removal of the dental apparatus generally prevents the patient from incurring abrasions and/or bruising of the cheek tissue. The patient controls the rate of fluid removal by manipulating valve 40. As the patient perceives moisture building up inside their mouth,

the patient may operate valve 40 to either increase or decrease the rate of fluid removal thereby adjusting the moisture level in their mouth.

[00044] By allowing the patient to control the moisture removal process, anxiety about a health professional-operated moisture control device is removed. The dental apparatus is continuously located in the patient's mouth during a dental procedure so no discomfort is experienced due to repeated insertion and removal of the moisture control device during the dental procedure. In addition, the patient experiences little or no discomfort while the dental apparatus is continuously located in the mouth because of the small size and streamlined shape of the intraoral tip 20. The ability to control the amount of fluid in the mouth further increases the patient's level of comfort so that the patient is able to relax more effectively while undergoing the dental procedure.

[00045] The above-described embodiments have been provided as examples, for clarity in understanding the invention. A person of skill in the art will recognize that alterations, modifications and variations may be effected to the embodiments described above while remaining within the scope of the invention as defined by the claims appended hereto.

What is claimed is:

1. A dental apparatus for removing fluid from a patient's mouth during a dental procedure, said dental apparatus comprising:

an intraoral tip having a wall defining a cavity, said wall having a plurality of apertures and at least one opening, said apertures being distributed over the wall; and

a hollow tube coupled to said intraoral tip, said hollow tube for connecting said opening of said intraoral tip to a suction device;

wherein said intraoral tip is continuously within said patient's mouth and wherein said dental apparatus removes fluid from said patient's mouth through said apertures of said intraoral tip.

2. A dental apparatus according to claim 1 further comprising a valve for modulating the rate of fluid removal from said patient's mouth.
3. A dental apparatus according to claim 2, wherein said valve is located between said intraoral tip and said suction device.
4. A dental apparatus according to claim 2, wherein said valve has a plurality of operating positions and is moveable between said operating positions.
5. A dental apparatus according to claim 2 further comprises a flow control switch, wherein said flow control switch is in communication with said valve for enabling said patient to control said rate of fluid removal from their mouth.
6. A dental apparatus according to claim 5, wherein said flow control switch moves said valve between a plurality of operating positions.
7. A dental apparatus according to claim 1, wherein the rate of fluid removal from said patient's mouth is about said salivary flow rate.
8. A dental apparatus according to claim 2, wherein said valve is operable by said patient.
9. A dental apparatus according to claim 1 further comprising a fastener for securing said intraoral tip within said patient's mouth.

10. A dental apparatus according to claim 9, wherein said fastener is selected from the group comprising dental floss, a ring, a clip, and combinations thereof.
11. A dental apparatus according to claim 9, wherein said fastener attaches said intraoral tip to a tooth within said patient's mouth.
12. A dental apparatus according to claim 1, wherein said apertures are evenly distributed between a first end and a second end of said intraoral tip.
13. A dental apparatus according to claim 1, wherein said apertures are unevenly distributed between a first end and a second end of said intraoral tip.
14. A dental apparatus according to claim 1, wherein said apertures are distributed proximate to a first end of said intraoral tip.
15. A dental apparatus according to claim 1, wherein said apertures are distributed proximate to a second end of said intraoral tip.
16. A dental apparatus according to claim 1, wherein a diameter of said apertures is from about 0.25 mm to about 3 mm.
17. A dental apparatus according to claim 1, wherein a length of said intraoral tip is from about 5 mm to about 40 mm.
18. A dental apparatus according to claim 1, wherein an internal diameter of said intraoral tip is from about 0.25 mm to about 10 mm.
19. A dental apparatus according to claim 1, wherein said intraoral tip is removably coupled to said hollow tube.
20. A method for removing fluid from a patient's mouth during a dental procedure, said method comprising:

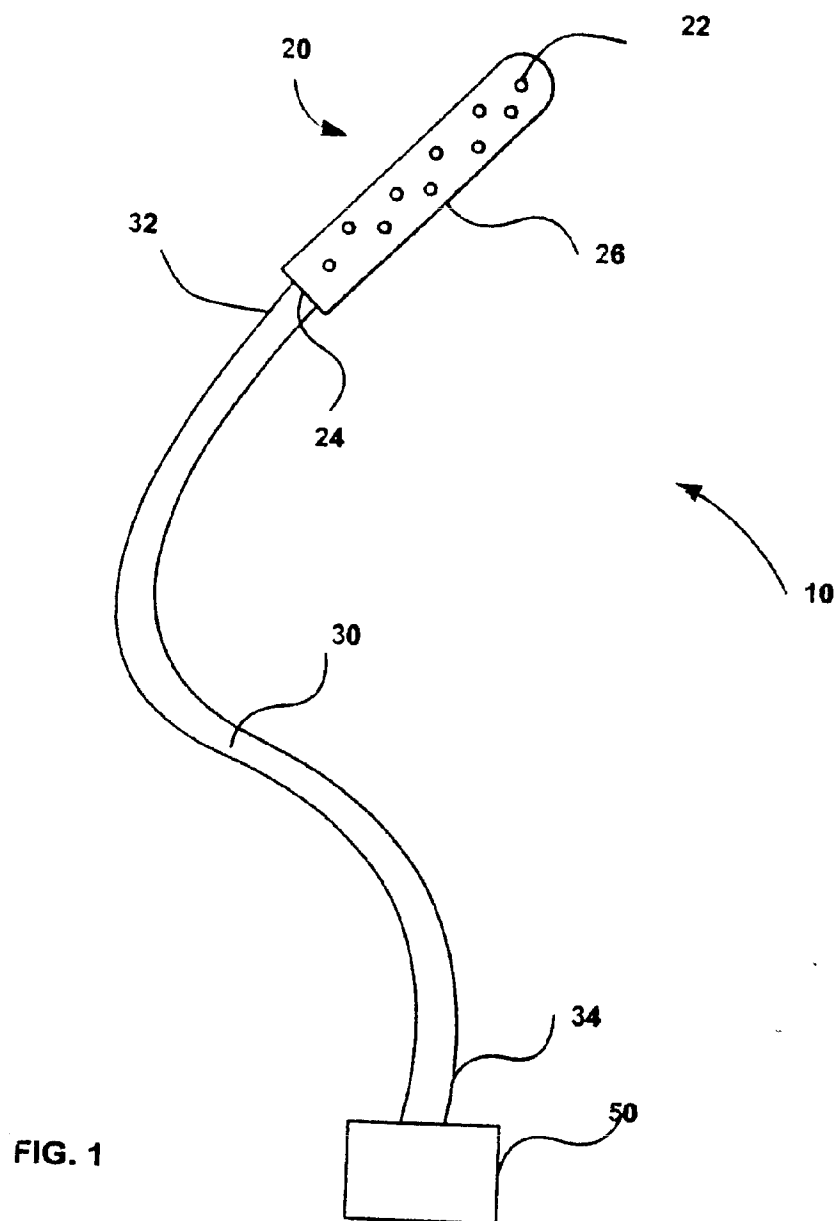
inserting a dental apparatus into said patient's mouth, said dental apparatus comprising a hollow tube coupled to an intraoral tip, said intraoral tip having a wall defining a cavity, a plurality of apertures provided in said wall and an opening, a first end of a hollow tube being coupled to said opening of said intraoral tip;

removing fluid from said patient's mouth by operating a suction device, said suction device being coupled to a second end of said hollow tube;

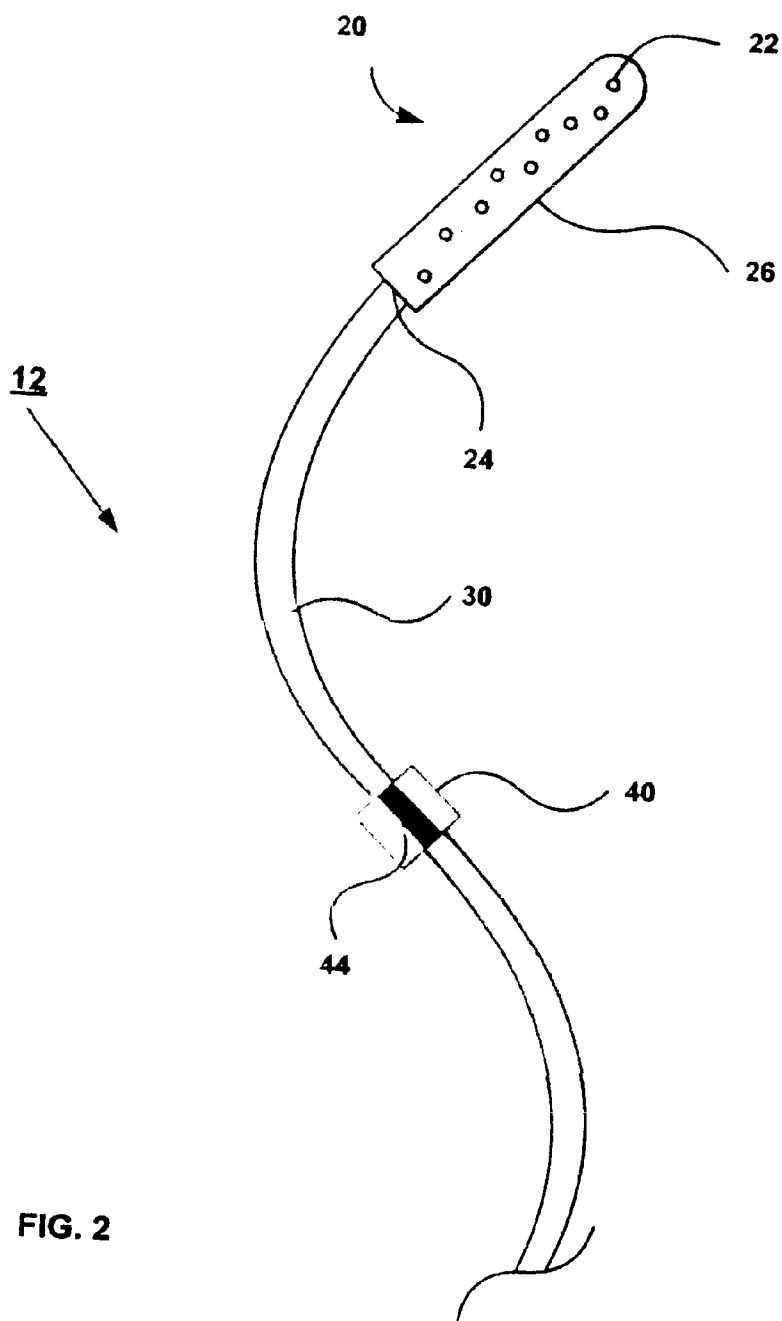
wherein said dental apparatus is operated by said patient to remove fluid from said patient's mouth.

21. A method as claimed in claim 20, further comprising a valve for modulating the rate of fluid removal from said patient's mouth, said valve being adjustable by said patient.
22. A method as claimed in claim 21, wherein said valve is located between said intraoral tip and said suction device.
23. A method as claimed in claim 21, wherein said valve has a plurality of operating positions and is moveable between said operating positions.
24. A method as claimed in claim 21, further comprising a flow control switch, wherein said flow control switch is in communication with said valve for enabling said patient to control said rate of fluid removal from their mouth.
25. A method as claimed in claim 24, wherein said flow control switch is movable by said patient to move said valve between a plurality of operating positions.
26. A method as claimed in claim 21, wherein said the rate of fluid removal from said patient's mouth is about said salivary flow rate.

