

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ASCENTCARE DENTAL PRODUCTS, INC.,
Petitioner

v.

SOLMETEX, LLC
Patent Owner

Patent No. 12,011,329

Case No. IPR2025-01104

DECLARATION OF MICHAEL JOBIN

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I, Michael Jobin, declare as follows:

1. I make this declaration based upon my own personal knowledge and, if called upon to testify, would testify competently to the matters stated herein.

2. I have been retained on behalf of Solmetex, LLC, (“Solmetex” or “Patent Owner”) as an independent expert consultant to provide this declaration concerning the technical subject matter relevant to U.S. Patent No. 12,011,329 (“the ‘329 patent”) in connection with an *inter partes* review (“IPR”) petition filed by Ascentcare Dental Products, Inc. (“Ascentcare” or “Petitioner”).

3. I am being compensated at my standard hourly rate of \$595 per hour for the time I spend on this matter. My compensation is not based on the content of my opinions or the resolution of this matter, and I have no other interest in this proceeding.

4. I understand that Solmetex is asserting the ‘329 Patent against Ascentcare in a related matter currently pending in the United States District Court for the Western District of Michigan (“the Parallel Litigation”).

5. In this declaration, I offer opinions relating to the ‘329 patent, claim construction, the references in the Petition, and the declaration submitted by Petitioner. The substance and bases of my opinions appear below.

I. BACKGROUND AND QUALIFICATIONS

6. In formulating my opinions, I have relied on my knowledge, training, and experience in the relevant field, which I will summarize briefly herein. In addition, Ex. 2031 is a true and correct copy of my current *curriculum vitae* (CV).

A. Education

7. I received two degrees from the University of Michigan in 1991, a Bachelor of Science, Engineering with a focus on mechanical engineering, and a Bachelor of Fine Arts, Industrial Design with a focus on product development, both cum laude. I was the recipient of the Kiefer Award for excellence in Industrial Design.

B. Work Experience

8. I have worked in various product development companies throughout my 33 year career, and have developed many products that demonstrate knowledge and experience with the subject matter relevant in this case. I provide below a summary of my work experience and relevant project examples.

9. After my undergraduate degrees, I was hired as a program manager by Design 4 Plastics, Inc. I leveraged my industrial design and engineering education to develop a wide range of products. My projects included a heavy emphasis on plastic part design (including injection molding, rotational molding, vacuum and pressure forming) and sheet metal fabrication (stamping, forming).

10. For NTI Surgical, I designed a custom sterilized impeller pump and tubing set for insufflation of the abdomen during laparoscopic surgery. I developed a cleaning and storage system for reusable tonometer tips, which are used to measure intraocular pressure.

11. For Coca-Cola, I developed a disposable valve for a bag-in-box syrup dispensing system using FDA grade materials.

12. Next, in 1996, I joined Proteus, Inc. as Senior Mechanical Engineer. There, I focused on product design and engineering of products for consumer, medical, and laboratory applications. For example, I developed a disposable cartridge for measuring blood coagulation characteristics prior to surgery.

13. For PUR, I developed a faucet mounted water filter with replaceable cartridge and a rotary actuated valve, and filtered water pitchers.

14. For Physiometrix, I developed an anesthesia monitor including flexible disposable electrodes for fitment to the head.

15. I founded Boston Innovation in 1998, focusing on developing precision fluidic dispensing instruments for pharmaceutical research applications that leveraged a novel pressure activated valve technology that I invented. In these instruments, sample fluid was stored in small sealed reservoirs, and precision low volumes dispensed by the translation of a needle and application of a rinse fluid and/or air pressure. *See, e.g.*, U.S. Pat. Nos. 6,085,773 and 6,706,538.

16. For Gillette, I designed a disposable, handheld shaving cream dispenser.

17. For Bard, I designed a handheld endoscopic device with integrated irrigation and suction.

18. In 2000, I joined Arthur D. Little, where I led mechanical engineering of a next-generation network storage product, integrating contributions of mechanical, software, hardware and industrial designers.

19. I founded MicroBioSciences in 2001. There, I invented and developed novel disposable fluid handling cartridges for high throughput screening in pharmaceutical research.

20. Later in 2001, I joined Altitude, Inc., a product development consulting firm, first as Engineering Manager, and then I was promoted to Director of Engineering in 2005. I performed design and engineering activities and led a team of designers and engineers to develop a wide range of consumer products, medical devices and instrumentation.

21. I developed a wide range of home humidifiers for Honeywell, Kaz and Vicks. These included water reservoirs with removable caps and elastomer valves.

22. I developed a water dispenser for PUR with chilled and heated water and dispensing valves. This included a refillable water reservoir with wide mouth threaded cap and valve for easy cleaning.

23. For Colgate, I developed a low-cost, low profile electric toothbrush in or around 2008. This toothbrush was the first commercially available toothbrush that ran on one AA battery (rather than multiple batteries).

24. For Exact Sciences, I designed a custom cylindrical sample collection and shipping vessel with large diameter threaded lid and elastomer gaskets.

25. I developed the first integrated ice shaving and blending frozen drink appliances for home use for Margaritaville. These products included a reservoir for ice, a robust motor and rotary ice shaving blade, a blender, and electronic controls.

26. I developed a wine preservation and dispensing system for home use. The product stored multiple wine bottles at the user-selected optimum temperature using thermoelectric chiller technology, and used valves and air pressure for dispensing, and vacuum for preservation.

27. I developed a handheld eye medication dispenser for Optimyst. This product included a custom disposable fluid reservoir and ultrasonic dispensing technology. *See* U.S. Pat. Nos. D597,206; 8,545,463; 8,012,136.

28. I developed a range of safety eyewear for UVEX. These included adjustable features leveraging advanced injection molding techniques such as in-mold assembly and plastic and elastomer materials. *See, e.g.*, U.S. Pat. Nos. 7,758,789; 7,246,901; 7,237,892; 7,210,777; 7,175,270.

29. In 2008 I founded Aston Technology Advisors, and continued with product development and consulting activities.

30. There I developed an instrument that uses sound to measure wind. This included a novel hydronic heating system for melting snow. *See* U.S. Pat. Nos. 8,958,269 and 9,279,821.

31. I developed a custom plastic and elastomer sterilizable probe for measuring blood oxygen inside the cheek (buccal mucosa) for Pendar Technologies. The probe was positioned in the mouth to press against the inside of the cheek.

32. I developed a custom, portable dispenser for hand sanitizer for use by health care professionals.

33. In 2012, I cofounded 908 Devices Inc. to develop portable chemical detection instrumentation based on mass spectroscopy. Here I have developed various instruments with applications in pharmaceutical research, forensics and hazardous material identification at the point of need. These instruments include complex fluid handling, fluidic and pneumatic connectors, custom vacuum pumps,

pressure regulators and pressure sensors. *See* U.S. Pat. Nos. D703,074; D703,075; 9,093,253; 9,502,226; 9,698,000; 9,978,574; 10,438,787.

34. At 908 Devices I developed reusable sensors and for bioprocessing applications designed to survive repeated autoclaving cycles. I also developed various single use sterilized tubing sets.