1/9



2/9



3/9

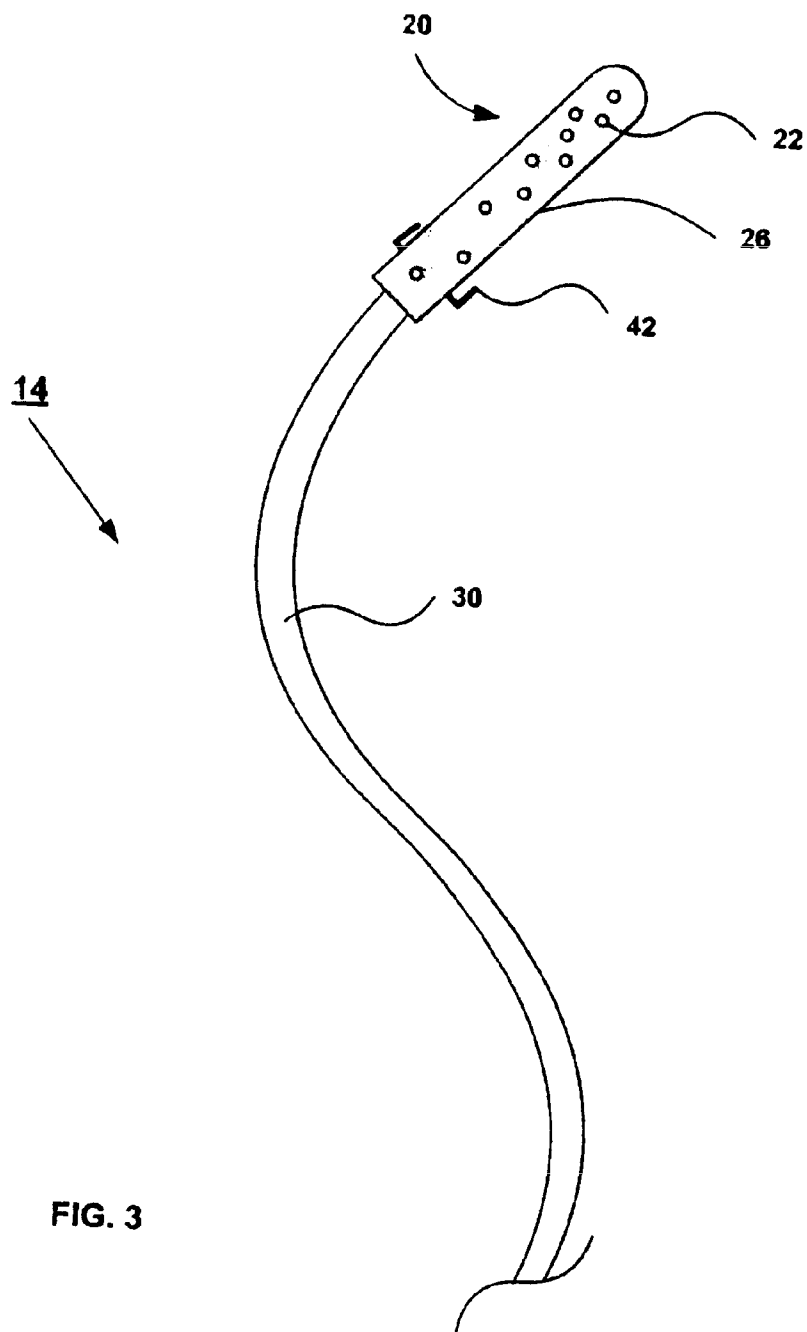


FIG. 3

4/9

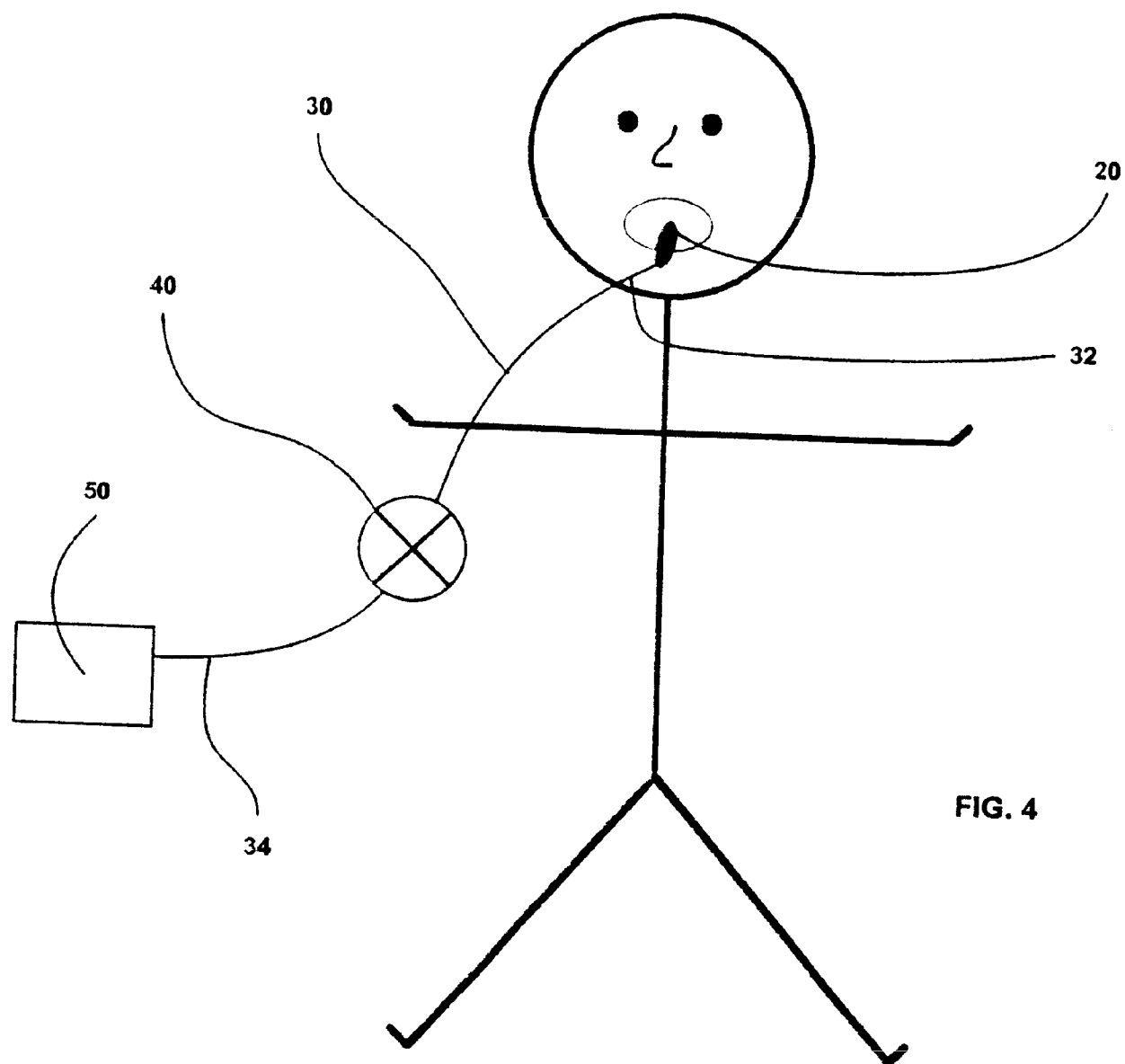


FIG. 4

5/9

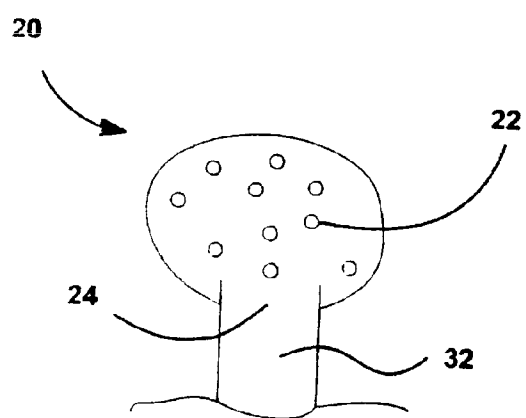
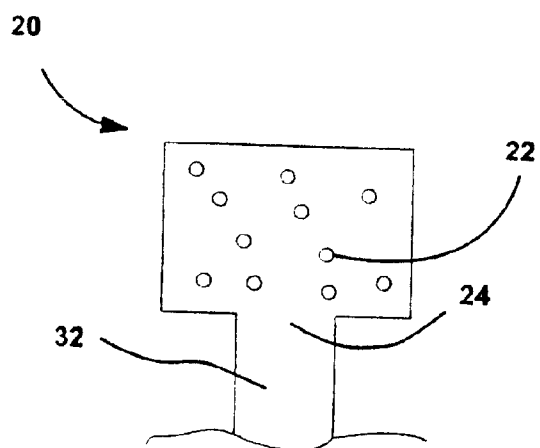


FIG. 5

6/9

**FIG. 6**

7/9

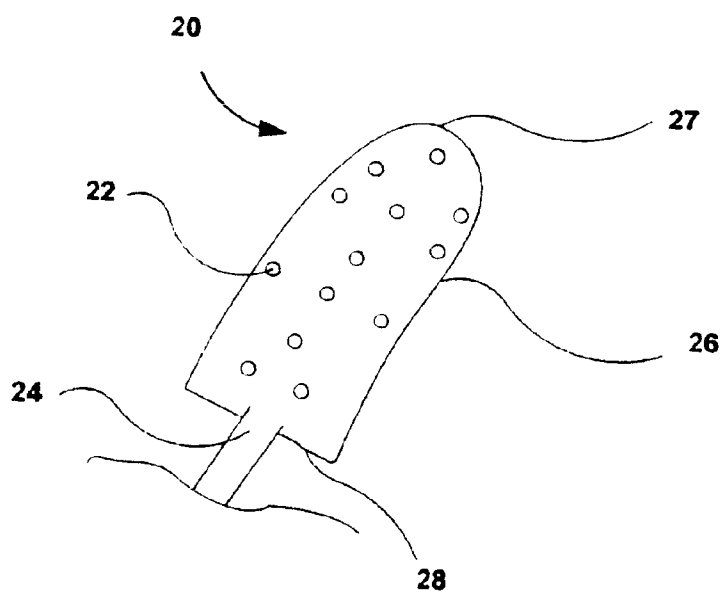
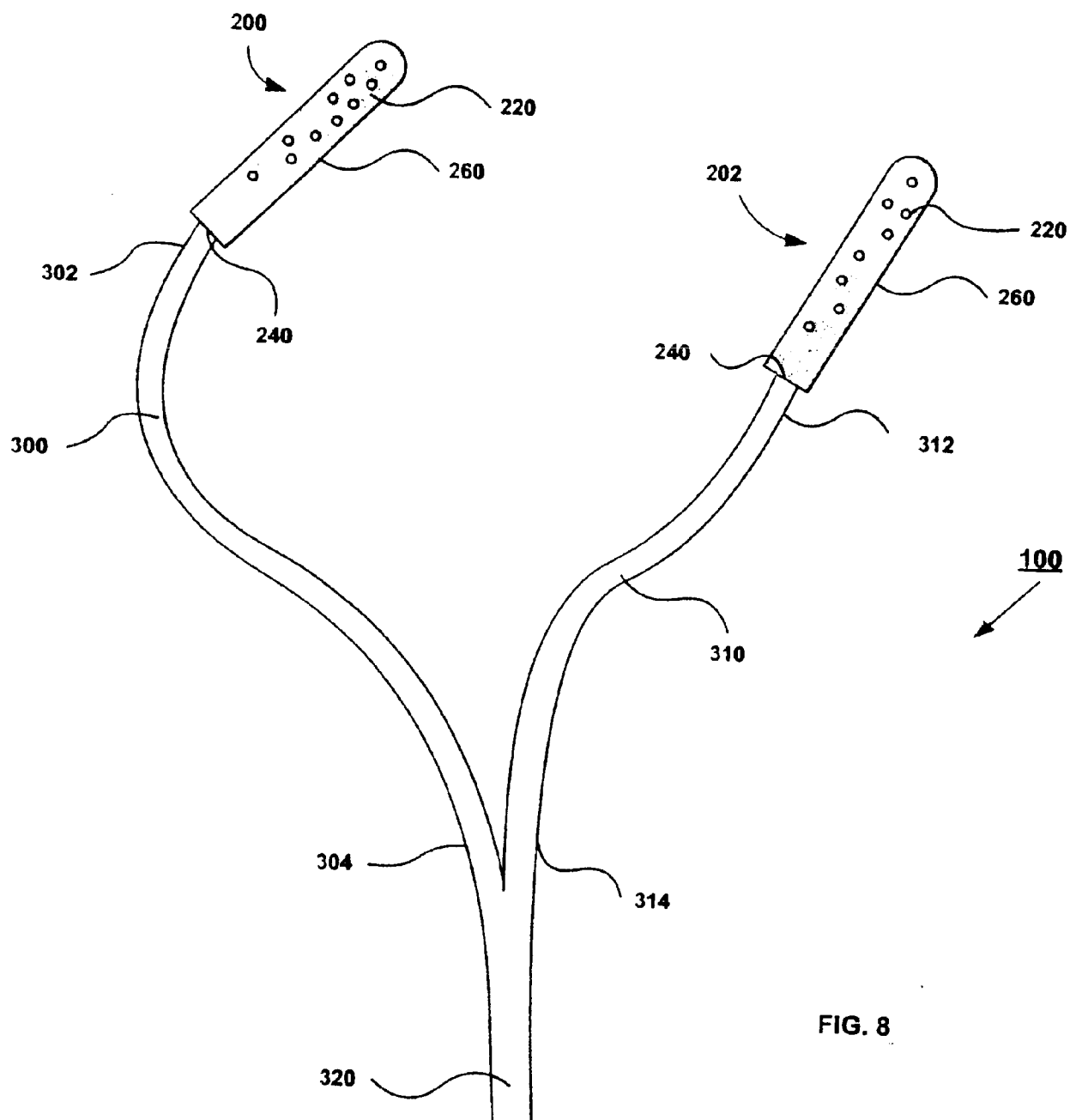


FIG. 7

8/9



9/9

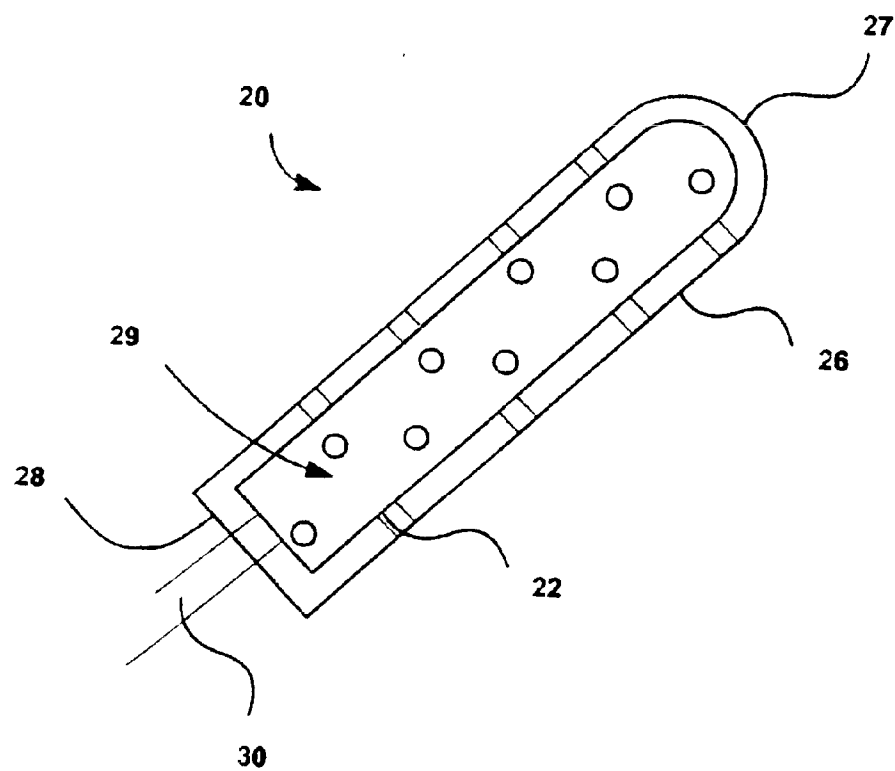


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2010/001204

A. CLASSIFICATION OF SUBJECT MATTER IPC: A61C 17/08 (2006.01) , A61C 17/06 (2006.01) , A61C 17/12 (2006.01) According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) IPC: A61C 17/08 (2006.01) , A61C 17/06 (2006.01) , A61C 17/12 (2006.01) EC: A61C 17/04B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used) Database: EPOQUE (Epodoc) Keywords: N/A		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP8196552 A (SHIGA, E. et al.) 06 August 1996 (06-08-1996) *Figures 1-3; Abstract*	1, 7, 9, 10, 11, 12, 14-20 and 26 2-6, 8, 13 and 21-25
X Y	US2507938 A (ASHLEY, S.) 16 May 1950 (16-05-1950) *Whole Document*	1, 7, 9, 10, 11, 12, 14-20 and 26 2-6, 8, 13 and 21-25
X Y	WO20083025 A1 (SULLMAN, R.) 24 October 2002 (24-10-2002) *Figures 7 & 9*	1, 7, 9, 10, 11, 12, 14-20 and 26 2-6, 8, 13 and 21-25
Y	US2006008764 A1 (ABO, T.) 12 January 2006 (12-01-2006) *Figures 1, 6, 7 & 13*	2-6, 8 and 21-25
Y	WO2008072100 A1 (HERSHEY, A. et al.) 19 June 2008 (19-06-2008) *Figures 2A & 2B*	13
☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents :	"T"	later document published after the international filing date or priority date and not in conflict with the application put cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"T" earlier application or patent but published on or after the international filing date	"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
"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)	"&"	document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		
Date of the actual completion of the international search 9 November 2010 (09-11-2010)		Date of mailing of the international search report 22 November 2010 (22-11-2010)
Name and mailing address of the ISA/CA Canadian Intellectual Property Office Place du Portage I, C114 - 1st Floor, Box PCT 50 Victoria Street Gatineau, Quebec K1A 0C9 Facsimile No.: 001-819-953-2476		Authorized officer Zachary Rokosh (819) 956-0848

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CA2010/001204

Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
JP8196552 A	06 August 1996 (06-08-1996)	JP8196552 A	06 August 1996 (06-08-1996)
US2507938A	16 May 1950 (16-05-1950)	US2507938A	16 May 1950 (16-05-1950)
WO02083025A1	24 October 2002 (24-10-2002)	EP1408869A1 GB0109560D0 GB0208719D0 GB2376895A US2004197732A1	21 April 2004 (21-04-2004) 06 June 2001 (06-06-2001) 29 May 2002 (29-05-2002) 31 December 2002 (31-12-2002) 07 October 2004 (07-10-2004)
US2006008764A1	12 January 2006 (12-01-2006)	JP2006025870A US7261560B2	02 February 2006 (02-02-2006) 28 August 2007 (28-08-2007)
WO2008072100A1	19 June 2008 (19-06-2008)	AU2007331127A1 AU2007335842A1 CA2670714A1 CA2672823A1 CN101541257A EP2094183A1 EP2094184A2 JP2010512821T JP2010512824T KR20090091162A MX2009006072A MX2009006073A US2008145815A1 US7625207B2 US2008145816A1 US2010018536A1 WO2008075241A2 WO2008075241A3	19 June 2008 (19-06-2008) 26 June 2008 (26-06-2008) 19 June 2008 (19-06-2008) 26 June 2008 (26-06-2008) 23 September 2009 (23-09-2009) 02 September 2009 (02-09-2009) 02 September 2009 (02-09-2009) 30 April 2010 (30-04-2010) 30 April 2010 (30-04-2010) 26 August 2009 (26-08-2009) 16 June 2009 (16-06-2009) 16 June 2009 (16-06-2009) 19 June 2008 (19-06-2008) 01 December 2009 (01-12-2009) 19 June 2008 (19-06-2008) 28 January 2010 (28-01-2010) 26 June 2008 (26-06-2008) 21 August 2008 (21-08-2008)



- (51) International Patent Classification:
A61C 17/00 (2006.01) *A61C 17/06* (2006.01)
- (21) International Application Number:
PCT/US2014/032892
- (22) International Filing Date:
3 April 2014 (03.04.2014)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
14/100,323 9 December 2013 (09.12.2013) US
- (71) Applicant: INCEPT, INC. [US/US]; 92 Corporate Park,
Suite C, #818, Irvine, CA 92606 (US).
- (72) Inventors: NGUYEN, Thien; 92 Corporate Park, Suite C
#818, Irvine, CA 92606 (US). PHAM, Tam, Thanh; 92
Corporate Park, Suite C, #818, Irvine, CA 92606 (US).
- (74) Agent: PHAM, Tam, Thanh; Lewis Roca Rothgerber
LLP, 2440 W El Camino Real, 6th Floor, Mountain View,
CA 94040 (US).
- (81) Designated States (*unless otherwise indicated, for every
kind of national protection available*): AE, AG, AL, AM,

AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,
BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR,
KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM,
ZW.

- (84) Designated States (*unless otherwise indicated, for every
kind of regional protection available*): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

Published.

— with international search report (Art. 21(3))

(54) Title: INTRAORAL DENTAL SUCTION AND ISOLATION SYSTEM

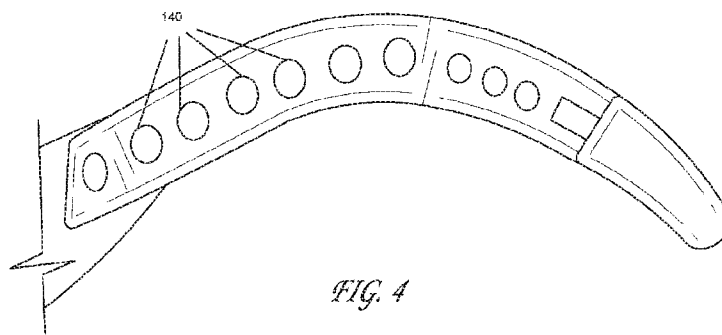


FIG. 4

(57) Abstract: A dental mouthpiece is provided that may be attached to a high-suction dental adapter for the purpose of assisting the dental staff during dental procedures through chair-side, hands-free suction, and isolation. Such a mouthpiece may comprise a main body portion, a cheek retractor portion, and a suction connector portion. In some embodiments, the main body portion, cheek retractor portion, and suction connector portion (and sub-portions thereof) may be molded in one piece, preferably by injection molding. In an exemplary embodiment, the mouthpiece may be made of a material that is flexible, translucent, conducive to injection molding, high heat-resistant, and autoclavable. Such a material may include silicone. Because the mouthpiece may be made of a high heat-resistant and autoclavable material, such a mouthpiece may be reusable.

INTRAORAL DENTAL SUCTION AND ISOLATION SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to the field of dental mouthpieces. More specifically, the present invention relates to intraoral dental suction and isolation mouthpieces.

2. Description of Related Art

Various mouthpieces are currently used by dental health professionals, dental hygienists, and dental assistants in the field of dentistry. In the past, a dental patient has been treated by a traditional two-person team that comprises a dental professional and a dental assistant. Further, dental treatment may be provided by the team using many different types of dental equipment and materials. Such dental equipment and materials may include such items as an intraoral mirror, a bite block, a slow speed suction ejector, a high speed suction ejector, gauzes, cotton rolls, and dry angles. Each item of dental equipment may be used for different purposes, though some may be used in combination for some types of dental services. As such, a dental professional seeking to provide such dental services may need to use multiple items of such dental equipment. An important role of the dental assistant is therefore to assist the dental professional in coordinating the use of these multiple items of different equipment and materials.

There is, therefore, a need in the art for improved systems and methods of providing dental services in a more efficient, comfortable, and safe manner to the dental patient.

SUMMARY OF THE CLAIMED INVENTION

Embodiments of the present invention may include a mouthpiece that may be attached to a high-suction dental adapter for the purpose of assisting the dental staff during dental procedures through chair-side, hands-free suction, and isolation. Such a mouthpiece may comprise a main body portion, a cheek retractor portion, and a suction connector portion. In some embodiments, the main body portion, cheek retractor portion, and suction connector portion (and sub-portions thereof) may be molded in one piece, preferably by injection molding. In an exemplary embodiment, the mouthpiece may be made of a material that is flexible, translucent, conducive to injection molding, high heat-resistant, and autoclavable. Such a material may include silicone. Because the mouthpiece may be made of a high heat-resistant and autoclavable material, such a mouthpiece may be reusable.

The main body portion may comprise an enclosed pocket made up of an anterior wall, a posterior wall, and a side wall in between the anterior and posterior walls. The side wall may be perforated with a plurality of perforations. Such perforations may constitute a mesh. Additional perforations may be located on the anterior and posterior walls. The main body portion may further include a slit along a longitudinal, central axis on the anterior wall. Such openings (*e.g.*, perforations and slit) allow for suction of air, fluids, and small debris from the patient's mouth, through the openings into the interior portion, and into the suction connector portion towards a suction source. Because the mouthpiece is made of a flexible and resilient material (*e.g.*, silicone), the mouthpiece may be bent when placed in a patient's mouth to conform to the shape of the mouth. When properly positioned, the suction connector portion may protrude from one side of the patient's mouth, while the main body lies against the back of the patient's mouth, and the cheek retractor presses against the patient's cheek on the opposite side of the patient's mouth.

The main body may further include an protruding bridge structure on the interior surface of the posterior wall. Such a bridge structure may protrude from the interior surface in a wave shape with crests and troughs. The crests provide a plurality of contact points with the anterior wall to keep the anterior wall separated

from the posterior wall during suction. Meanwhile, the troughs provide gaps that allow for suction of air, fluids, and small debris through the bridge structure.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1A is a perspective view of an exemplary mouthpiece with a detachable mouth prop.

FIG. 1B is a top view of the exemplary mouthpiece and detachable mouth prop of FIG. 1A.

FIG. 1C is a bottom view of the exemplary mouthpiece and detachable mouth prop of FIG. 1A.

FIG. 1D is a side view of the exemplary mouthpiece and detachable mouth prop of FIG. 1A.

FIG. 1E is a cross-sectional view of the exemplary mouthpiece and detachable mouth prop of FIG. 1A.

FIG. 2A is a perspective view of the exemplary mouthpiece of FIG. 1A where the detachable mouth prop has been detached.

FIG. 2B is a top view of the exemplary mouthpiece of FIG. 2A.

FIG. 2C is a bottom view of the exemplary mouthpiece of FIG. 2A.

FIG. 2D is a side view of the exemplary mouthpiece of FIG. 2A.

FIG. 2E is a cross-sectional view of the exemplary mouthpiece of FIG. 2A.

FIG. 3A is a front view of an exemplary mouth prop.

FIG. 3B is a back view of the exemplary mouth prop of FIG. 3A.

FIG. 3C is a bottom view of the exemplary mouth prop of FIG. 3A.

FIG. 3D is a perspective view of the exemplary mouth prop of FIG. 3A.

FIG. 3E is a side view of the exemplary mouth prop of FIG. 3A.

FIG. 3F is a top view of the exemplary mouth prop of FIG. 3A.

FIG. 4 is a close-up view of exemplary mesh sides in an exemplary mouthpiece.

FIG. 5 is a close-up view of an internal bridge in an exemplary mouthpiece.

FIG. 6A is a close-up view of an exemplary reinforcing bar in an exemplary mouthpiece.

FIG. 6B is a cross-sectional view of the exemplary reinforcing bar of FIG. 6A.

FIG. 7A is a close-up view of an exemplary cheek retractor portion in an

exemplary mouthpiece.

FIG. 7B is a cross-sectional view of the exemplary cheek retractor portion of FIG. 7A.

DETAILED DESCRIPTION

Embodiments of the present invention provide for a mouthpiece comprising a main body portion, a cheek retractor portion, and a suction connector portion. In some embodiments, the main body portion, cheek retractor portion, and suction connector portion (and sub-portions thereof) may be molded as one-piece, preferably by injection molding. In an exemplary embodiment, the mouthpiece may be made of a material that is flexible, translucent, conducive to injection molding, high heat-resistant, and autoclavable. Such a material may include silicone. Because the mouthpiece may be made of a high heat-resistant and autoclavable material, such a mouthpiece may be reusable.

FIGs. 1A-E are different views of an exemplary mouthpiece with an attachable mouth prop 160, while FIGs. 2A-E are different views of the exemplary mouthpiece of FIG. 1A where the attachable mouth prop 160 has been detached. Such a mouthpiece may include a main body portion 110, a suction connector portion 120, and a cheek retractor portion 130.

The main body portion 110 may include mesh or perforations 140, a stability bar 150, an open slit 170, and an internal bridge 180. The main body portion 110 may connect to a suction connector portion 120 on one end and a cheek retractor portion 130 at the other end. Such a cheek retractor portion 130 may be configured to press against and retract a patient's cheek away from the patient's teeth. When placed in a patient's mouth, the suction connector portion 120 may protrude from one side of the patient's mouth, while the main body portion 110 lies against the back of the patient's mouth, and the cheek retractor portion 130 retracts the patient's cheek on the opposite side of the patient's mouth. The flexibility of the material used to form the mouthpiece allows for some bending when placed in the patient's mouth. The material is, however, resilient enough that the cheek retractor portion presses against the inside of the patient's cheek with such pressure being sufficient to move the cheek away from the patient's teeth.

An exemplary main body portion 110, when placed in a mouth, may include an anterior wall facing the front of the mouth (*e.g.*, the side with slit 170) and a posterior

wall facing the back of the mouth. The two walls may connect at a superior wall and an inferior wall forming a body that is at least partially enclosed.

Superior may be used herein to refer to the side that rests against a roof of a patient's mouth when placed therein, and inferior may be used to refer to the side that rests against the floor of the patient's mouth. The superior and inferior sides may be formed identically, which may allow for the mouthpiece to change orientation such that the superior side may appear as the inferior side and vice versa, in the new orientation. When in use, the respective sides of the main body portion 110 may serve to protect and separate the top of the mouth and the bottom of the mouth/tongue. In addition, the main body portion 110 may also serve to protect the back of the mouth (e.g., throat and airway) from falling debris.

Much of the main body portion 110 of the mouthpiece may be shaped as a straight-line arrowhead or shield whose base generally conforms to the intraoral shape of a patient's mouth. Differently-sized mouthpieces may be provided for differently-sized mouths of adults and children. Part of the base side of the arrowhead may be formed with thicker walls than the rest of the main body. Such thickening may provide additional stability.

In addition, the main body portion 110 of the mouthpiece may include a plurality of holes 140 distributed along the superior and inferior sides of the anterior and posterior walls to assist in suctioning of water, saliva and debris from the oral cavity. In some embodiments, a set of holes may also form a mesh along the walls of the superior and inferior edges. FIG. 4 is a close-up view of an exemplary mesh wall in an exemplary mouthpiece.

At the narrow end of the arrowhead that connects to the cheek retractor portion 130, the main body portion 110 may include a rectangular portion. Narrower than the base of the arrowhead, the rectangle may additionally include a reinforcing bar (or stability bar) 150 (described in further detail below) and may be at least partially crossed by a slit 170 (described in further detail below) into the interior of the pocket of the main body portion 110.

Stability bar 150 may be a protrusion or otherwise a thickened area that reinforces the stability of the rectangular portion and assist in shaping this region to

the intraoral posterior shape of a patient's mouth. FIG. 6A is a close-up view of an exemplary stability bar 150 of an exemplary mouthpiece. FIG. 6B is a cross-sectional view of the exemplary reinforcing bar in the cheek retractor connector portion of FIG. 6A.

In some embodiments, the internal, rectangular-shaped reinforcing or stability bar 150 may be located distally to the internal wavelike bridge structure 180 and attached to both the interior side of the posterior surface of the main body and the rectangular portion. Such a stability bar 150 may be located in the area where a positioned mouthpiece begins to wrap from the lingual side of the most posterior mandibular tooth, around the distal side of the most posterior tooth, and to anterior side of the most posterior mandibular tooth, thereby assisting in shaping the mouthpiece to the general intraoral shape of a patient's mouth.

Various embodiments of the mouthpiece may further include a longitudinal, open slit 170 extending over approximately two-thirds of the main body on the anterior surface. Running along the center of the main body across the rectangle and most of the arrowhead, such a slit 170 may assist in capture and suction of water, saliva and debris, as well as assisting in cleaning and maintenance.

Additionally, the main body of the mouthpiece may include a bridge structure 180 on an interior surface to ensure that the anterior and posterior surfaces remain separated during suction. FIG. 1E is a cross-sectional view of the mouthpiece in which the bridge structure 180 is illustrated. FIG. 5 is a close-up view of the bridge structure 180 without the surrounding walls of the main body portion. Such a bridge structure 180 may be formed as an wave-like protrusion that generally corresponds to the distance between the anterior and posterior walls extending substantially (e.g., within 1 mm) the full distance at its crest and substantially flush to the surface at its trough. In some embodiments, the bridge structure 180 may be centrally-located in the main body portion 110 of the mouthpiece. The gaps (or troughs) between the waves of the bridge structure 180 assist in the suction-driven transfer of water and saliva to the suction connector portion 120 and ultimately, into a central suction vacuum. In some embodiments, the bridge structure 180 may follow the shape of a logo (e.g., an arrowhead or shield).

The suction connector portion 120 may be oval-shaped and also attached to the main body portion 110. The suction connector portion 120 may be formed with thicker walls than the main body portion 110 and configured to attach to a high-suction vacuum adapter and to assist in transferring water, saliva, and debris from the oral cavity to the external adapter for removal. The suction connector portion 120 may also include an internal stop to assist in sliding the mouthpiece onto the adapter to a desired depth. The suction connector portion 120 may additionally have an external, concave, notched region 210 that corresponds to a removable strap such that when the strap is in place, the external walls of the strap and the rest of the connector portion may be flush.

The cheek retractor portion 130 is illustrated as a hammerhead distal region, which may be attached to the main body portion 110. FIG. 7A is a close-up view of an exemplary cheek retractor portion 130 in an exemplary mouthpiece. FIG. 7B is a cross-sectional view of the exemplary cheek retractor portion 130 of FIG. 7A.

The mouthpiece may be used with a mouth prop 160, as illustrated in FIGs. 1 (with a mouth prop 160) and FIGs. 2 (illustrated without the mouth prop 160). FIGs. 3A-E provide different close-up views of an exemplary mouth prop 160. The removable strap 310 may be attached to mouth prop 160, which may be used to prop open a patient's mouth and teeth. In this regard, the suction connector portion 120 may additionally have an external plug 220 (FIG. 2C) protruding from the posterior side of the suction connector portion 120. Such a plug 220 may correspond to and serve to connect with an opening in the mouth prop 160. The mouth prop 160 may be reinforced by the presence of the plug 220 in the opening, thereby resulting in a more crush-resistant, nearly incompressible, and stable mouth prop 160. In some embodiments, the suction connector portion 120 may further have a cutout 230 (*e.g.*, which may be shaped as a logo) providing extra interlocking with a corresponding protrusion (*e.g.*, which may also be shaped as a logo) on an external high-suction vacuum adapter.

The mouth prop 160 may be made of thickened silicone material injection molded in a single piece with an elastic strap corresponding to the circumference of the suction connector portion. The mouth prop 160 has an internal, rectangular-

shaped female slot designed to fit snugly with the external, rectangular-shaped male plug 220 of the suction connector portion 120 of the mouthpiece. Mouth props may be made in different sizes for differently sized mouths. Because the mouth prop and mouthpiece are detachable from each other, different sizes of each may be mixed and matched as needed for a particular patient's mouth.

The mouthpiece as described herein may be used with a one-piece, autoclavable, high-suction vacuum adapter. Such a high-suction vacuum body adapter may be made of a single homogenous material. Having a single lever design, such a vacuum adapter may function in the same manner as all the current high-suction vacuum evacuators and saliva ejectors in controlling the removal of water, saliva, and debris from the oral cavity to the outside vacuum source. The single lever may be designed to control the removal of water, saliva, and debris from the at least partially enclosed so main body through a single, large evacuation conduit within the suction connector portion.

While various embodiments have been described above, it should be understood that they have been presented by way of example only, and not limitation. The descriptions are not intended to limit the scope of the invention to the particular forms set forth herein. Thus, the breadth and scope of a preferred embodiment should not be limited by any of the above-described exemplary embodiments. It should be understood that the above description is illustrative and not restrictive. To the contrary, the present descriptions are intended to cover such alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims and otherwise appreciated by one of ordinary skill in the art. The scope of the invention should, therefore, be determined not with reference to the above description, but instead should be determined with reference to the appended claims along with their full scope of equivalents.

CLAIMS

WHAT IS CLAIMED IS:

1. A dental mouthpiece composed of a material, the dental mouthpiece comprising:
 - a main body portion comprising a defined pocket having an anterior wall, a posterior wall, and a side wall in between the anterior wall and the posterior wall, wherein the anterior wall, the posterior wall, and the side wall define an interior portion of the defined pocket;
 - a cheek retractor portion configured to press against a cheek of a patient when placed in a mouth of the patient, wherein resilience of the material causes the cheek retractor portion to retract a cheek of the patient away from the teeth of the patient; and
 - a suction connector portion for connecting the interior portion of the main body to a vacuum suction source.
2. The mouthpiece of claim 1, wherein the side wall includes a plurality of perforations.
3. The mouthpiece of claim 1, wherein the anterior wall and the posterior wall each includes a plurality of perforations.
4. The mouthpiece of claim 1, wherein the anterior wall further includes a slit along a central axis.
5. The mouthpiece of claim 1, further comprising a stability bar protruding from an interior surface of the posterior wall, wherein a thickness of the stability bar increases resilience of the cheek retractor portion during bending.
6. The mouthpiece of claim 1, wherein the main body portion, the cheek retractor portion, and the suction connector portion are formed by injection-molded as one

piece.

7. The mouthpiece of claim 1, wherein the material used in the injection-molding is a flexible, translucent, high heat-resistant, autoclavable silicone-based material.

8. The mouthpiece of claim 1, further comprising a bridge structure protruding from an interior surface of the posterior wall, the protruding bridge structure comprising a plurality of spaced contact points that keep the anterior wall separated from the posterior wall during suction.

9. The mouthpiece of claim 8, wherein the bridge structure protrudes from the interior surface of the posterior wall in a wave shape, and wherein the contact points are at crests of the wave shape.

10. The mouthpiece of claim 9, wherein troughs of the wave shape are configured to allow suction through the bridge structure.

11. The mouthpiece of claim 1, wherein the suction connector portion comprises an internal stop to assist in positioning of a vacuum suction source or a vacuum adaptor.

12. The mouthpiece of claim 1, further comprising a detachable mouth prop.

13. The mouthpiece of claim 12, wherein the detachable mouth prop comprises a strap configured to fit around the suction connector portion, wherein an external surface of the suction connector portion comprises a notch region corresponding to the strap, and wherein an external surface of the strap is substantially flush with a remaining external surface of the suction connector portion when the strap sits in the notch region.