35. Throughout my professional career, I have designed products that have won various awards, including: Industrial Designers Society of America (IDSA) IDEA Awards, R&D 100, The Scientist Top 10 Innovations, and The Instrument Business Outlook Industrial Design Gold Award.

36. I have served as an expert in multiple cases. For example, in *Keurig, Inc. v. Kappos*, I was hired on behalf of the United States Patent & Trademark Office as an expert regarding technical concepts related to a USPTO Examiner's rejection of patent claims around Keurig's K-Cup coffee pods, including analysis of relevant prior art. Key issues included high volume manufacturing of thermoformed plastic pods, forming and assembly of filter baskets and fluid flow through the system under high pressure. Ultimately, the USPTO Examiner's rejection was affirmed on appeal.

C. Patents

37. I am a named inventor on nineteen issued utility patents and six issued design patents, which are listed below. These patents range in technologies from

consumer products to medical devices to instrumentation, and address technical issues like precision fluid handling, injection molding, and compact mass spectroscopy.

1. U.S. D932,046 Fluidic cartridge assembly
2. U.S. 10,438,787 Integrated mass spectrometry systems
3. U.S. 9,978,574 Sample collection in compact mass spectrometry systems
4. U.S. 9,698,000 Integrated mass spectrometry systems
5. U.S. 9,502,226 Sample collection in compact mass spectrometry systems
6. U.S. 9,279,821 Deicing system in sodar systems
7. U.S. 9,093,253 High pressure mass spectrometry systems and methods
8. U.S. 8,958,269 Transducer for phased array acoustic systems
9. U.S. D703,074 Handheld sensor
10. U.S. D703,075 Sensor device
11. U.S. 8,545,463 Ophthalmic fluid reservoir assembly for use with an ophthalmic fluid delivery device
12. U.S. 8,525,111 High pressure mass spectrometry systems and methods

- 13.U.S. 8,012,136 Ophthalmic fluid delivery device and method of operation
- 14.U.S. 7,758,789 Temple bar assembly for eyeglasses
- 15.U.S. D597,206 Ophthalmic misting device
- 16.U.S. 7,246,901 Adjustable length upper frame member for eyeglasses
- 17.U.S. 7,237,892 Temple bar with ball and socket hinge and method of making same
- 18.U.S. 7,210,777 Floating lens brow bar attachment for eyeglasses
- 19.U.S. 7,175,270 Flexible frame assembly for eyeglasses
- 20.U.S. D534,446 Handheld instrument
- 21.U.S. 7,080,904 One piece spectacle with temple pre-load
- 22.U.S. 6,706,538 Microvolume liquid dispensing array
- 23.U.S. 6,085,773 Automatic fluid switching valve
- 24.U.S. D425,979 Window fan
- 25.U.S. 5,794,897 Transmission line hanger, a method of attaching the hanger and the resulting assembly

II. MATERIALS CONSIDERED

38. In forming the opinions set forth herein, I have considered and relied upon my education, knowledge of the relevant field, and my experience. I have

also reviewed and considered the ‘329 Patent (Ex. 1001), the ‘329 Patent’s file history (Ex. 1002 (part 1) and Ex. 1020 (part 2)), and at least the following additional materials:

- Ascentcare’s Petition for *Inter Partes* Review of the ‘329 Patent (Paper 2);
- Declaration of Dr. Brian P. Black (Ex. 1003);
- U.S. Patent No. 8,029,280 (“Black,” Ex. 1005);
- Korean Patent No. 10-1082826 (“Park,” Ex. 1006);
- U.S. Patent No. 3,101,543 (“Baughan,” Ex. 1007);
- U.S. Patent No. 4,017,975 (“Johnson,” Ex. 1008);
- U.S. Patent Publication No. 2003/0134253 (“Hirsch,” Ex. 1012);
- Prosecution History of U.S. Patent No. 8,911,232 (Ex. 1015);
- Chinese Patent Application Publication No. 200420094338.X (“Zheng,” Ex. 1021);
- Prosecution History of U.S. Patent No. 11,589,970 (Part 1, Ex. 2019)
- Prosecution History of U.S. Patent No. 11,589,970 (Part 2, Ex. 2020)
- Prosecution History of U.S. Patent No. 11,589,970 (Part 3, Ex. 2021)
- Prosecution History of U.S. Patent No. 11,744,686 (Part 1, Ex. 2025)
- Prosecution History of U.S. Patent No. 11,744,686 (Part 2, Ex. 2026)
- Prosecution History of U.S. Patent No. 11,744,686 (Part 3, Ex. 2027)

- DryShield User Guide (Ex. 2029);
- Merriam-Webster Dictionary – “crest” (Ex. 2034);
- Merriam-Webster Dictionary – “wave”) (Ex. 2035);

39. I also considered any materials cited in this declaration to the extent they are not expressly listed above.

40. I am informed and understand that Ascentcare has challenged additional related patents in other *inter partes* review petitions as set forth in the table below.

Patent No.	Case No.
11,589,969	IPR2025-01020
11,589,970	IPR2025-01057
11,744,686	IPR2025-01059

41. The ‘329 Patent is a continuation of the application that led to the related ‘686 Patent. Each of these patents claims priority to U.S. Non-Provisional Application No. 14/100,323, filed on December 9, 2013, which issued as Patent No. 8,911,232.

42. I understand that Patent Owner has already submitted its preliminary patent owner responses in each of the above-listed IPR proceedings. I also understand that Patent Owner submitted declarations from Professor Charles

Garris, Ph.D. in support of its preliminary patent owner responses. I am informed and understand that due to a medical issue, Prof. Garris was not able to continue his work and offer opinions on the '329 Patent and the Petition for this proceeding.

43. I have reviewed Prof. Garris' declarations concerning the '969, '970, and '686 Patents and corresponding IPR petitions. Many of the issues Prof. Garris addressed in those declarations overlap with the issues I address in this declaration for the '329 Patent. For example, Petitioner relies on a combination of Park, Baughan, and Park for all four related patents. As another example, Petitioner relies on the Black reference in grounds challenging the '969 Patent and the '329 Patent. I agree with Dr. Garris' opinions and analysis. Given the overlapping issues between the '329 Patent and the other related patents, some of my analysis and opinions herein are the same as those provided by Prof. Garris, and in those cases, I have adopted Dr. Garris' analyses and opinions as my own.

III. LEGAL STANDARDS

44. In forming the opinions set forth herein, I have considered and relied upon my education, my work experience, and my personal experience designing medical devices.

D. Claim Construction

45. I understand that claim construction is the process by which a court determines the scope and meaning of terms used in the claims of a patent. I

understand that the goal of this process is to give claim terms the ordinary and customary meaning they would have had to a person of ordinary skill in the art (“POSITA”) at the time of the invention, after reading the patent and its prosecution history.

46. I understand that the patent specification may reveal a special definition given to a claim term by the patentee that differs from the plain and ordinary meaning it would otherwise have to a POSITA. In such cases, I understand that the patentee’s definition usually controls.

47. I understand that the prosecution history of a patent can inform the meaning of some claim language and that the prosecution history must be considered when construing the claims.