14. The mouthpiece of claim 13, wherein the strap is injection-molded in a single piece with the mouth prop.
15. The mouthpiece of claim 1, wherein the suction connector portion further comprises an external plug protrusion corresponding to an opening in a mouth prop associated with the strap.
16. The mouthpiece of claim 15, wherein the plug protrusion fits into the opening to provide additional crush-resistance and decreased compressibility during biting by the patient.
17. The mouthpiece of claim 1, wherein the suction connector portion comprises a cutout corresponding to a protrusion on a vacuum adapter for an interlocking fit.
18. The mouthpiece of claim 1, wherein the anterior wall and the posterior wall have different thicknesses.

1/11

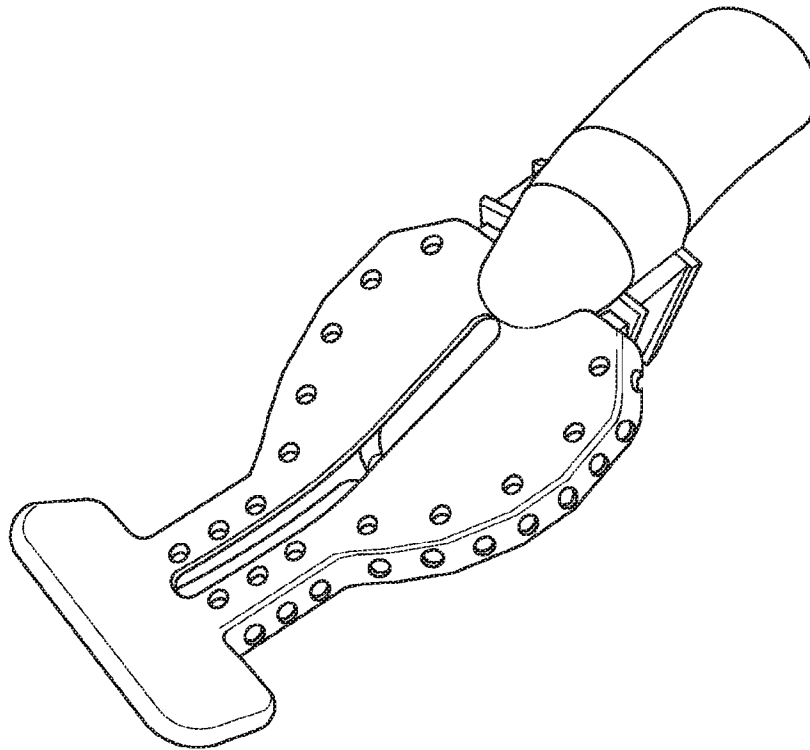


FIG. 1A

2/11

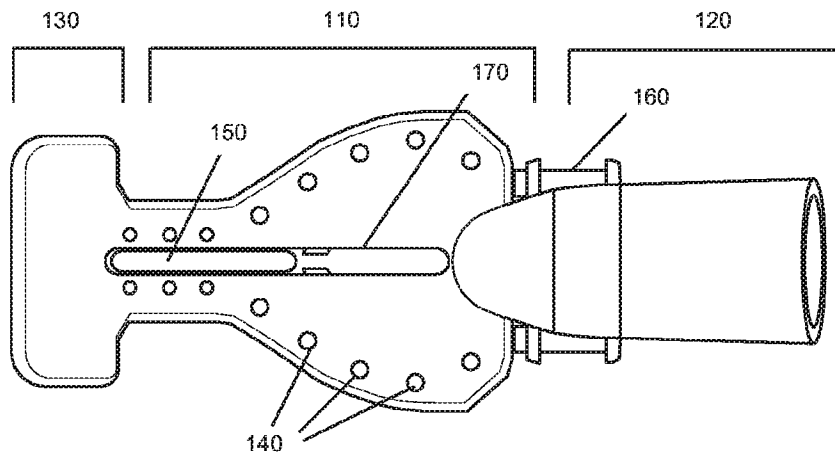


FIG. 1B

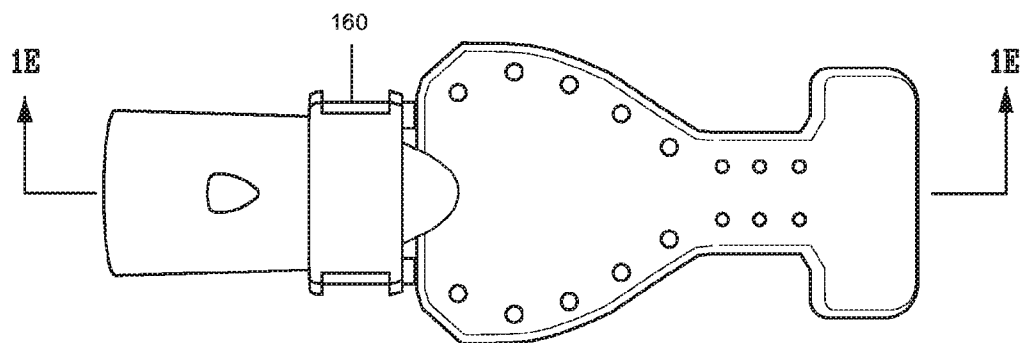
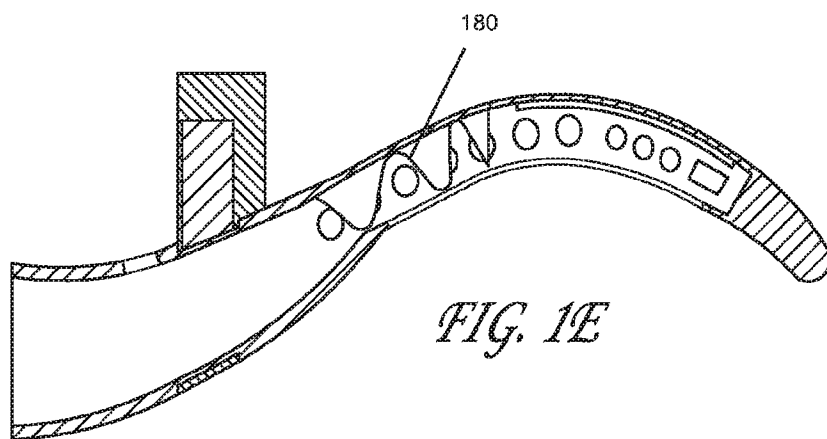
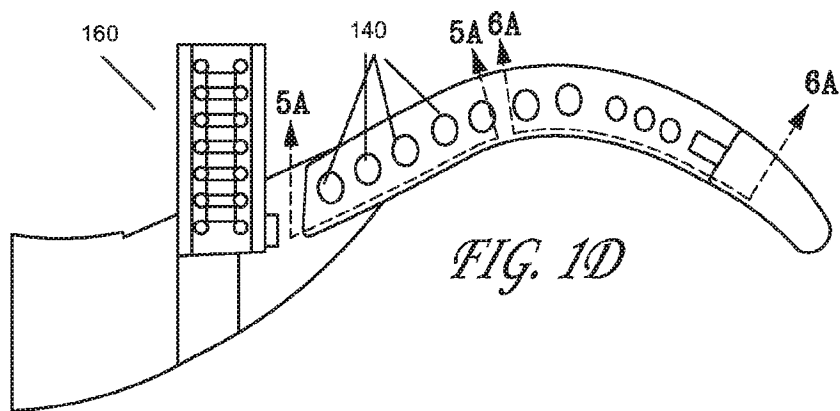
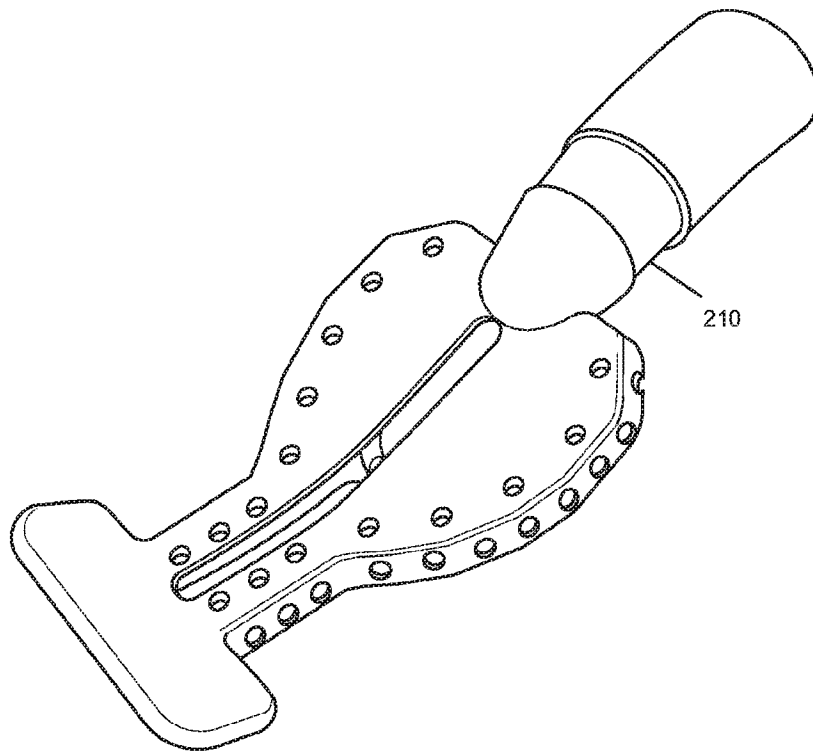


FIG. 1C

3/11



4/11

*FIG. 2A*

5/11

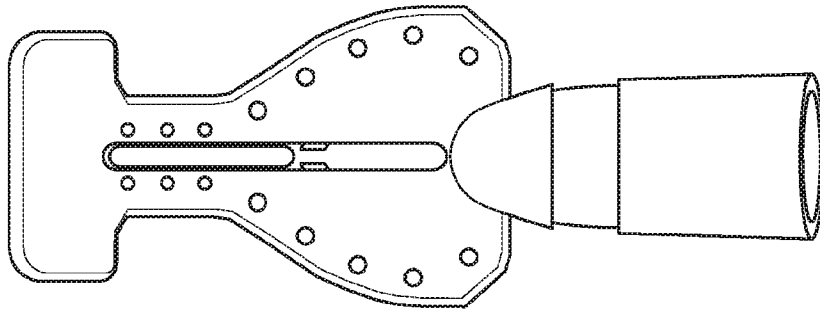


FIG. 2B

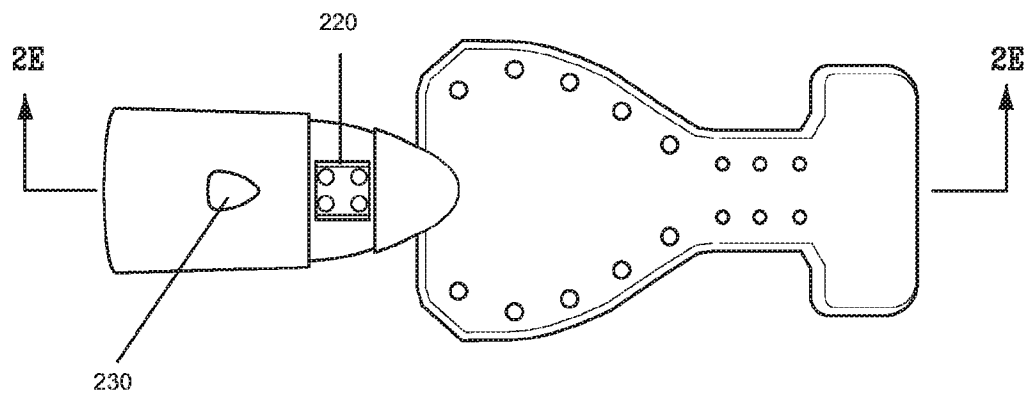


FIG. 2C

6/11

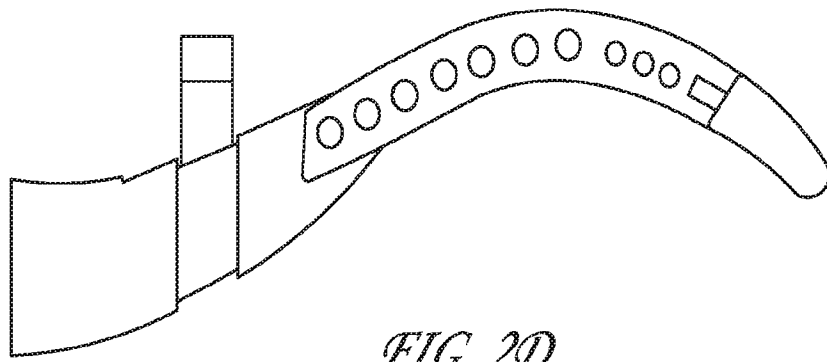


FIG. 2D

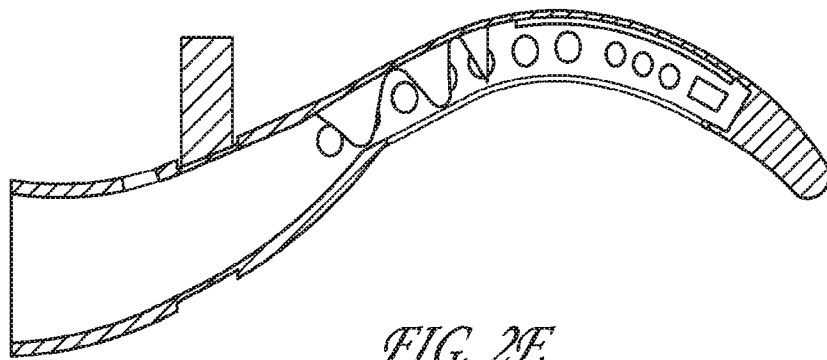


FIG. 2E

7/11

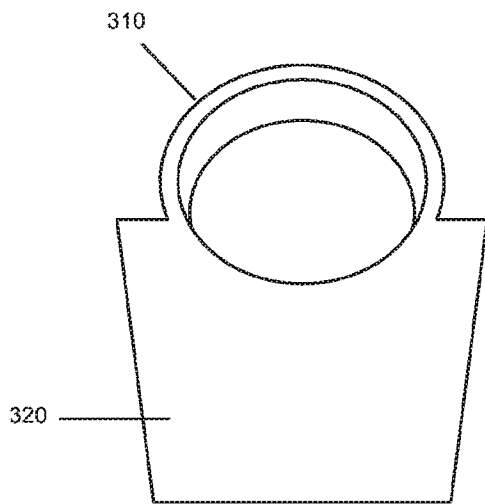


FIG. 3A

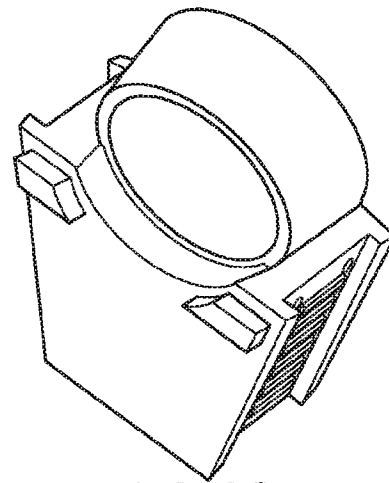


FIG. 3D

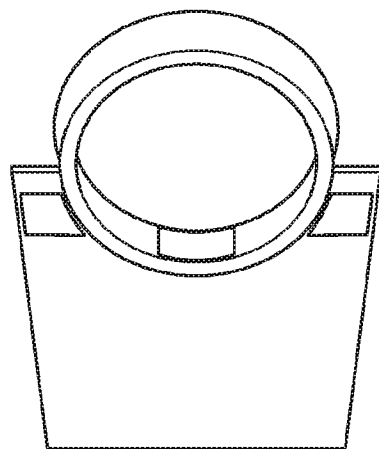


FIG. 3B

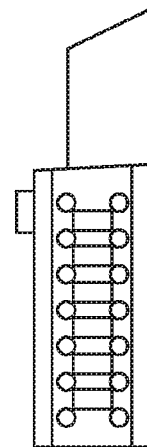


FIG. 3E

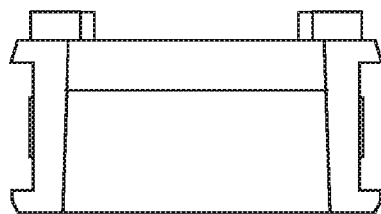


FIG. 3C

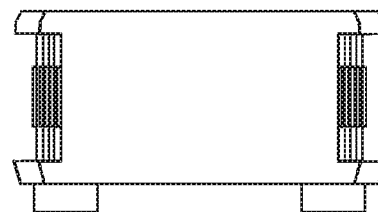
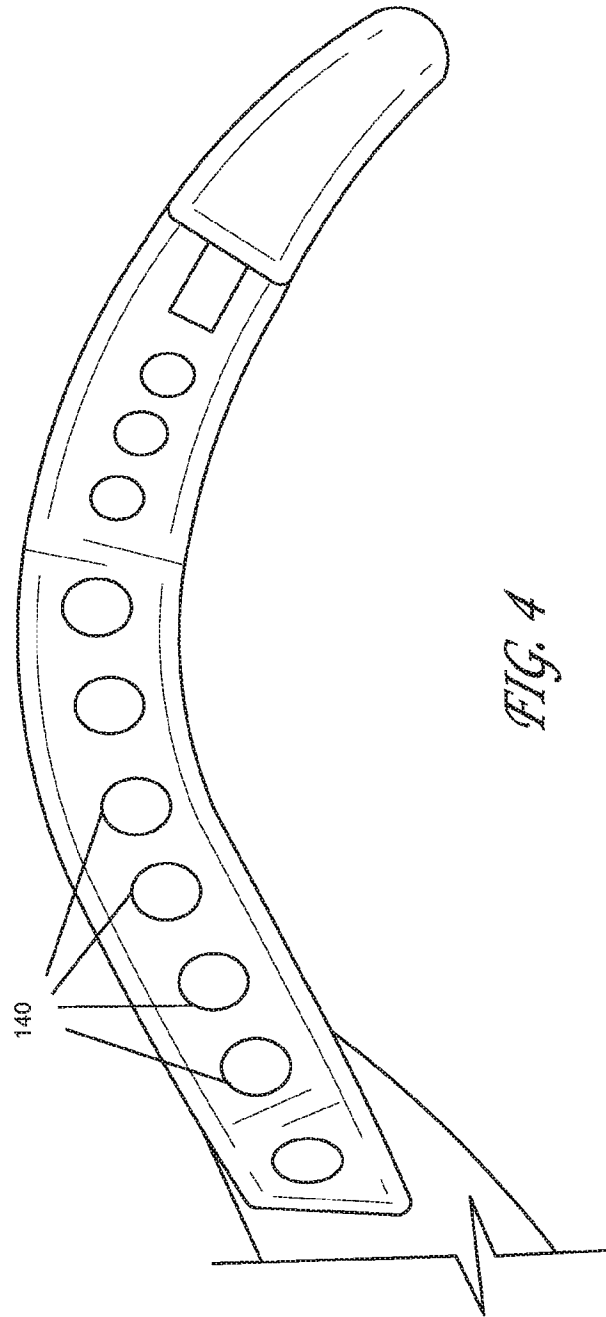