48. I understand that the court may consider extrinsic evidence, such as dictionaries, treatises, and expert opinions, to understand the technology at issue and the way in which claim terms would be understood by a POSITA in the relevant timeframe.

49. I understand that a dependent claim incorporates each and every limitation of the claim or claims from which it depends.

E. Anticipation

50. I have been informed and understand that a patent claim may be unpatentable as “anticipated” under 35 U.S.C. § 102. I understand that anticipation

analysis is a two-step process. The first step is to determine the meaning and scope of the asserted claims. Each claim must be viewed as a whole, and it is improper to ignore any element of the claim. For a claim to be anticipated: (1) each and every claim element must be identically disclosed, either explicitly or inherently, in a single prior art reference; (2) the claim elements disclosed in the single prior art reference must be arranged in the same way as in the claim; and (3) the identical invention must be disclosed in the single prior art reference, in as complete detail as set forth in the claim. Where even one element is not disclosed in a reference, there is no anticipation.

51. I understand that to serve as an anticipatory reference, the reference itself must be enabled, i.e., it must provide enough information so that a person of ordinary skill in the art can practice the subject matter of the reference without undue experimentation.

52. I further understand that where a prior art reference fails to explicitly disclose a claim element, the prior art reference inherently discloses the claim element only if the prior art reference must necessarily include the undisclosed claim element. Inherency may not be established by probabilities or possibilities. The fact that an element may result from a given set of circumstances is not sufficient to prove inherency.

F. Obviousness

53. I understand that a patent claim is invalid under 35 U.S.C. § 103 as being obvious only if the differences between the claimed invention and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person of ordinary skill in that art. An obviousness analysis requires consideration of four factors: (1) scope and content of the prior art relied upon to challenge patentability; (2) differences between the prior art and the claimed invention; (3) the level of ordinary skill in the art at the time of the invention; and (4) the objective evidence of non-obviousness, such as commercial success, unexpected results, the failure of others to achieve the results of the invention, a long-felt need which the invention fills, copying of the invention by competitors, praise for the invention, skepticism for the invention, or independent development.

54. I understand that a prior art reference is proper to use in an obviousness determination if the prior art reference is analogous art to the claimed invention. I understand that a prior art reference is analogous art if at least one of the following two considerations is met. First, a prior art reference is analogous art if it is from the same field of endeavor as the claimed invention, even if the prior art reference addresses a different problem and/or arrives at a different solution. Second, a prior art reference is analogous art if the prior art reference is reasonably

pertinent to the problem faced by the inventor, even if it is not in the same field of endeavor as the claimed invention.

55. I understand that it must be shown that one having ordinary skill in the art at the time of the invention would have had a reasonable expectation that a modification or combination of one or more prior art references would have succeeded. Furthermore, I understand that a claim may be obvious in view of a single prior art reference, without the need to combine references, if the elements of the claim that are not found in the reference can be supplied by the knowledge or common sense of one of ordinary skill in the relevant art. However, I understand that it is inappropriate to resolve obviousness issues by a retrospective analysis or hindsight reconstruction of the prior art and that the use of “hindsight reconstruction” is improper in analyzing the obviousness of a patent claim.

56. I further understand that the law recognizes several guidelines that inform the obviousness analysis. First, I understand that a reconstructive hindsight approach to this analysis, i.e., the improper use of post-invention information to help perform the selection and combination, or the improper use of the listing of elements in a claim as a blueprint to identify selected portions of different prior art references in an attempt to show that the claim is obvious, is not permitted. Second, I understand that any prior art that specifically teaches away from the claimed subject matter, i.e., prior art that would lead a person of ordinary skill in

the art to a specifically different solution than the claimed invention, points to non-obviousness, and conversely, that any prior art that contains any teaching, suggestion, or motivation to modify or combine such prior art reference(s) points to the obviousness of such a modification or combination. Third, while many combinations of the prior art might be “obvious to try,” I understand that any obvious to try analysis will not render a patent invalid unless it is shown that the possible combinations are: (1) sufficiently small in number so as to be reasonable to conclude that the combination would have been selected; and (2) such that the combination would have been believed to be one that would produce predictable and well understood results. Fourth, I understand that if a claimed invention that arises from the modification or combination of one or more prior art references uses known methods or techniques that yield predictable results, then that factor also points to obviousness. Fifth, I understand that if a claimed invention that arises from the modification or combination of one or more prior art references is the result of known work in one field prompting variations of it for use in the same field or a different one based on design incentives or other market forces that yields predictable variations, then that factor also points to obviousness. Sixth, I understand that if a claimed invention that arises from the modification or combination of one or more prior art references is the result of routine optimization, then that factor also points to obviousness. Seventh, I understand

that if a claimed invention that arises from the modification or combination of one or more prior art references is the result of a substitution of one known prior art element for another known prior art element to yield predictable results, then that factor also points to obviousness.

57. I understand that each alleged prior art reference in a proposed obviousness combination must be evaluated in its entirety, i.e., including those portions that would argue against obviousness, and must be considered for everything that it teaches, not simply the described invention or a preferred embodiment. I understand that it is impermissible to pick and choose from any one reference only so much of it as will support a given position to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one skilled in the art, or to ignore portions of the reference that argue against obviousness. I also understand that all of the supposed prior art to be combined as proposed must also be evaluated as a whole and should be evaluated for what they teach in combination as well as separately.

G. Dependent Claims

58. I understand that a dependent claim incorporates each and every limitation of the claim(s) from which it depends. Thus, my understanding is that if a prior art reference fails to anticipate an independent claim, then that prior art reference also necessarily fails to anticipate all of its dependent claims. Similarly,

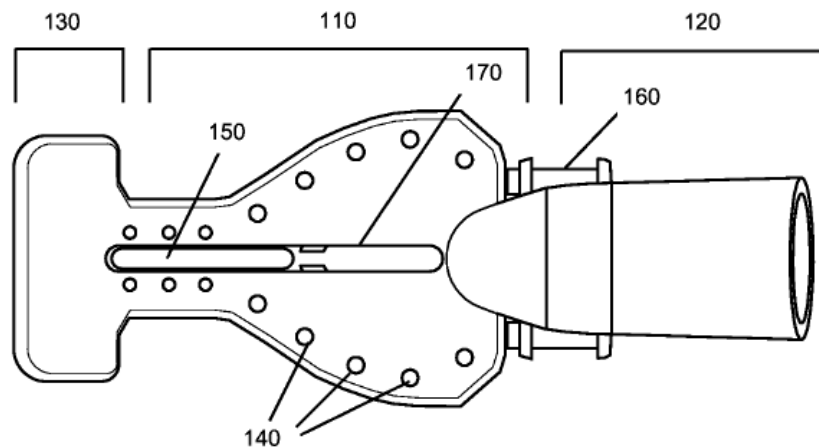
my understanding is that if a prior art reference or combination of prior art references fails to render obvious an independent claim, then that prior art reference or combination of prior art references also necessarily fails to render obvious all of its dependent claims.