FIG. 3F

8/11



9/11

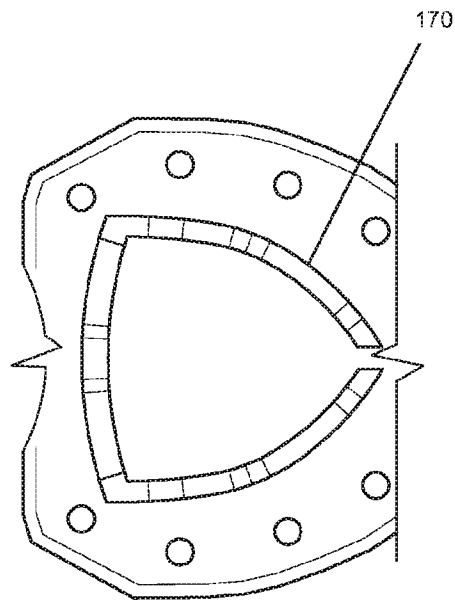


FIG. 5

10/11

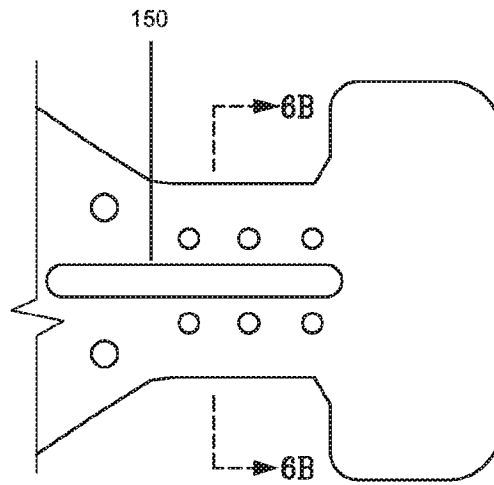


FIG. 6A

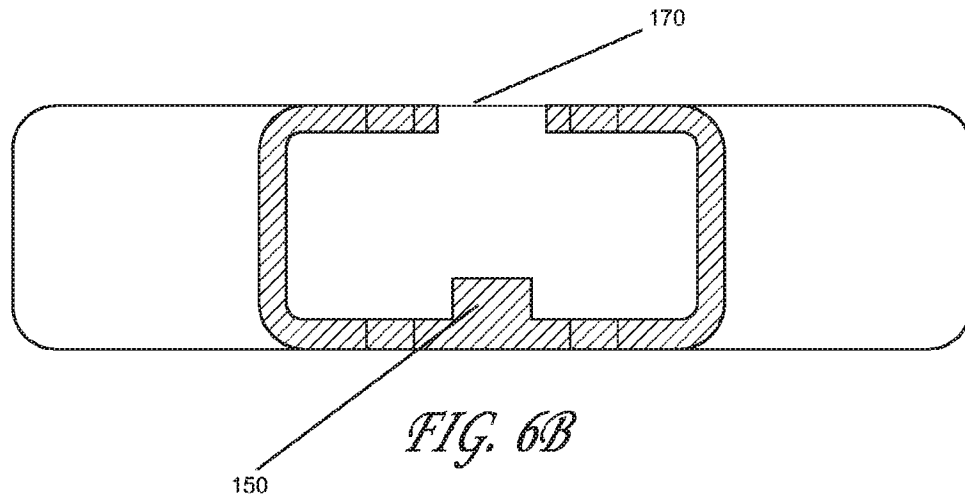


FIG. 6B

11/11

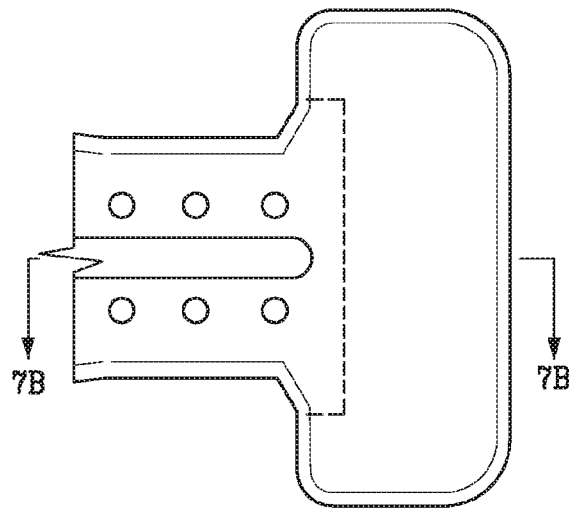


FIG. 7A

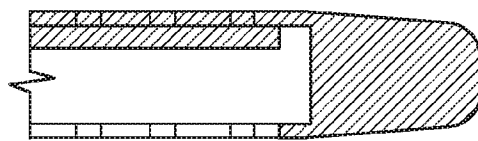


FIG. 7B

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2014/032892

A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - A41C 17/00, 17/06 (2014.01) CPC - A41C 17/00 (2014.07) According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC(8) - A41C 17/00, 17/06 (2014.01) CPC - A41C 17/00 (2014.07) Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched USPC - 433/91, 92, 93, 140 Electronic data base consulted during the international search (name of data base and; where practicable, search terms used) Orbit, Google Patents, Google Scholar, PubMed		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006/0084031 A1 (HIRSCH et al) 20 April 2006 (20.04.2006) entire document	1-6, 12, 17, 18
-		
Y		7-11, 13-16
Y	US 2013/0252193 A1 (BOWMAN et al) 26 September 2013 (26.09.2013) entire document	7
Y	US 2011/0311942 A1 (BLACK et al) 22 December 2011 (22.12.2011) entire document	8-10, 13-16
Y	US 4,822,278 A (OLIVA et al) 18 April 1989 (18.04.1989) entire document	11
☐ Further documents are listed in the continuation of Box C. ☐		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "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) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "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 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "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 "&" document member of the same patent family		
Date of the actual completion of the international search 22 August 2014		Date of mailing of the international search report 04 SEP 2014
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201		Authorized officer: Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (July 2009)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference INCEP-001PCT	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/US2014/032892	International filing date (day/month/year) 03 April 2014	(Earliest) Priority Date (day/month/year) 09 December 2013
Applicant INCEPT, INC.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

☒ the international application in the language in which it was filed.

☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found unsearchable (see Box No. II).

3. ☐ Unity of invention is lacking (see Box No. III).

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

a. the figure of the drawings to be published with the abstract is Figure No. 4

☐ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☒ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2014/032892

A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - A41C 17/00, 17/06 (2014.01) CPC - A41C 17/00 (2014.07) According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC(8) - A41C 17/00, 17/06 (2014.01) CPC - A41C 17/00 (2014.07) Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched USPC - 433/91, 92, 93, 140 Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Orbit, Google Patents, Google Scholar, PubMed		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006/0084031 A1 (HIRSCH et al) 20 April 2006 (20.04.2006) entire document	1-6, 12, 17, 18
-		
Y		7-11, 13-16
Y	US 2013/0252193 A1 (BOWMAN et al) 26 September 2013 (26.09.2013) entire document	7
Y	US 2011/0311942 A1 (BLACK et al) 22 December 2011 (22.12.2011) entire document	8-10, 13-16
Y	US 4,822,278 A (OLIVA et al) 18 April 1989 (18.04.1989) entire document	11
☐ Further documents are listed in the continuation of Box C. ☐		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "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) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "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 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "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 "&" document member of the same patent family		
Date of the actual completion of the international search 22 August 2014		Date of mailing of the international search report 04 SEP 2014
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201		Authorized officer: Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (July 2009)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: TAM THANH PHAM
LEWIS ROCA ROTHGERBER LLP
2440 W EL CAMINO REAL, 6TH FLOOR
MOUNTAIN VIEW, CA 94040

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year)

04 SEP 2014

Applicant's or agent's file reference
INCEP-001PCT

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/US2014/032892

International filing date (day/month/year)

03 April 2014

Priority date (day/month/year)

09 December 2013

International Patent Classification (IPC) or both national classification and IPC

IPC(8) - A41C 17/00, 17/06 (2014.01)

CPC - A41C 17/00 (2014.07)

Applicant INCEPT, INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1 bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-3201

Date of completion of this opinion

22 August 2014

Authorized officer:

Blaine R. Copenheaver

PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2014/032892

Box No. 1 Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed.
 - ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:
 - a. (means)
 - ☐ on paper
 - ☐ in electronic form
 - b. (time)
 - ☐ in the international application as filed
 - ☐ together with the international application in electronic form
 - ☐ subsequently to this Authority for the purposes of search
4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US2014/032892

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	5-11, 13-18	YES
	Claims	1-4, 12	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-18	NO
Industrial applicability (IA)	Claims	1-18	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1-4 and 12 lack novelty under PCT Article 33(2) as being anticipated by Hirsch et al hereinafter referred to as Hirsch. Regarding claim 1, Hirsch teaches a dental mouthpiece (intraoral device 20; Fig. 2; para [0042]) composed of a material (Abstract), the dental mouthpiece comprising:

- a main body portion (main body portion 50; Fig. 2; para [0047]) comprising a defined pocket (main receiving channel 62; Fig. 2; para [0047]) having an anterior wall (shown in Fig. 3), a posterior wall (shown in Fig. 4), and a side wall (shown in Figs. 5 and 8A-8B) in between the anterior wall and the posterior wall, wherein the anterior wall, the posterior wall, and the side wall define an interior portion of the defined pocket;
- a cheek retractor portion (cheek retractor portion 52 of retractor 22; Fig. 2; para [0046]) configured to press against a cheek of a patient when placed in a mouth of the patient (para [0043]), wherein resilience of the material causes the cheek retractor portion to retract a cheek of the patient away from the teeth of the patient (para [0043]); and
- a suction connector portion (exit port 108; Fig. 3; para [0058]) for connecting the interior portion of the main body to a vacuum suction source (vacuum source 110; Fig. 1; para [0062]).

Regarding claim 2, Hirsch teaches the mouthpiece of claim 1, wherein the side wall includes a plurality of perforations (evacuation holes 60; Figs. 3-4; para [0047]).

Regarding claim 3, Hirsch teaches the mouthpiece of claim 1, wherein the anterior wall and the posterior wall each includes a plurality of perforations (evacuation holes 60; Figs. 3-4).

Regarding claim 4, Hirsch teaches the mouthpiece of claim 1, wherein the anterior wall further includes a slit along a central axis (shown in Fig. 2 near channels 66).

Regarding claim 12, Hirsch teaches the mouthpiece of claim 1, further comprising a detachable (via pivot pins 92; para [0055]) mouth prop (bite block 26; Fig. 2).

Claims 5, 6, 17 and 18 lack an inventive step under PCT Article 33(3) as being obvious over Hirsch.

Regarding claim 5, Hirsch teaches the mouthpiece of claim 1, further comprising a stability bar (dispersion piece 24; Fig. 3). Hirsch fails to teach the stability bar protruding from an interior surface of the posterior wall. In Fig. 3, Hirsch shows the stability bar protruding from an interior of the anterior wall.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the intraoral device of Hirsch to include the stability bar protruding from the interior wall of the posterior wall, since a mere reversal of essential working parts of a device involves only routine skill in the art. The motivation for doing so would be to provide a mouthpiece that would come in two different configurations, depending on the side of the mouth being examined (para [0045]).

Hirsch further fails to teach wherein a thickness of the stability bar increases resilience of the cheek retractor portion during bending. However, Hirsch teaches a combined thickness when the stability bar is connected to the mouthpiece (using pivot pins 92) (see Figs. 2 and 3 which shows the main body 50 before and after attachment of the stability bar). Further, Hirsch teaches both the stability bar (dispersion piece 24) and the cheek retractor portion (cheek retractor portion 52) are made of flexible material and are in pivot connection (para [0045]; [0049]).

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the intraoral device of Hirsch with increased resilience of the cheek retractor portion during bending in order to provide a mouthpiece to better accommodate different mouth sizes and shapes.

(Continued in Supplemental Boxes)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2014/032892

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box V

Regarding claim 6, Hirsch teaches the mouthpiece of claim 1, wherein the main body portion, the cheek retractor portion, and the suction connector portion, but lacks the teaching that they are formed by injection-molded as one piece.

However, in an alternate embodiment shown in Fig. 18A, Hirsch teaches intraoral device (200) preferably has a single-piece, integrated homogenous-material, injection-molded construction (para [0074]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the intraoral device of Hirsch, as taught in the alternate embodiment, for the purpose of minimize the cost of construction of each device, thus eliminating the need for reuse.

Regarding claim 17, Hirsch teaches the mouthpiece of claim 1, but lacks the teaching of the suction connector portion comprises a cutout corresponding to a protrusion on a vacuum adapter for an interlocking fit.

However, in alternate embodiment shown in Fig. 18B, Hirsch teaches the suction connector portion (connection section 570) comprises a cutout (slots 630) corresponding to a protrusion (barbs 690) on a vacuum adapter (vacuum-only adapter 230 by way of plug portion 640; Fig. 18B; para [0092]) for an interlocking fit (para [0092]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the intraoral device of Hirsch, as taught in the alternate embodiment, for the purpose of providing a more secure connection between the suction connection portion and the vacuum.

Regarding claim 18, Hirsch teaches the mouthpiece of claim 1, but lacks the teaching of the anterior wall and the posterior wall having different thicknesses.

However, Hirsch teaches the intraoral device "may also come in different sizes...to accommodate different mouth sizes and shapes" (para [0056]). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the intraoral device of Hirsch to include an anterior wall and posterior wall having different thicknesses, for the purpose of providing a device that may accommodate a variety of patients' mouths.

Claim 7 lacks an inventive step under PCT Article 33(3) as being obvious over Hirsch in view of Bowman et al hereinafter referred to as Bowman.

Regarding claim 7, Hirsch teaches the mouthpiece of claim 1, wherein the material used in the injection molding is autoclavable.

Hirsch teaches "the bite piece 26 and dispersion piece 24 are autoclaved" (para [0060]). However, Hirsch lacks the teaching wherein the material used in the injection-molding is a flexible, translucent material.

However, in an alternate embodiment shown in Figs. 18A-18B, Hirsch teaches the "intraoral device is preferably injection molded out of a translucent, flexible...elastomer" (para [0074]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the intraoral device, as taught by the alternate embodiment for the purpose of minimizing construction costs a provide a device that may accommodate many different patients mouths.

Hirsch also fails to teach the mouthpiece wherein the material used in the injection molding is a high heat-resistant, silicone-based material.

Bowman teaches dental positioners where the use of "silicone became very acceptable because of its...resistance to heat" (para [0018]). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the intraoral device of Hirsch to include a heat resistant silicone-based material, as taught by Bowman, since selection of a known material on the basis of its suitability for an intended use involves only routine skill in the art. The motivation for doing so would be to provide a device with enhanced efficacy and patient comfort.

Claims 8-10 and 13-16 lack an inventive step under PCT Article 33(3) as being obvious over Hirsch in view Black et al hereinafter referred to as Black.

Regarding claim 8, Hirsch teaches the mouthpiece of claim 1, but lacks the teaching of the mouthpiece further comprising a bridge structure protruding from an interior surface of the posterior wall, the protruding bridge structure comprising a plurality of spaced contact points that keep the anterior wall separated from the posterior wall during suction.

Black teaches an intraoral device comprising a bridge structure (transverse walls 348c; Figs. 23A and 23C) protruding from an interior surface of the posterior wall (posterior layer 348a), the protruding bridge structure comprising a plurality of spaced contact points that keep the anterior wall (anterior layer 348b) separated from the posterior wall during suction (para [0122]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the intraoral device of Hirsch, as taught by Black, for the purpose of providing enhanced efficacy during suction.

Regarding claim 9, Hirsch and Black teach the mouthpiece of claim 8, but lack the teaching wherein the bridge structure protrudes from the interior surface of the posterior wall in a wave shape, and wherein the contact points are at crests of the wave shape.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the intraoral device of Hirsch to include bridge structures with the contact points are at crests of the wave shape, since a change in shape of an element involves only routine skill in the art. The motivation for doing so would be to provide enhanced efficacy during suction.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2014/032892

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Regarding claim 10, Hirsch and Black teach the mouthpiece of claim 9, wherein troughs are configured to allow suction through the bridge structure. Black teaches "in this way the channels 342,343 (troughs)...thereby allowing for simultaneous aspiration of debris and fluid" para [0122]). However, Hirsch and Black lack the teaching wherein the bridge structure protrudes from the interior surface of the posterior wall in a wave shape, and wherein the contact points are at crests of the wave shape.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the intraoral device of Hirsch to include bridge structures with the contact points are at crests of the wave shape, since a change in shape of an element involves only routine skill in the art. The motivation for doing so would be to provide enhanced efficacy during suction.

Regarding claim 13, Hirsch teaches the mouthpiece of claim 12, but lacks the teaching of wherein the detachable mouth prop comprises a strap configured to fit around the suction connector portion, wherein an external surface of the suction connector portion comprises a notch region corresponding to the strap, and wherein an external surface of the strap is substantially flush with a remaining external surface of the suction connector portion when the strap sits in the notch region.

Hirsch does teach a notch region (plug portion 640) for matingly corresponding to connection section 570 of tube 590; Fig. 18B; para [0092]).

Black teaches an intraoral device comprising a strap (conduit 312; Fig. 20B; para [0114]) configured to fit around the suction connector portion ("neck of tongue..."; para [0114]) wherein an external surface of the suction connector portion (Figs. 23B-23C; neck 346; para [0126]), comprises a region corresponding to the strap, and wherein an external surface of the strap is substantially flush with a remaining external surface of the suction connector portion when the strap sits in the region (para [0126]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the intraoral device of Hirsch, as taught by Black, for the purpose of providing a more secure connection between the mouth prop and suction connection portion.

Regarding claim 14, Hirsch and Black teach the mouthpiece of claim 13, but lack the teaching wherein the strap is injection-molded in a single piece with the mouth prop.

Hirsch teaches the use of injection molding for the intraoral device ("one piece, flexible injection-molded body; Abstract).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the Hirsch device, since the use of a one piece construction instead of the structure disclosed in the prior art would have required only routine skill in the art. The motivation for doing so would be to provide enhanced efficacy during suction.

Regarding claim 15, Hirsch teaches the mouthpiece of claim 1, but lacks the teaching wherein the suction connector portion further comprises an external plug protrusion corresponding to an opening in a mouth prop associated with the strap.

Black teaches an intraoral device wherein the suction connector portion further comprises an external plug protrusion (longitudinal projection 344; para [0126]) corresponding to an opening (groove 311; Fig. 20D; para [0126]) in a mouth prop associated with the strap (para [0126]). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Hirsch, with the intraoral device as taught by Black, in order to provide a more secure connection at the suction connection portion.

Regarding claim 16, Hirsch and Black teach the mouthpiece of claim 15, wherein the plug protrusion fits into the opening to provide additional crush-resistance and decreased compressibility during biting by the patient.

Hirsch does teach, when adding plug 640 into connection section 570, "the plug...helps keep bite piece 250 from collapsing; para [0092]). Specifically, Black teaches the plug protrusion (longitudinal projection 344) fits into the opening (groove 311).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Hirsch, with the plug protrusion as taught by Black, for the purpose of providing a more secure connection at the suction connection portion.

Claims 11 lacks an inventive step under PCT Article 33(3) as being obvious over Hirsch in view of Oliva et al hereinafter referred to as Oliva.

Regarding claim 11, Hirsch teaches the mouthpiece of claim 1, but lacks the teaching wherein the suction connector portion comprises an internal stop to assist in positioning of a vacuum suction source or a vacuum adaptor.

Oliva teaches a dental instrument that comprises an internal stop (spring-loaded valve stem 239; Fig. 14; col.8, lns. 15-22).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the intraoral device of Hirsch to include an internal stop, as taught by Oliva, for the purpose of manually stopping the suctioning during positioning of the vacuum source.

Claims 1-18 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry

Electronic Acknowledgement Receipt

EFS ID:	40308186
Application Number:	16870745
International Application Number:	
Confirmation Number:	7491
Title of Invention:	DENTAL MOUTHPIECE
First Named Inventor/Applicant Name:	Thien Nguyen
Customer Number:	138718
Filer:	Ruby Lim Chung/Lea Fong
Filer Authorized By:	Ruby Lim Chung
Attorney Docket Number:	INCEP-005
Receipt Date:	18-AUG-2020
Filing Date:	08-MAY-2020
Time Stamp:	18:11:11
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
------------------------	----

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	INCEP-005_IDS_Statement_8-18-20.pdf	96025	no	2
			028ee5dac19ea33645693a5b14630db29d24559e		

Warnings:

Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	INCEP-005_IDS_1449_8-18-20.pdf	292411	no	9
			51bef675ca2a28fb913ab3386929d4527b30106		
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Foreign Reference	CA_2851861.pdf	2424067	no	32
			85366301decdd3125811177b5fe10e1ac2404fe2		
Warnings:					
Information:					
4	Foreign Reference	CN_102026587.pdf	2438656	no	18
			2d0d519437a575ac8f1848b86a283e2fe9cf6d0		
Warnings:					
Information:					
5	Foreign Reference	CN_102247140.pdf	614223	no	7
			63fdb427693f459fcd71369e5a11e3e93fc2645a		
Warnings:					
Information:					
6	Foreign Reference	CN_105578986.pdf	1830562	no	15
			62fbeb6b0b03a3685ace840a5ec6cfadc781c200		
Warnings:					
Information:					
7	Foreign Reference	EP_2903557.pdf	74115	no	1
			0651af6f12a4a74795a2e885304bfa803efeb9a2		
Warnings:					
Information:					
8	Foreign Reference	EP_3184076.pdf	1862059	no	21
			7fc2233763ad1f02bf20136a540b4b7cb0741804		
Warnings:					
Information:					
266 of 295					

9	Foreign Reference	GB_2170106.pdf	1001522	no	6
			0b5f812d7c308ee865d724ff65e450bc20d7ce84		
Warnings:					
Information:					
10	Foreign Reference	WO_9937238.pdf	3905823	no	33
			b9990229f14cb100f4da1d470673704a974df8a0		
Warnings:					
Information:					
11	Foreign Reference	WO_2011014952.pdf	1348515	no	25
			3ae4fe28285fd3a1f9da46b3aa3be9d17f37b410		
Warnings:					
Information:					
12	Foreign Reference	WO_2015088577.pdf	1843302	no	26
			81da0f7475af15e04330d2d83fcaeeb44dd4402a		
Warnings:					
Information:					
13	Non Patent Literature	PCTUS2014032892_Search_Report_and_Written_Opinion_9-4-14.pdf	1061235	no	7
			2d7a866894850e60d31f1c9e8c4e85e08ac22e65		
Warnings:					
Information:					
14	Non Patent Literature	AU_2014202637_AU_Examination_Report_1-23-15.pdf	200087	no	2
			f092c4b3ba8796d129a73c66636b8da4ccf89770		
Warnings:					
Information:					
15	Non Patent Literature	CA_2919142_Examination_Search_Report_5-31-16.pdf	1663214	no	5
			9db73d088259fb48da5bb4f1eb0637b68923bac5		
Warnings:					
Information:					

16	Non Patent Literature	CN_20148003991_First_OA_12-29-16.pdf	62422 827fadd98546b4af1744b9456b97ebd1934a7667	no	8
Warnings:					
Information:					
17	Non Patent Literature	EP_14721736_Extended_EP_Se arch_Report_10-20-15.pdf	683373 2398e212c948c9e89d80168ed6aace2fb902d2dd	no	6
Warnings:					
Information:					
18	Non Patent Literature	EP_17150671_Extended_EP_Se arch_Report_5-29-17.pdf	769177 0e6bff63e4ca8ad044040074bc053ab7f10f5aea	no	8
Warnings:					
Information:					
19	Non Patent Literature	INCEP-001BR_Preliminary_Offic eAction_1-7-20.pdf	301942 e0b594728503e7f3ac4addd9016f4faa10621394	no	13
Warnings:					
Information:					
Total Files Size (in bytes):			22472730		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Group Art Unit: 3772

Examiner: Not Yet Assigned

Serial No.: 16/870,745

Filed: May 8, 2020

In re Application of: Thien Nguyen

Confirmation No.: 7491

Customer No.: 138718

Title: DENTAL MOUTHPIECE

INFORMATION DISCLOSURE STATEMENT

Under 37 C.F.R. § 1.56 and 1.97-1.98

Examiner:

Pursuant to the provisions of 37 C.F.R. §§ 1.56 and 1.97-98 of the Rules of Practice in Patent Cases, enclosed herewith is form PTO-SB-08, listing several references. The Examiner is requested to make these references of official record in the application.

The references cited may be material to examination of the application and are submitted in compliance with the Applicants' duty of disclosure as defined by 37 C.F.R. § 1.56.

No representation is made or intended as to the completeness of this list, nor is the inclusion of any reference an admission that it is prior art or pertinent to this application.

Respectfully submitted,
POLSINELLI LLP

Dated: August 18, 2020

By: _____/Ruby L. Chung/_____
Ruby L. Chung (Reg. No. 76,809)
Polsinelli LLP
Three Embarcadero Center, Suite 2400
San Francisco, CA 94111
415-248-2100 (Main)
patentdocketing@polsinelli.com

Substitute for Form 1449/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(use as many sheets as necessary)</i>				Complete if Known	
				Application Number	16/870,745
				Filing Date	May 8, 2020
				First Named Inventor:	Thien Nguyen
				Art Unit	3772
				Examiner Name	Not Yet Assigned
Sheet	1	of	2	Attorney Docket Number	INCEP-005

U.S. PATENT DOCUMENTS						
Examiner Initials*	Cite No. ¹	Document Number		Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code ² (If known)				
		US-	2001/0008752	7/19/2001	Hirsch et al.	
		US-	2017/0156832	6/8/2017	Reyes	
		US-				
		US-				
		US-				
		US-				
		US-				
		US-				
		US-				
		US-				
		US-				
		US-				
		US-				
		US-				
		US-				
		US-				

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No.¹	Foreign Patent Document	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T6
		Country Code³ Number⁴ Kind Codes (if known)				

Examiner Signature		Date Considered	
--------------------	--	-----------------	--

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. ¹Applicant's unique citation designation number (optional). ²See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴For Japanese patent documents, the indication of the year of reign of the Emperor must precede the serial number of the patent document. ⁵Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. ⁶Applicant is to place a check mark here if English language translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SENT FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference INCEP-001PCT	FOR FURTHER ACTION	See item 4 below
International application No. PCT/US2014/032892	International filing date (<i>day/month/year</i>) 03 April 2014 (03.04.2014)	Priority date (<i>day/month/year</i>) 09 December 2013 (09.12.2013)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant INCEPT, INC.		

1.	This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).																								
2.	This REPORT consists of a total of 6 sheets, including this cover sheet.																								
In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.																									
3.	This report contains indications relating to the following items: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%; text-align: center;">☒</td> <td style="width: 25%;">Box No. I</td> <td style="width: 70%;">Basis of the report</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td style="text-align: center;">☒</td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td style="text-align: center;">☐</td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table>	☒	Box No. I	Basis of the report	☐	Box No. II	Priority	☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	☐	Box No. IV	Lack of unity of invention	☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	☐	Box No. VI	Certain documents cited	☐	Box No. VII	Certain defects in the international application	☐	Box No. VIII	Certain observations on the international application
☒	Box No. I	Basis of the report																							
☐	Box No. II	Priority																							
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability																							
☐	Box No. IV	Lack of unity of invention																							
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement																							
☐	Box No. VI	Certain documents cited																							
☐	Box No. VII	Certain defects in the international application																							
☐	Box No. VIII	Certain observations on the international application																							
4.	The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).																								

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Date of issuance of this report 14 June 2016 (14.06.2016) Authorized officer Kihwan Moon e-mail: pt01.pct@wipo.int
--	--

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: TAM THANH PHAM
LEWIS ROCA ROTHGERBER LLP
2440 W EL CAMINO REAL, 6TH FLOOR
MOUNTAIN VIEW, CA 94040

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year)

04 SEP 2014

Applicant's or agent's file reference
INCEP-001PCT

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/US2014/032892

International filing date (day/month/year)

03 April 2014

Priority date (day/month/year)

09 December 2013

International Patent Classification (IPC) or both national classification and IPC

IPC(8) - A41C 17/00, 17/06 (2014.01)

CPC - A41C 17/00 (2014.07)

Applicant INCEPT, INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1 bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-3201

Date of completion of this opinion

22 August 2014

Authorized officer:

Blaine R. Copenheaver

PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (July 2011)

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US2014/032892

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed.
 - ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:
 - a. (means)
 - ☐ on paper
 - ☐ in electronic form
 - b. (time)
 - ☐ in the international application as filed
 - ☐ together with the international application in electronic form
 - ☐ subsequently to this Authority for the purposes of search
4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US2014/032892

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	5-11, 13-18	YES
	Claims	1-4, 12	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-18	NO
Industrial applicability (IA)	Claims	1-18	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1-4 and 12 lack novelty under PCT Article 33(2) as being anticipated by Hirsch et al hereinafter referred to as Hirsch.

Regarding claim 1, Hirsch teaches a dental mouthpiece (intraoral device 20; Fig. 2; para [0042]) composed of a material (Abstract), the dental mouthpiece comprising:

a main body portion (main body portion 50; Fig. 2; para [0047]) comprising a defined pocket (main receiving channel 62; Fig. 2; para [0047]) having an anterior wall (shown in Fig. 3), a posterior wall (shown in Fig. 4), and a side wall (shown in Figs. 5 and 8A-8B) in between the anterior wall and the posterior wall, wherein the anterior wall, the posterior wall, and the side wall define an interior portion of the defined pocket;

a cheek retractor portion (cheek retractor portion 52 of retractor 22; Fig. 2; para [0046]) configured to press against a cheek of a patient when placed in a mouth of the patient (para [0043]), wherein resilience of the material causes the cheek retractor portion to retract a cheek of the patient away from the teeth of the patient (para [0043]); and

a suction connector portion (exit port 108; Fig. 3; para[0058]) for connecting the interior portion of the main body to a vacuum suction source (vacuum source 110; Fig. 1; para [0062]).

Regarding claim 2, Hirsch teaches the mouthpiece of claim 1, wherein the side wall includes a plurality of perforations (evacuation holes 60; Figs. 3-4; para [0047]).

Regarding claim 3, Hirsch teaches the mouthpiece of claim 1, wherein the anterior wall and the posterior wall each includes a plurality of perforations (evacuation holes 60; Figs. 3-4).

Regarding claim 4, Hirsch teaches the mouthpiece of claim 1, wherein the anterior wall further includes a slit along a central axis (shown in Fig. 2 near channels 66).

Regarding claim 12, Hirsch teaches the mouthpiece of claim 1, further comprising a detachable (via pivot pins 92; para [0055]) mouth prop (bite block 26; Fig. 2).

Claims 5, 6, 17 and 18 lack an inventive step under PCT Article 33(3) as being obvious over Hirsch.

Regarding claim 5, Hirsch teaches the mouthpiece of claim 1, further comprising a stability bar (dispersion piece 24; Fig. 3).

Hirsch fails to teach the stability bar protruding from an interior surface of the posterior wall. In Fig. 3, Hirsch shows the stability bar protruding from an interior of the anterior wall.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the intraoral device of Hirsch to include the stability bar protruding from the interior wall of the posterior wall, since a mere reversal of essential working parts of a device involves only routine skill in the art. The motivation for doing so would be to provide a mouthpiece that would come in two different configurations, depending on the side of the mouth being examined (para [0045]).

Hirsch further fails to teach wherein a thickness of the stability bar increases resilience of the cheek retractor portion during bending.

However, Hirsch teaches a combined thickness when the stability bar is connected to the mouthpiece (using pivot pins 92) (see Figs. 2 and 3 which shows the main body 50 before and after attachment of the stability bar).