IV. OVERVIEW OF THE ‘329 PATENT

59. The ‘329 Patent discloses and claims a dental appliance often referred to as a dental isolation mouthpiece. Ex. 1001 at 1:17-19. The background section of the ‘686 Patent explains that at the time of the invention, “[v]arious mouthpieces are currently used by dental health professionals, dental hygienists, and dental assistants.” Ex. 1001 at 1:25-27. Traditionally, dental procedures were (and often still are) performed by “a two-person team that comprises a dental professional and a dental assistant” and used “many different types of dental equipment and materials.” Ex. 1001 at 1:27-31. By using a two-person teams, the dental assistant can “assist the dental professional in coordinating the use of these multiple items of different equipment and materials.” Ex. 1001 at 1:39-41.

60. As reflected in the background section, the inventors of the ‘329 Patent recognized “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.” Ex. 1001, 1:43-45. The ‘329 Patent discloses “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.” Ex. 1001 at 1:49-53. In one example, an isolation mouthpiece includes a main body portion 110, a suction connector portion 120, and a cheek retractor portion 130. Ex. 1001 at 3:22-28. FIG. 1B of the ‘329 Patent, which shows these features, is reproduced below:



Ex. 1001 at FIG. 1B

61. The main body portion 110 “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.” Ex. 1001 at 3:46-49. According to the specification, the anterior and posterior walls “protect the back of the mouth (e.g., throat and airway) from falling debris.” Ex. 1001 at 3:61-64.

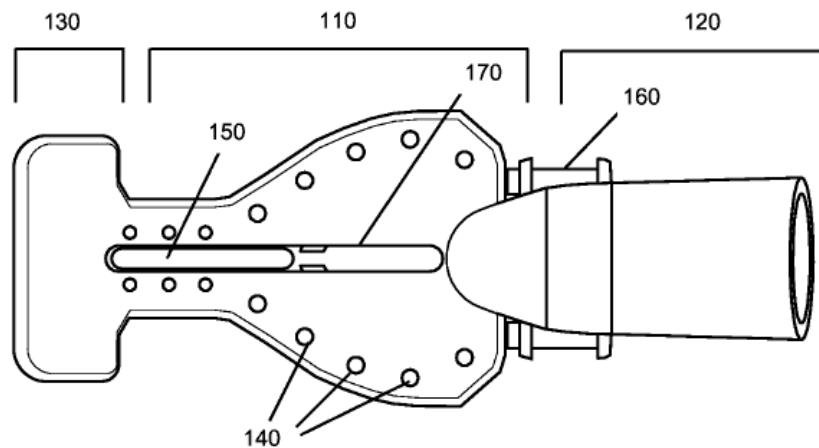
62. The specification details how the mouthpiece is used in dental procedure. “When placed in a patient’s mouth, the suction connector portion may protrude from one side of the patient’s mouth, while the main body portion 110 lies

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." Ex. 1001 at 3:35-40. An illustration of how the mouthpiece fits into the patient's mouth, which I understand is from Patent Owner's literature for its "DryShield" product, is shown below:



Ex. 2029

63. In order to allow for suctioning of fluids while positioned within the mouth during a dental procedure, the main body portion 110 includes perforations 140 that "assist in suctioning of water, saliva and debris from the oral cavity." Ex. 1001 at 4:6-10. The open slit 170 may also assist in the suctioning "of water, saliva and debris." Ex. 1001 at 4:41-47.

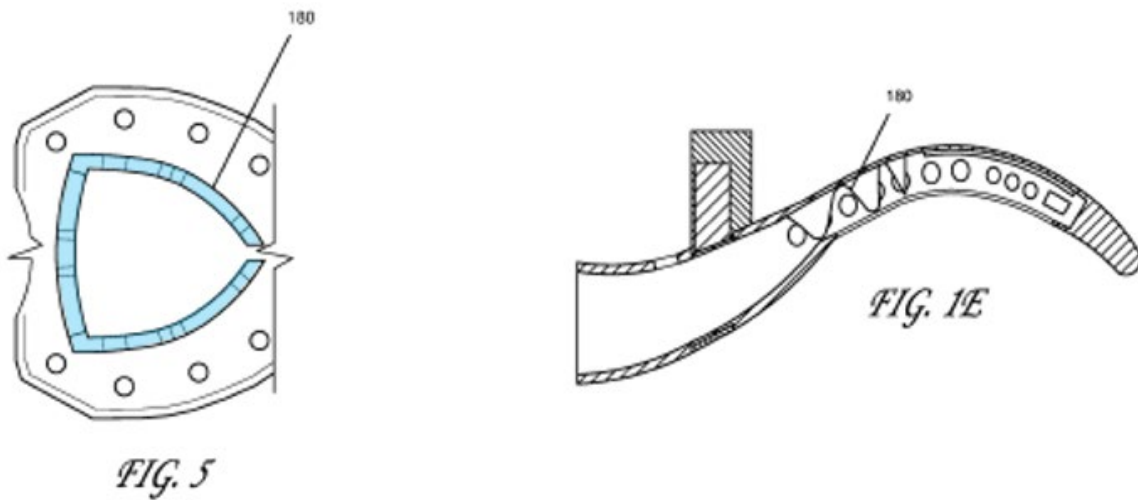


Ex. 1001 at FIG. 1B

64. The specification acknowledges that given this particular design (including the presence of the open slit 170 in the anterior wall), when the suction force is applied to the mouthpiece during operation, opposing anterior and posterior surfaces of the main body 110 could collapse and limit or block the suctioning through the perforations 140. To avoid this, a bridge structure 180 is formed “on an interior surface [of the main body 110] to ensure that the anterior and posterior surfaces remain separated during suction.” Ex. 1001 at 4:48-51.

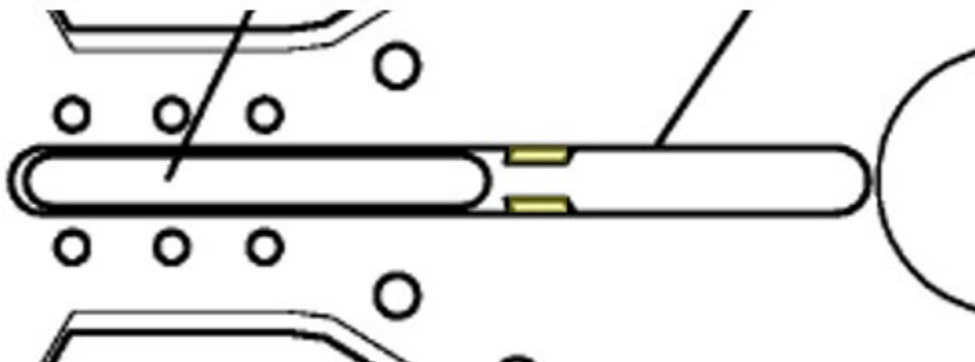
65. FIG. 5 shows a “close-up view of the bridge structure 180,” and FIG. 1E shows a cross-sectional view illustrating the bridge structure 180 formed on the interior surface of upper wall of the main body 110 and protruding toward the

lower wall:



Ex. 1001 at FIGS. 5, 1E (annotated)