Further, Hirsch teaches both the stability bar (dispersion piece 24) and the cheek retractor portion (cheek retractor portion 52) are made of flexible material and are in pivot connection (para [0045]; [0049]).

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the intraoral device of Hirsch with increased resilience of the cheek retractor portion during bending in order to provide a mouthpiece to better accommodate different mouth sizes and shapes.

(Continued in Supplemental Boxes)

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US2014/032892

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box V

Regarding claim 6, Hirsch teaches the mouthpiece of claim 1, wherein the main body portion, the cheek retractor portion, and the suction connector portion, but lacks the teaching that they are formed by injection-molded as one piece.

However, in an alternate embodiment shown in Fig. 18A, Hirsch teaches intraoral device (200) preferably has a single-piece, integrated homogenous-material, injection-molded construction (para [0074]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the intraoral device of Hirsch, as taught in the alternate embodiment, for the purpose of minimize the cost of construction of each device, thus eliminating the need for reuse.

Regarding claim 17, Hirsch teaches the mouthpiece of claim 1, but lacks the teaching of the suction connector portion comprises a cutout corresponding to a protrusion on a vacuum adapter for an interlocking fit.

However, in alternate embodiment shown in Fig. 18B, Hirsch teaches the suction connector portion (connection section 570) comprises a cutout (slots 630) corresponding to a protrusion (barbs 690) on a vacuum adapter (vacuum-only adapter 230 by way of plug portion 640; Fig. 18B; para [0092]) for an interlocking fit (para [0092]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the intraoral device of Hirsch, as taught in the alternate embodiment, for the purpose of providing a more secure connection between the suction connection portion and the vacuum.

Regarding claim 18, Hirsch teaches the mouthpiece of claim 1, but lacks the teaching of the anterior wall and the posterior wall having different thicknesses.

However, Hirsch teaches the intraoral device "may also come in different sizes...to accommodate different mouth sizes and shapes" (para [0056]). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the intraoral device of Hirsch to include an anterior wall and posterior wall having different thicknesses, for the purpose of providing a device that may accommodate a variety of patients' mouths.

Claim 7 lacks an inventive step under PCT Article 33(3) as being obvious over Hirsch in view of Bowman et al hereinafter referred to as Bowman.

Regarding claim 7, Hirsch teaches the mouthpiece of claim 1, wherein the material used in the injection molding is autoclavable.

Hirsch teaches "the bite piece 26 and dispersion piece 24 are autoclaved" (para [0060]). However, Hirsch lacks the teaching wherein the material used in the injection-molding is a flexible, translucent material.

However, in an alternate embodiment shown in Figs. 18A-18B, Hirsch teaches the "intraoral device is preferably injection molded out of a translucent, flexible...elastomer" (para [0074]).

Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the intraoral device, as taught by the alternate embodiment for the purpose of minimizing construction costs a provide a device that may accommodate many different patients mouths.

Hirsch also fails to teach the mouthpiece wherein the material used in the injection molding is a high heat-resistant, silicone-based material.

Bowman teaches dental positioners where the use of "silicone became very acceptable because of its...resistance to heat" (para [0018]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the intraoral device of Hirsch to include a heat resistant silicone-based material, as taught by Bowman, since selection of a known material on the basis of its suitability for an intended use involves only routine skill in the art. The motivation for doing so would be to provide a device with enhanced efficacy and patient comfort.

Claims 8-10 and 13-16 lack an inventive step under PCT Article 33(3) as being obvious over Hirsch in view Black et al hereinafter referred to as Black.

Regarding claim 8, Hirsch teaches the mouthpiece of claim 1, but lacks the teaching of the mouthpiece further comprising a bridge structure protruding from an interior surface of the posterior wall, the protruding bridge structure comprising a plurality of spaced contact points that keep the anterior wall separated from the posterior wall during suction.

Black teaches an intraoral device comprising a bridge structure (transverse walls 348c; Figs. 23A and 23C) protruding from an interior surface of the posterior wall (posterior layer 348a), the protruding bridge structure comprising a plurality of spaced contact points that keep the anterior wall (anterior layer 348b) separated from the posterior wall during suction (para [0122]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the intraoral device of Hirsch, as taught by Black, for the purpose of providing enhanced efficacy during suction.

Regarding claim 9, Hirsch and Black teach the mouthpiece of claim 8, but lack the teaching wherein the bridge structure protrudes from the interior surface of the posterior wall in a wave shape, and wherein the contact points are at crests of the wave shape.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the intraoral device of Hirsch to include bridge structures with the contact points are at crests of the wave shape, since a change in shape of an element involves only routine skill in the art. The motivation for doing so would be to provide enhanced efficacy during suction.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2014/032892

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Regarding claim 10, Hirsch and Black teach the mouthpiece of claim 9, wherein troughs are configured to allow suction through the bridge structure. Black teaches "in this way the channels 342,343 (troughs)...thereby allowing for simultaneous aspiration of debris and fluid" para [0122]). However, Hirsch and Black lack the teaching wherein the bridge structure protrudes from the interior surface of the posterior wall in a wave shape, and wherein the contact points are at crests of the wave shape.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the intraoral device of Hirsch to include bridge structures with the contact points are at crests of the wave shape, since a change in shape of an element involves only routine skill in the art. The motivation for doing so would be to provide enhanced efficacy during suction.

Regarding claim 13, Hirsch teaches the mouthpiece of claim 12, but lacks the teaching of wherein the detachable mouth prop comprises a strap configured to fit around the suction connector portion, wherein an external surface of the suction connector portion comprises a notch region corresponding to the strap, and wherein an external surface of the strap is substantially flush with a remaining external surface of the suction connector portion when the strap sits in the notch region.

Hirsch does teach a notch region (plug portion 640) for matingly corresponding to connection section 570 of tube 590; Fig. 18B; para [0092]).

Black teaches an intraoral device comprising a strap (conduit 312; Fig. 20B; para [0114]) configured to fit around the suction connector portion ("neck of tongue..."; para [0114]) wherein an external surface of the suction connector portion (Figs. 23B-23C; neck 346; para [0126]), comprises a region corresponding to the strap, and wherein an external surface of the strap is substantially flush with a remaining external surface of the suction connector portion when the strap sits in the region (para [0126]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the intraoral device of Hirsch, as taught by Black, for the purpose of providing a more secure connection between the mouth prop and suction connection portion.

Regarding claim 14, Hirsch and Black teach the mouthpiece of claim 13, but lack the teaching wherein the strap is injection-molded in a single piece with the mouth prop.

Hirsch teaches the use of injection molding for the intraoral device ("one piece, flexible injection-molded body; Abstract).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the Hirsch device, since the use of a one piece construction instead of the structure disclosed in the prior art would have required only routine skill in the art. The motivation for doing so would be to provide enhanced efficacy during suction.

Regarding claim 15, Hirsch teaches the mouthpiece of claim 1, but lacks the teaching wherein the suction connector portion further comprises an external plug protrusion corresponding to an opening in a mouth prop associated with the strap.

Black teaches an intraoral device wherein the suction connector portion further comprises an external plug protrusion (longitudinal projection 344; para [0126]) corresponding to an opening (groove 311; Fig. 20D; para [0126]) in a mouth prop associated with the strap (para [0126]). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Hirsch, with the intraoral device as taught by Black, in order to provide a more secure connection at the suction connection portion.

Regarding claim 16, Hirsch and Black teach the mouthpiece of claim 15, wherein the plug protrusion fits into the opening to provide additional crush-resistance and decreased compressibility during biting by the patient.

Hirsch does teach, when adding plug 640 into connection section 570, "the plug...helps keep bite piece 250 from collapsing; para [0092]). Specifically, Black teaches the plug protrusion (longitudinal projection 344) fits into the opening (groove 311).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Hirsch, with the plug protrusion as taught by Black, for the purpose of providing a more secure connection at the suction connection portion.

Claims 11 lacks an inventive step under PCT Article 33(3) as being obvious over Hirsch in view of Oliva et al hereinafter referred to as Oliva.

Regarding claim 11, Hirsch teaches the mouthpiece of claim 1, but lacks the teaching wherein the suction connector portion comprises an internal stop to assist in positioning of a vacuum suction source or a vacuum adaptor.

Oliva teaches a dental instrument that comprises an internal stop (spring-loaded valve stem 239; Fig. 14; col.8, lns. 15-22).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the intraoral device of Hirsch to include an internal stop, as taught by Oliva, for the purpose of manually stopping the suctioning during positioning of the vacuum source.

Claims 1-18 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference INCEP-005PCT		FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/US 20/32228	International filing date (day/month/year) 08 May 2020 (08.05.2020)	(Earliest) Priority Date (day/month/year) 10 May 2019 (10.05.2019)	
Applicant DRYSHIELD, LLC			

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed.
☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found unsearchable (see Box No. II).

3. ☐ Unity of invention is lacking (see Box No. III).

4. With regard to the title,

- ☒ the text is approved as submitted by the applicant.
☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

- ☒ the text is approved as submitted by the applicant.
☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No. 1
☒ as suggested by the applicant.
☐ as selected by this Authority, because the applicant failed to suggest a figure.
☐ as selected by this Authority, because this figure better characterizes the invention.
- b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 20/32228

A. CLASSIFICATION OF SUBJECT MATTER

IPC - A61B 1/24, A61C 17/00, A61C 17/06, A61C 17/10, A61C 5/14 (2020.01)

CPC - A61B 1/24, A61C 17/00, A61C 17/06, A61C 17/10, A61C 5/14, A61C 5/90

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

See Search History document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

See Search History document

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2017/0156832 A1 (Reyes) 8 June 2017 (08.06.2017), entire document	1-20
Y	US 2014/0212838 A1 (Incept, Inc.) 31 July 2014 (31.07.2014), entire document	1-20
A	US 2015/0335409 A1 (Innerlite, Inc.) 26 November 2015 (26.11.2015), entire document	1-20
A	US 2009/0274991 A1 (Black et al.) 5 November 2009 (05.11.2009), entire document	1-20
A	US 2001/0008752 A1 (Hirsch et al.) 19 July 2001 (19.07.2001), entire document	1-20



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"D" document cited by the applicant in the international application

"E" earlier application or patent but published on or after the international filing date

"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)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"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

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"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

"&" document member of the same patent family

Date of the actual completion of the international search

27 JULY 2020

Date of mailing of the international search report

12 AUG 2020

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents

P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-8300

Authorized officer

Lee Young

Telephone No. PCT Helpdesk: 571-272-4300

Form PCT/ISA/210 (second sheet) (July 2019)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: JACEK MAREK WNUK
POL SINELLI LLP
THREE EMBARCADERO CENTER, SUITE
2400
SAN FRANCISCO, CA 94111

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year)

12 AUG 2020

Applicant's or agent's file reference
INCEP-005PCT

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/US 20/32228

International filing date (day/month/year)

08 May 2020 (08.05.2020)

Priority date (day/month/year)

10 May 2019 (10.05.2019)

International Patent Classification (IPC) or both national classification and IPC

IPC - A61B 1/24, A61C 17/00, A61C 17/06, A61C 17/10, A61C 5/14 (2020.01)

CPC - A61B 1/24, A61C 17/00, A61C 17/06, A61C 17/10, A61C 5/14, A61C 5/90

Applicant DRYSHIELD, LLC

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-8300

Date of completion of this opinion

27 JULY 2020

Authorized officer

Lee Young

PCT Help Desk

Telephone No. 571-272-4300

Form PCT/ISA/237 (cover sheet) (revised January 2019)

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 20/32228

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed.
 - ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).
2. ☐ This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(b)).
3. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. ☐ forming part of the international application as filed:
 - ☐ in the form of an Annex C/ST.25 text file.
 - ☐ on paper or in the form of an image file.
 - b. ☐ furnished together with the international application under PCT Rule 13ter.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
 - c. ☐ furnished subsequent to the international filing date for the purposes of international search only:
 - ☐ in the form of an Annex C/ST.25 text file (Rule 13ter.1(a)).
 - ☐ on paper or in the form of an image file (Rule 13ter.1(b) and Administrative Instructions, Section 713).
4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 20/32228

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	none	NO
Inventive step (IS)	Claims	none	YES
	Claims	1-20	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	none	NO

2. Citations and explanations:

Claims 1-20 lack an inventive step under PCT Article 33(3) as being obvious over US 2017/0156832 A1 to Reyes in view of US 2014/0212838 A1 to Incept, Inc. (hereinafter Incept).

Regarding claim 1, Reyes teaches a dental mouthpiece (see fig. 1-9; para [0022]) the dental mouthpiece comprising: a main body portion at a central part of the mouthpiece having a first end and a second end (fig. 3 see in closed configuration the dental mouthpiece comprises a main body portion which is centrally circular with ends at suction piece 28 and the opposite, tapered distal end; para [0022]; para [0031]), the main body portion having an anterior wall (fig. 3, 5 see anterior wall 32; para [0028]) and a posterior wall (fig. 3, 5 see posterior wall 34; para [0028]), the anterior wall and the posterior wall defining an interior space (fig. 3, 5 see walls 32, 34 define space therebetween when the mouthpiece is closed), at least one connector connecting the anterior wall to the posterior wall (fig. 1 see connector 36/38 on trough 18/20; para [0028]; para [0032]), at least one anterior intervening wall extending from the anterior wall partially towards the posterior wall (fig. 1-5 see anterior intervening wall 8; para [0024]-[0025]), and at least one posterior intervening wall extending from the posterior wall partially towards the anterior wall (fig. 1-5 see posterior intervening wall 10; para [0024]-[0025]), the at least one anterior intervening wall and the at least one posterior intervening wall each having alternating crests and troughs (fig. 1-5 see crests 12 and troughs between crests 12; para [0034]; para [0027]); a suction connector portion connected to the first end (fig. 1-7 see suction connector portion 26; para [0031]), the connector portion connecting the interior space to a vacuum suction source (para [0029]; para [0031]); and a cheek retractor portion connected to the second end (fig. 1-3 see tapered distal end; para [0036]), but does not explicitly teach the dental mouthpiece formed in a curve, the main body at a central part of the curve, the anterior wall inside the curve nor the posterior wall outside the curve. However, in similar art, Incept teaches a dental mouthpiece formed in a curve (see fig. 1A, 1D-E; para [0033]) comprising a main body portion at a central part of the curve (fig. 1E see main body portion at the center of the curve between the left open channel and the right distal tip), the main body portion having an anterior wall inside the curve (fig. 1A-1D see anterior wall inside curve) and a posterior wall outside the curve (fig. 1A-1D see posterior wall outside the curve). Curved shaped of dental mouthpieces are well known in the art for improved fit within the mouth for retracting a cheek. Accordingly, it would have been obvious to a person having ordinary skill in the art to have shaped the mouthpiece taught by Reyes in a curve as taught by Incept, such that the main body is at a central part of the curve, the anterior wall is inside the curve, and the posterior wall is outside the curve, in order to optimize the shape of the mouthpiece to improve fit in mouth of a patient.

Regarding claim 2, Reyes in view of Incept teach the mouthpiece of claim 1, and Reyes modified by Incept further teaches wherein the at least one connector is a cylindrical shaped pillar (Reyes fig. 1 see connector includes cylindrical shaped pillar 36; para [0032]).

Regarding claim 3, Reyes in view of Incept teach the mouthpiece of claim 1, and Reyes modified by Incept further teaches wherein the at least one connector is a wall spanning longitudinally in the main body portion in the interior space (Reyes fig. 1 see connector includes wall 18/20; para [0028]).

Regarding claim 4, Reyes in view of Incept teach the mouthpiece of claim 1, but Reyes modified by Incept does not explicitly teach the mouthpiece further comprising a bridge structure in the interior space protruding from the posterior wall, wherein the bridge comprises protrusions, wherein the protrusions are battlement-shaped, with spaced crests. However, Incept teaches a mouthpiece comprising a bridge structure in an interior space (fig. 1E see bridge 180; para [0042]), wherein the bridge comprises protrusions (fig. 1E see protruding crests of bridge 180), wherein the protrusions are battlement-shaped, with spaced crests (fig. 1E see spaced crests form a battlement-shape; para [0042]). It would have been obvious to a person having ordinary skill in the art to have included a bridge structure as taught by Incept in the mouthpiece taught by Reyes in order to improve the transfer of fluids to the vacuum connection (see Incept para [0042]), thus improving the suction capabilities of the mouthpiece.

Regarding claim 5, Reyes in view of Incept teach the mouthpiece of claim 4, but Reyes modified by Incept does not explicitly teach wherein the protrusions near the suction connector is in greater height and length. However, Incept teaches wherein the protrusions near the suction connector are greater in size (see fig. 1E; para [0042]). Furthermore, Incept teaches the protrusions are shaped to improve the suction of fluids through the interior space (para [0042]). Accordingly, it would have been obvious to a person having ordinary skill in the art to have increased both the height and length of the protrusions near the suction connector in order to improve the suction of fluids through the interior space and thus improve the suction capabilities of the device.