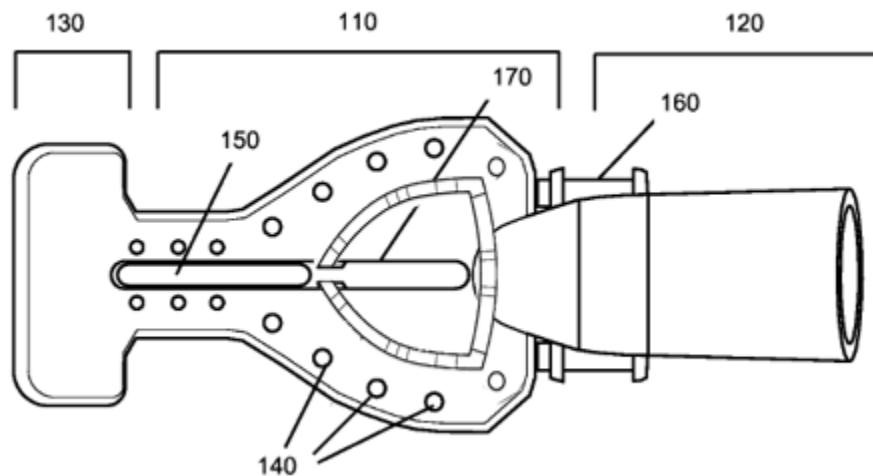
66. In FIG. 1A, a portion of the internal bridge structure is visible through the open slit 170, as shown by the highlighting below:



Ex. 1001 at FIG. 1B (excerpted and annotated)

67. In the image below, FIG. 5 is superimposed on top of FIG. 1B to show how the bridge structure 180 is positioned in the area of the slit 170 with

portions of the bridge structure 180 near some of the perforations 140 that follow the edges of the main body 110.



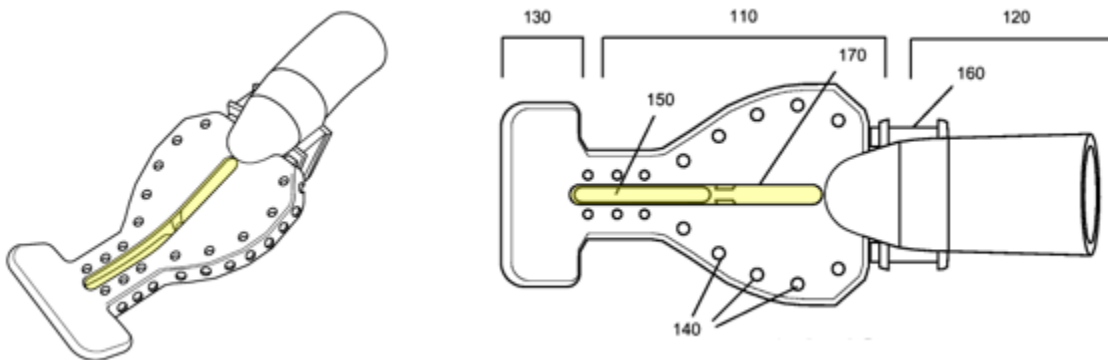
Ex. 1001 at FIGS. 1B and 5 (superimposed)

68. As shown the cross-sectional view illustrated in FIGS. 1E and 2E, the bridge structure 180 is “formed as a[] 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.” Ex. 1001 at 4:54-59. Within the wave-like structure, “[t]he crests provide a plurality of contact points with the anterior wall to keep the anterior wall separated from the posterior wall during suction [while] the troughs provide gaps that allow for suction of air, fluids, and small debris through the bridge structure.” Ex. 1001 at 2:21-26. The geometry of the bridge structure 180 is important during use of the dental isolation mouthpiece because “[t]he 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,” which is “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” from of the patient’s mouth during a dental procedure. Ex. 1001 at 4:61-65, 5:2-7.

69. Because the wave-like protrusions are formed on the interior surface of only one wall (not both walls) of the main body 110, this provides an additional benefit in that both walls of the main body 110 can be pulled away from each other by hand to permit access into the interior space between the walls to facilitate cleaning. The ‘329 Patent teaches that the mouthpiece can be made of “a high heat-resistant and autoclavable material” so that the “mouthpiece may be reusable.” Ex. 1001 at 1:58-64. Being “autoclavable” refers to the ability to be cleaned and sterilized for reuse in medical (e.g., dental) procedures, typically using steam.

70. The specification explains that in addition to allowing suctioning of materials therethrough, the open slit 170 also permits access into the interior space between the walls to “assist in cleaning and maintenance.” Ex. 1001 at 4:45-47.



Ex. 1001 at FIGS. 1A-1B (annotated)

The open slit 170 allows one to insert a cleaning brush in the interior of the main body 110 through the open slit 170 for cleaning or maintenance.

71. Since the wave-like protrusions of the bridge structure 180 are formed on the interior surface of one wall of the main body 110, this configuration provides additional flexibility to the mouthpiece. This is helpful when attempting to position the mouthpiece within the patient's mouth for a dental procedure. If the bridge structure 180 were instead connected to the interior surfaces of both walls, the main body 110 would be more rigid and more resistive of torsional forces when attempting to twist the mouthpiece into the proper position for a dental procedure.

72. Because the wave-like protrusions of the bridge structure 180 are formed on the interior surface of one wall of the main body 110, the main body 110 is more flexible and the walls can be pulled apart from each other to allow access into the interior space the main body 110 for maintenance or cleaning. Additionally, when suction forces are applied, the wave-like protrusions keep the two walls separated from each other by using the contact points at the crests of the wave-like protrusions, while still permitting the suction of air, fluids, and small debris through the troughs between the crests of the wave-like protrusions. Ex. 1001 at 2:18-26.

73. Independent claims 1, 9, 21, and 30 of the '329 Patent, which I understand are the challenged independent claims, are reproduced below with the identifiers used in the Petition and Dr. Black's declaration for ease of reference:

74. Independent claim 1 recites:

1(a)	A mouthpiece comprising:
1(b)	a main body having a first end opposite a second end that is narrower than the first end, the main body comprising:
1(c)	a first wall having a plurality of first edges and extending from the first end to the second end,
1(d)	a second wall having a plurality of second edges and located at a distance from the first wall, the distance corresponding to an interior space between the first wall and the second wall, wherein the second wall also extends from the first end to the second end,
1(e)	a connecting wall that connects one of the first edges of the first wall to one of the second edges of the second wall across the distance between the first wall and the second wall, and
1(f)	a bridge structure that includes a plurality of spaced protrusions protruding from an interior surface of the second wall, the bridge

	structure extending across the distance between the first wall and the second wall through the interior space towards the first wall; and
1(g)	a cheek-retractor portion connected to the narrower second end of the main body portion and expanding outwardly away from the second narrower end, the first wall and the second wall of the main body transitioning into and being connected in the cheek-retractor portion to form the cheek-retractor portion, wherein the first wall and the second wall of the main body portion that transition into the cheek-retractor portion are spaced apart from each other for a distance within the cheek-retractor portion before being connected at the cheek-retractor portion.

75. Independent claim 9 recites:

9(a)	An isolation mouthpiece for use with a suction system in a dental procedure, the mouthpiece comprising:
9(b)	a main body portion having a first end and a second end, the main body portion including:
9(c)	a first wall having a first edge and a second edge extending from the first end of the main body portion towards the second end of the main body portion, the first wall including a first plurality of perforations formed adjacent to and extending along a portion of the first edge and a

	second plurality of perforations formed adjacent to and extending along a portion of the second edge,
9(d)	a second wall having a third edge and a fourth edge extending from the first end of the main body portion towards the second end of the main body portion, the second wall including a third plurality of perforations formed adjacent to and extending along a portion of the third edge, and a fourth plurality of perforations formed adjacent to and extending along a portion of the fourth edge, wherein the second wall further includes a plurality of protrusions extending from an interior surface of the second wall towards the first wall in a shape having one or more crests and one or more troughs, and
9(e)	a third wall connecting the first wall and the second wall such that the first wall is spaced from the second wall to define an inner cavity, wherein a portion of the first wall has a first width adjacent to the first end of the main body portion and a second width adjacent to the second end of the main body portion, wherein a portion of the second wall has a third width adjacent to the first end of the main body portion and a fourth width adjacent to the second end of the main body portion,

	wherein the first width is greater than the second width, and wherein the third width is greater than the fourth width;
9(f)	a suction connector portion extending from the first end of the main body portion, the suction connector portion including: a generally tubular conduit including: an opening extending through the conduit and in fluid communication with the inner cavity, the opening being configured to receive a vacuum portion of the suction system therein, and a cutout configured to engage a protrusion on the suction system to aid in coupling the mouthpiece to the suction system
9(g)	a mouth prop including a first side and a second side that are inwardly tapered from a top surface of the mouth prop towards a bottom surface of the mouth prop, the first side and the second side each including a plurality of ridges; and
9(h)	a cheek retractor portion having a first cheek-retractor end coupled to the second end of the main body portion and a second cheek-retractor end, the first cheek-retractor end and the second cheek-retractor end each having rounded edges, wherein the first wall and the second wall of the main body portion that transition into the cheek-retractor portion are spaced apart from each other for a distance within the cheek-

	retractor portion before being connected to each other in the cheek-retractor portion.
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76. Independent claim 21 recites:

21(a)	An isolation mouthpiece for use with a suction system in a dental procedure, the mouthpiece comprising:
21(b)	a main body portion having a first end and a second narrower end that is narrower than the first end, the main body portion including:
21(c)	a first wall having first and second edges extending from the first end towards the second narrower end of the main body portion, the first wall having a first-wall width defined between the first and second edges, the first-wall width being at a maximum in a region between the first and second ends and being at a minimum at the second narrower end, the first wall including a first plurality of perforations formed adjacent to and extending along a substantial portion of the first edge and a second plurality of perforations formed adjacent to and extending along a substantial portion the second edge, at least one of the first plurality of perforations and at least one of the second plurality of perforations being located adjacent to the minimum width of the first wall at the second narrower end of the main body;

21(d)	a second wall spaced apart from the first wall to define an inner cavity of the main body between the second wall and the first wall, the second wall having third and fourth edges extending from the first end towards the second end of the main body portion, the second wall having a second-wall width defined between the third and fourth edges, the second-wall width being at a maximum in a region between the first and second ends and being at a minimum at the second narrower end, the second wall including a third plurality of perforations formed adjacent to and extending along a substantial portion of the third edge and a fourth plurality of perforations formed adjacent to and extending along a substantial portion of the fourth edge, at least one of the third plurality of perforations and at least one of the fourth plurality of perforations being located adjacent to the minimum width of the second wall at the second end of the main body;
21(e)	a stability bar located along a center of the first wall at least adjacent to the second narrow end of the main body, the at least one of the first plurality of perforations being positioned on one side of the stability bar and the at least one of the second plurality of perforations being positioned on another side of the stability bar; and

21(f)	a bridge structure extending from an interior surface of the first wall toward the second wall, the bridge structure including a plurality of wave-like protrusions to ensure the first wall remains separated from the second wall during suction from the suction system;
21(g)	a suction-connector portion extending from the first end of the main body portion, the suction-connector portion including: a generally tubular conduit including an opening extending through the conduit and in fluid communication with the inner cavity of the main body, the opening being configured to receive a vacuum portion of the suction system therein for providing suction to the inner cavity; and
21(h)	a mouth prop that extends away from the tubular conduit, the mouth prop at least partially defined by a first side and a second side that generally taper inwardly in a direction away from the tubular conduit towards a bottom surface of the mouth prop, the first side and the second side including a plurality of ridges; and
21(g)	a cheek-retractor portion connected to the second narrower end of the main body portion and expanding outwardly away from the second narrower end, the first wall and the second wall of the main body transitioning into and being connected in the cheek-retractor portion to

	form the cheek-retractor portion, wherein the first wall and the second wall of the main body portion that transition into the cheek-retractor portion are spaced apart from each other for a distance within the cheek-retractor portion before being connected to each other in the cheek-retractor portion.
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77. Independent claim 30 recites:

30(a)	An isolation mouthpiece for use with a suction system in a dental procedure, the mouthpiece comprising:
30(b)	a main body portion having a first end and a second end, the main body portion including:
30(c)	a first wall having a first edge and a second edge extending from the first end of the main body portion towards the second end of the main body portion, the first wall including a first plurality of perforations formed adjacent to and extending along a portion of the first edge and a second plurality of perforations formed adjacent to and extending along a portion of the second edge,
30(d)	a second wall having a third edge and a fourth edge extending from the first end of the main body portion towards the second end of the main body portion, the second wall including a third plurality of perforations

	formed adjacent to and extending along a portion of the third edge, and a fourth plurality of perforations formed adjacent to and extending along a portion of the fourth edge, wherein the second wall further includes a plurality of protrusions extending from an interior surface of the second wall towards the first wall in a shape having one or more crests and one or more troughs, and wherein the first wall and the second wall are shaped such that the first edge of the first wall corresponds to the third edge of the second wall and the second edge of the first wall corresponds to the fourth edge of the second wall, and
30(e)	a third wall connecting the first wall and the second wall such that the first wall is spaced from the second wall to define an inner cavity, wherein a portion of the first wall has a first width adjacent to the first end of the main body portion and a second width adjacent to the second end of the main body portion, wherein a portion of the second wall has a third width adjacent to the first end of the main body portion and a fourth width adjacent to the second end of the main body portion, wherein the first width is greater than the second width, and wherein the third width is greater than the fourth width;

30(f)	a suction connector portion extending from the first end of the main body portion, the suction connector portion including: a generally tubular conduit including: an opening extending through the conduit and in fluid communication with the inner cavity, the opening being configured to receive a vacuum portion of the suction system therein, and a cutout configured to engage a protrusion on the suction system to aid in coupling the mouthpiece to the suction system;
30(g)	a mouth prop including a first side and a second side that are inwardly tapered from a top surface of the mouth prop towards a bottom surface of the mouth prop, the first side and the second side each including a plurality of ridges; and
30(h)	a cheek retractor portion having a first cheek-retractor end coupled to the second end of the main body portion and a second cheek-retractor end, the first cheek-retractor end and the second cheek-retractor end each having rounded edges.