-*-Continued in Supplemental Box-*-

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 20/32228

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 4: Regarding claim 4, the claim language is confusing and lacks clarity. Specifically, the recitation "protrusions" lacks proper antecedent basis. In order to give meaning to this claim such that an opinion may be rendered, it has been interpreted to read "The mouthpiece of claim 1, further comprising a bridge structure in the interior space protruding from the posterior wall, wherein the bridge comprises protrusions, wherein the protrusions are battlement-shaped, with spaced crests," which gives proper antecedent basis.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 20/32228

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

~Box V.2 - Citations and Explanations~

Regarding claim 6, Reyes in view of Incept teach the mouthpiece of claim 4, and Reyes modified by Incept further teaches wherein spaces between the crests are troughs of the battlement shape (see Incept fig. 1A spaces between crests are battlement-shaped troughs; para [0042]).

Regarding claim 7, Reyes in view of Incept teach the mouthpiece of claim 1, but Reyes modified by Incept does not explicitly teach wherein the alternating crests and troughs on the anterior intervening wall and the posterior intervening wall are semi-circle shaped. However, optimization of shape is within the ordinary skill of a person with the art. Furthermore, Reyes teaches the crests and troughs comprise sharp corners (see fig. 1-3; para [0034]; para [0025]-(0027)), but it is well known in the art that sharp corners are difficult and expensive to manufacture. Accordingly, it would have been obvious to a person having ordinary skill in the art to have optimized the shape of the crests and troughs to a semi-circle in order to prevent the presence of sharp corners to improve ease of manufacturing.

Regarding claim 8, Reyes in view of Incept teach the mouthpiece of claim 1, and Reyes modified by Incept further teaches wherein the anterior intervening wall and the posterior intervening wall have varying heights to maintain integrity of the main body portion (Reyes fig. 1-3 see presence of crests 12 and troughs therebetween varies the heights of intervening walls 8, 10 in order to provide integrity to the structure of the interior space; para [0034]).

Regarding claim 9, Reyes in view of Incept teach the mouthpiece of claim 1, and Reyes modified by Incept further teaches wherein the troughs of the anterior intervening wall and the posterior intervening wall decrease in size as the troughs approach the cheek retractor portion (Reyes fig. 1 see troughs between crests 12 become smaller in length as they approach the cheek retractor portion at the distal end).

Regarding claim 10, Reyes in view of Incept teach the mouthpiece of claim 1, and Reyes modified by Incept further teaches wherein the anterior intervening wall and the posterior intervening wall meet at a point where the suction connector meets the main body (Reyes fig. 1-3; para [0034]).

Regarding claim 11, Reyes in view of Incept teach the mouthpiece of claim 1, and Reyes modified by Incept further teaches wherein the anterior intervening wall and the posterior intervening wall meet at a point where the main body meets the cheek retractor portion (Reyes fig. 1-3; para [0034]).

Regarding claim 12, Reyes in view of Incept teach the mouthpiece of claim 1, but Reyes modified by Incept does not explicitly teach further comprising a bite block integrated to the suction connector portion, wherein the bite block provide additional crush-resistance and decreased compressibility during biting by a patient. However, Incept teaches the mouthpiece may provide a bite block (see claim 18-19). Bite blocks are well known in the art to prevent compression of a device entering the mouth cavity and to ensure that the mouth or airway remains open during a procedure. Accordingly, it would have been obvious to a person having ordinary skill in the art to have provided a bite block in the mouthpiece to protect the suction tube and maintain the mouth in an open position during a procedure.

Regarding claim 13, Reyes in view of Incept teach the mouthpiece of claim 1, but Reyes modified by Incept does not explicitly teach wherein the main body portion, the suction connector portion, and the cheek retractor portion are formed by injection-molding as one piece. However, Reyes teaches the device may be manufactured by any simplified process (para [0010]). Furthermore, Incept teaches the mouthpiece may be formed by injection-molding (para [0032]). Injection molding is well known in the art for easy and inexpensive manufacturing of a one-piece polymer. Accordingly, it would have been obvious to a person having ordinary skill in the art to have manufactured the mouthpiece by injection-molding in order to provide a cost-effective production of the device.

Regarding claim 14, Reyes in view of Incept teach the mouthpiece of claim 1, but Reyes modified by Incept does not explicitly teach wherein a material that forms the main body, the suction connector portion, and the cheek retractor portion is a flexible, translucent, high heat-resistant, autoclavable silicon-based material. However, Reyes teaches wherein the material of the mouthpiece is a suitable, flexible polymer (para [0023]). Furthermore, Incept teaches a mouthpiece formed of a flexible, translucent, high heat-resistant, autoclavable silicon-based material (para [0032]). It would have been obvious to a person having ordinary skill in the art to have provided a flexible, translucent, high heat-resistant, autoclavable silicon-based material to construct the mouthpiece in order to optimize the mouthpiece for strength and manufacturing properties.

Regarding claim 15, Reyes in view of Incept teach the mouthpiece of claim 1, and Reyes modified by Incept further teaches wherein the posterior wall further includes a stability bar protruding from an interior surface of the posterior wall and along a longitudinal axis of the main body (Reyes fig. 1-5 see stability bar 18/20 comprises connector 36/38; para [0028]; para [0032]).

Regarding claim 16, Reyes in view of Incept teach the mouthpiece of claim 15, and Reyes modified by Incept further teaches wherein the at least one connector lies evenly spaced along the stability bar (Reyes fig. 1-5 see stability bar 18/20 comprises connector 36/38; para [0028]; para [0032]).

Regarding claim 17, Reyes in view of Incept teach the mouthpiece of claim 1, but Reyes modified by Incept does not explicitly teach wherein the suction connector portion comprises a cutout corresponding to a protrusion on a vacuum adapter interlocking fit. However, Incept teaches wherein the dental mouthpiece comprises a suction connector (Incept fig. 2A-E see connector 120; para [0045]) which connects to a vacuum source with an interlocking fit by a cutout (Incept see fig. 2A-E cutout 230; para [0045]). It would have been obvious to a person having ordinary skill in the art to have included a interlocking fit to a vacuum source as taught by Incept in the connector portion taught by Reyes in order to improve the integrity of the connector and prevent failure during use.

~Continued in next Supplemental Box~

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 20/32228

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

-Supplemental Box - Box V.2 - Citations and Explanations--

Regarding claim 18, Reyes in view of Incept teach the mouthpiece of claim 1, and Reyes modified by Incept further teaches where in the suction connector portion connects to a vacuum source (Reyes para [0030]-[0031]; para [0036]-[0038]), wherein activation of the vacuum source provides suction of fluids from the interior space of the main body (Reyes para [0036]-[0038]).

Regarding claim 19, Reyes in view of Incept teach the mouthpiece of claim 18, and Reyes modified by Incept further teaches wherein the activation of the vacuum source draws fluids from an exterior of the main body through the crests and troughs of the anterior intervening wall and the posterior intervening wall, into the interior space of the main body (Reyes para [0036]-[0038]).

Regarding claim 20, Reyes in view of Incept teach the mouthpiece of claim 1, and Reyes modified by Incept further teaches wherein the cheek retractor portion includes a surface that applies pressure based on resilience of the cheek retractor portion (Reyes fig. 1-5 see outer surface of cheek retractor portion at distal end; para [0036]; para [0023] device is flexible).

Claims 1-20 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used by industry.

Electronic Acknowledgement Receipt

EFS ID:	41076170
Application Number:	16870745
International Application Number:	
Confirmation Number:	7491
Title of Invention:	DENTAL MOUTHPIECE
First Named Inventor/Applicant Name:	Thien Nguyen
Customer Number:	138718
Filer:	Ruby Lim Chung/Lea Fong
Filer Authorized By:	Ruby Lim Chung
Attorney Docket Number:	INCEP-005
Receipt Date:	10-NOV-2020
Filing Date:	08-MAY-2020
Time Stamp:	18:13:49
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
------------------------	----

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	INCEP-005_IDS_Statement_11-10-20.pdf	96052	no	2
			6e04a919e211ad35ad9a8237e7353c05142d63b9		

Warnings:

Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	INCEP-005_IDS_1449_11-10-20.pdf	223581 7e0444ad1322fc68692236b2dbd6e6bb6d4f6153	no	2
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Non Patent Literature	PCTUS2014032892_InternationalPreliminaryReportOnPatentability_6-14-16.pdf	334202 7b192fb9ea41dea74c303a365c828775974a5c96	no	6
Warnings:					
Information:					
4	Non Patent Literature	PCTUS2020032228_SearchReport_and_WrittenOpinion_8-12-20.pdf	214171 deb3ae7e4c08b757cb43ee6a74d841aba69b704c	no	8
Warnings:					
Information:					
Total Files Size (in bytes):			868006		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Group Art Unit: 3772

Examiner: Not Yet Assigned

Serial No.: 16/870,745

Filed: May 8, 2020

In re Application of: Thien Nguyen

Confirmation No.: 7491

Customer No.: 138718

Title: DENTAL MOUTHPIECE

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Under 37 C.F.R. § 1.56 and 1.97-1.98

Examiner:

Pursuant to the provisions of 37 C.F.R. §§ 1.56 and 1.97-98 of the Rules of Practice in Patent Cases, enclosed herewith is form PTO-SB-08, listing several references. The Examiner is requested to make these references of official record in the application.

The references cited may be material to examination of the application and are submitted in compliance with the Applicants' duty of disclosure as defined by 37 C.F.R. § 1.56.

No representation is made or intended as to the completeness of this list, nor is the inclusion of any reference an admission that it is prior art or pertinent to this application.

Respectfully submitted,
POLSINELLI LLP

Dated: November 10, 2020

By: _____/Ruby L. Chung/_____
Ruby L. Chung (Reg. No. 76,809)
Polsinelli LLP
Three Embarcadero Center, Suite 2400
San Francisco, CA 94111
415-248-2100 (Main)
patentdocketing@polsinelli.com



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/870,745	05/08/2020	Thien Nguyen	INCEP-005

CONFIRMATION NO. 7491

PUBLICATION NOTICE



OC000000121292544

138718
Polsinelli LLP
3 Embarcadero Center
Suite 2400
San Francisco, CA 94111

Title:DENTAL MOUTHPIECE

Publication No.US-2020-0352680-A1

Publication Date:11/12/2020

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <https://portal.uspto.gov/pair/PublicPair>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Substitute for Form 1449/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(use as many sheets as necessary)</i>				Complete if Known	
				Application Number	16/870,745
				Filing Date	May 8, 2020
				First Named Inventor:	Thien Nguyen
				Art Unit	3772
				Examiner Name	Not Yet Assigned
Sheet	1	of	2	Attorney Docket Number	INCEP-005

U.S. PATENT DOCUMENTS						
Examiner Initials*	Cite No. ¹	Document Number		Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code ² (If known)				
		US-	D666,726	9/4/2012	Davis et al.	
		US-	D735,858	8/4/2015	Hirsch et al.	
		US-	D737,964	9/1/2015	Jessop et al.	
		US-	D782,047	3/21/2017	Ritter	
		US-	D782,048	3/21/2017	Ritter	
		US-	D787,069	5/16/2017	Ritter	
		US-	D787,070	5/16/2017	Ritter	
		US-	1,731,322	10/15/2029	Riddle	
		US-	D868,958	12/3/2019	Reyes	
		US-	3,758,950	9/18/1973	Krouzian	
		US-	5,009,595	4/23/1991	Osborn	
		US-	5,588,836	12/31/1996	Landis et al.	
		US-	6,241,521	6/5/2001	Garrison	
		US-	9,968,341	5/15/2018	Ritter	

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No.¹	Foreign Patent Document	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T6
		Country Code³ Number⁴ Kind Codes (if known)				
		WO 2020/231864	11/19/2020	Dryshield, LLC		

Examiner Signature		Date Considered	
--------------------	--	-----------------	--

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. ¹Applicant's unique citation designation number (optional). ²See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. ³Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). ⁴For Japanese patent documents, the indication of the year of reign of the Emperor must precede the serial number of the patent document. ⁵Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. ⁶Applicant is to place a check mark here if English language translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SENT FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Substitute for Form 1449/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(use as many sheets as necessary)</i>		Complete if Known			
		Application Number	16/870,745		
		Filing Date	May 8, 2020		
		First Named Inventor:	Thien Nguyen		
		Art Unit	3772		
		Examiner Name	Not Yet Assigned		
Sheet	2	of	2	Attorney Docket Number	INCEP-005
NON PATENT LITERATURE DOCUMENTS					
Examiner Initials*	Cite No'	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published			T ²
		Docket No. INCEP-001COA U.S. Patent Application 14/228,046; Final Office Action mailed 11/27/20			
		Docket No. INCEP-001COC U.S. Patent Application 14/228,054; Final Office Action mailed 12/22/20			
		Docket No. INCEP-001COD U.S. Patent Application 14/228,057; Office Action mailed 5/5/21			
		Docket No. INCEP-001COE U.S. Patent Application 14/228,061; Final Office Action mailed 4/29/21			
		Docket No. INCEP-001COE U.S. Patent Application 14/228,061; Office Action mailed 11/27/20			

Examiner Signature		Date Considered	
-----------------------	--	--------------------	--

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

'Applicant's unique citation designation number (optional). 'Applicant is to place a check mark here if English Translation is attached.

This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SENT FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.



(51) International Patent Classification:

A61B 1/24 (2006.01) *A61C 17/10* (2006.01)
A61C 17/00 (2006.01) *A61C 5/14* (2006.01)
A61C 17/06 (2006.01)

(21) International Application Number:

PCT/US2020/032228

(22) International Filing Date:

08 May 2020 (08.05.2020)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/846,353 10 May 2019 (10.05.2019) US

(71) Applicant: **DRYSHIELD, LLC** [US/US]; 11230 Grace Avenue, Suite B, Fountain Valley, CA 92708 (US).

(72) Inventors: **NGUYEN, Thien**; 11230 Grace Avenue, Suite B, Fountain Valley, CA 92708 (US). **PHAM, Tam, Thanh**; 11230 Grace Avenue, Suite B, Fountain Valley, CA 92708 (US). **NGUYEN, Ethan**; 11230 Grace Avenue, Suite B, Fountain Valley, CA 92708 (US). **NGUYEN, Lauren**; 11230 Grace Avenue, Suite B, Fountain Valley, CA 92708 (US).

(74) Agent: **CHUNG, Ruby** et al.; Polsinelli LLP, Three Embarcadero Center, Suite 2400, San Francisco, CA 94111 (US).

(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,

(54) Title: DENTAL MOUTHPIECE

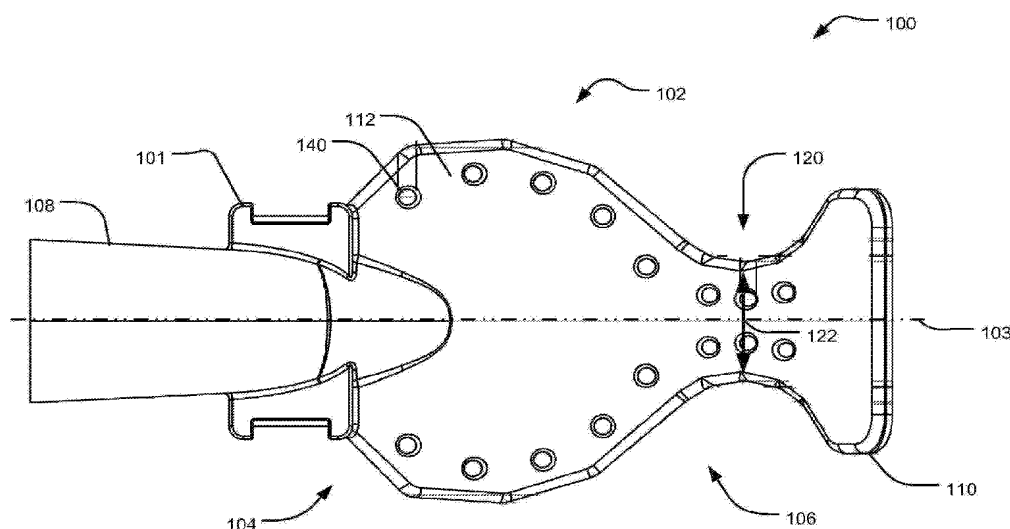


FIG. 1

(57) Abstract: A dental mouthpiece is provided that may be attached to a high-suction dental adapter for the purpose of assisting the dental staff during dental procedures through chair-side, hands-free suction, and isolation. Such a mouthpiece may comprise a main body portion, a cheek retractor portion, and a suction connector portion. In an embodiment, the main body portion, cheek retractor portion, and suction connector portion may be molded in one piece, preferably by injection molding. The main body portion has an anterior wall inside the curve and a posterior wall outside the curve, and an at least one connector connecting the anterior wall and the posterior wall. The main body portion has an anterior intervening wall and the posterior intervening wall in between the anterior and posterior walls. The anterior intervening wall and the posterior intervening walls have alternating crests and troughs.



OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*