V. LEVEL OF SKILL IN THE ART

78. I understand that the level of ordinary skill in the relevant art at the time of the invention is relevant to inquiries such as the meaning of claim terms,

the meaning of disclosures found in the prior art, and the reasons one of ordinary skill in the art may have for combining references.

79. I have reviewed the definition of the level of ordinary skill in the art proposed in the Petition, which is:

a PHOSITA, at the time the '329 Patent was filed, would have been a person with at least a B.S. degree in mechanical engineering or a related field with at least two years' experience designing dental devices. Less work experience may be compensated by a higher level of education, such as a master's degree, and vice versa

Petition at 32.

80. I am informed and understand that in connection with its IPRs challenged related patents, including the '969, '970, and '686 Patents, Petitioner has proposed a different definition for a POSITA that requires at least a B.S. in mechanical engineering and two years' experience designing medical devices.

81. I am informed and understand that in connection with the Parallel Litigation, Petitioner has proposed the following definition for a POSITA for purposes of the '329 Patent: "a person having at least a degree in mechanical engineering or related field with at least 2 years of experience designing dental devices or suction devices." I also understand that Petitioner proposed this definition in connection with its IPR challenging U.S. Patent No. 11,826,217, which is also owned by Patent Owner and is directed to a dental isolation mouthpiece.

82. In my view, either (1) the definition Petitioner had proposed in connection with the prior IPRs, which requires either experience designing medical devices rather than the more narrow field of dental devices or (2) the definition Petitioner had proposed in the Parallel Litigation, which requires either experience designing dental devices or suction devices, is more appropriate than the narrow definition set forth in the Petition.

83. The challenged claims do not require any specialized knowledge regarding dentistry or dental devices. The types of issues and challenges a POSITA may face in designing a dental isolation mouthpiece are the same types of problems and issues that would arise when designing other devices of similar complexity that involve suction or transfer of fluids. For example, the mouthpieces disclosed and claimed in the '329 Patent are simple devices manufactured in silicone or other suitable rubber or elastomer material. They connect via fittings and tubing to a vacuum source or pump to pull fluids through the mouthpiece. The claims in the '329 Patent are directed towards mechanical features of the mouthpiece, e.g., "wall," "inner cavity," "main body," "suction connector," "perforation," "protrusions," etc. and the physical arrangement of these and other similar features. The mechanical nature of the claim elements, not specific to any specialized knowledge of dental devices supports my opinion that a broader definition for a POSITA is appropriate.

84. I was, as of at least December 2012, and still am, a person of ordinary skill in the art through my education and experience under the definition Petitioner had proposed in the prior IPRs for related patents and the definition Petitioner proposed in the Parallel Litigation for the '329 Patent. I am also familiar with individuals having this level of skill in the relevant timeframe.

85. To the extent Petitioner's narrower definition in the Petition is adopted for the '329 Patent, in my view, my many years of experience in the field of designing medical devices and suction devices, coupled with my education, is equivalent to 2 years of experience designing dental devices.

VI. SUMMARY OF REFERENCES IN THE PETITION

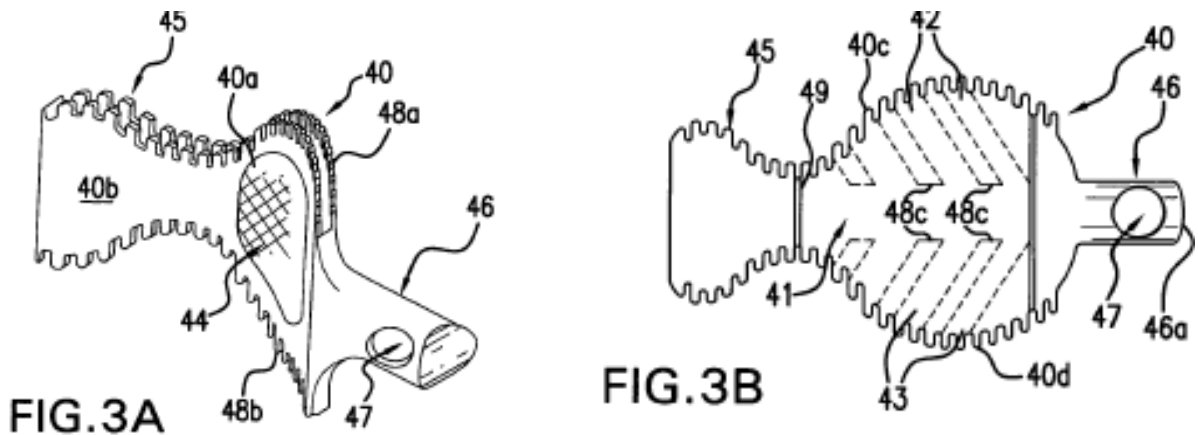
86. Below, I provide a summary the references that are relied upon in Grounds 1-10 of the Petition.

A. Black (Ex. 1005) (Grounds 1-2, 4, 6-7, and 9)

87. Black describes an intraoral device with a tongue shield aspirator a bite member, a bite grip, and an evacuation tube. Ex. 1005, Abstract. Black discloses multiple embodiments.

88. In a first embodiment, Black describes a tongue shield aspirator 40 that includes "a first (posterior) layer 48a and a second (anterior) layer 48b which are connected to, but spaced apart from, one another by transverse walls 48c." Ex. 1005 at 5:55-60. The transverse walls 48c (which are shown in dashed lines in

FIG. 3B below) connect the first layer 48a to the second layer 48b within the interior of the tongue shield aspirator 40 and are angled relative to the longitudinal (central) axis of the tongue shield aspirator 40.



Ex. 1005 at FIGS. 3A-3B

89. Black explains that “each set of two consecutive walls 48c that are disposed above the longitudinal lumen 41 forms an upper channel 42” while “[e]ach set of two consecutive walls 48c that are disposed below the longitudinal hollow lumen 41 forms a lower channel 42.” Ex. 1005 at 5:27-36.

90. In a second embodiment, Black describes a tongue shield aspirator 340 including “a first (posterior) layer 348a and a second (anterior) layer 348b which are connected to, but spaced apart from, one another by transverse walls 348c (shown in phantom in FIG. 23A).” Ex. 1005 at 14:25-30. As in the first embodiment, these transverse walls 348c are angled relative to the

longitudinal (central) axis of the tongue shield aspirator 340, as can be seen below in FIG. 23A.

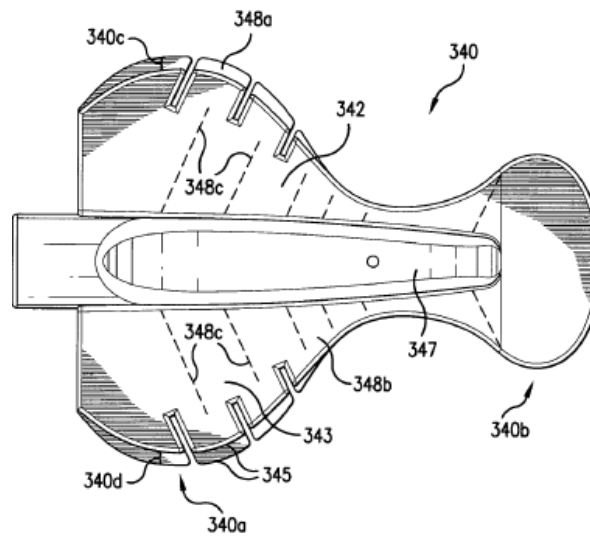


FIG. 23A

Ex. 1005 at FIG. 23A

91. In the figure above, pairs of consecutive transverse walls 348c form the upper channels 342 and the lower channels 343 within the interior, like the first embodiment. Ex. 1005 at 14:33-37.

92. Black's figures do not include a side view of the embodiment in FIGS. 3A-B. However, FIG. 23C (which shows the other embodiment) shows a side view of the tongue shield aspirator 340 from FIGS. 23A, including the transverse walls 348c connecting the first layer 348a and the second layer 348b, and the channels 342 between adjacent transverse walls 348c.

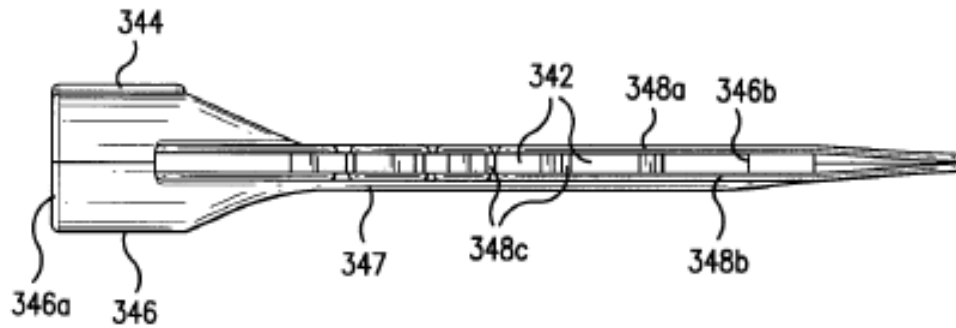


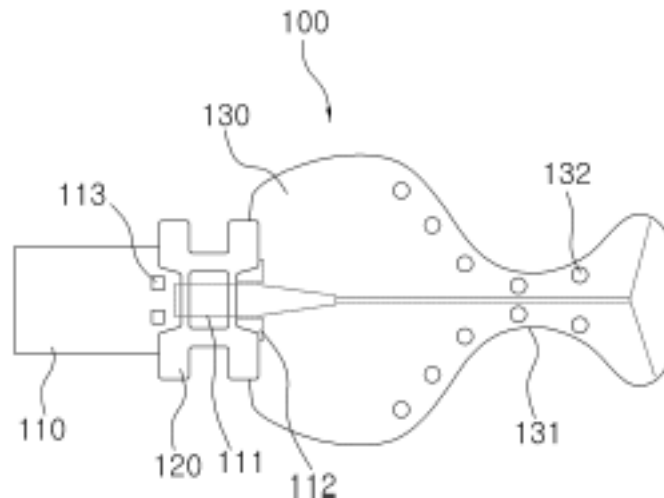
FIG. 23C

Ex. 1005 at FIG. 23C

B. Park (Ex. 1006) (Grounds 3-5 and 8-10)

93. Park is a Korean patent reference that describes “a detachable oral illuminating device with a mouth prop that maintains the patient’s mouth in an open state, suppresses the movement of the tongue, allows for illumination and suction of foreign substances in the oral cavity, and enables the sterilization of only the mouth prop.” Ex. 1006 at ¶ [0010].

Fig. 3

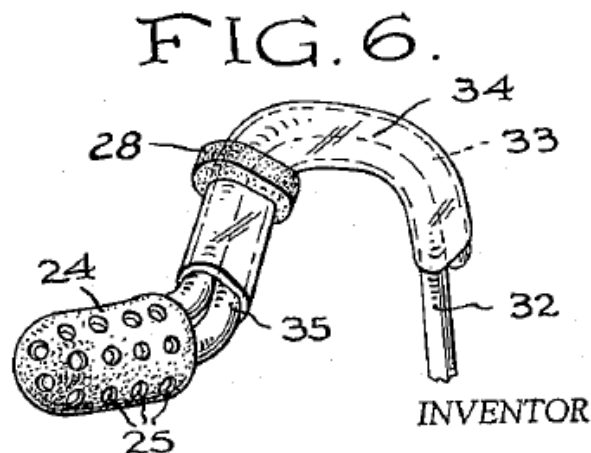


Ex. 1006 at FIG. 3

C. Baughan (Ex. 1007) (Grounds 3-5 and 8-10)

94. Baughan is directed to a different type of dental appliance than the ‘970 Patent: a dental saliva ejector with “suction relief means.” Ex. 1007 at 1:6-7. The background section of the ‘686 Patent mentions high speed and low speed “suction ejector[s]” as being a different type of dental device than an isolation mouthpiece. Ex. 1001 at 1:6-20.

95. Baughan’s dental saliva ejector is designed so that it “cannot traumatize or damage the mouth tissue by sucking the tissue into the suction orifices during the operation of the device for removing saliva from the mouth.” Ex. 1007 at 1:6-20.

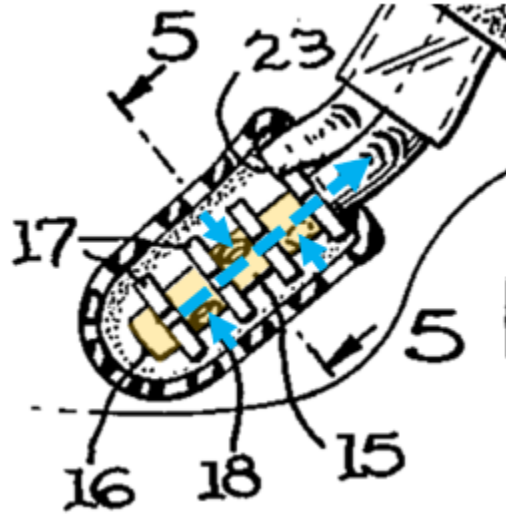


Ex. 1007 at FIG. 6

96. In Baughan, suction is applied via a terminal tube portion 15 with orifices 18, which in turn is surrounded by a series of circular discs 17 which

prevent the outer sleeve 24 from blocking the orifices 18 during operation. Ex.

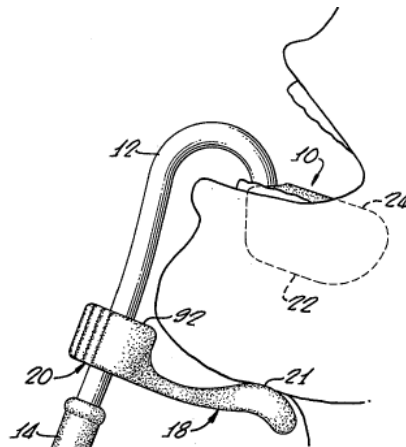
1007 at 3:36-48.



Ex. 1007, FIG 3 (excerpted and annotated)

D. Johnson (Ex. 1008) (Grounds 3-5 and 8-10)

97. Johnson describes a “saliva ejector capable of acting as a tongue guard” and “a chin holder . . . adapted for use with dental appliances, such as saliva ejectors.” Ex. 1008 at 1:6-11. An example is shown below:

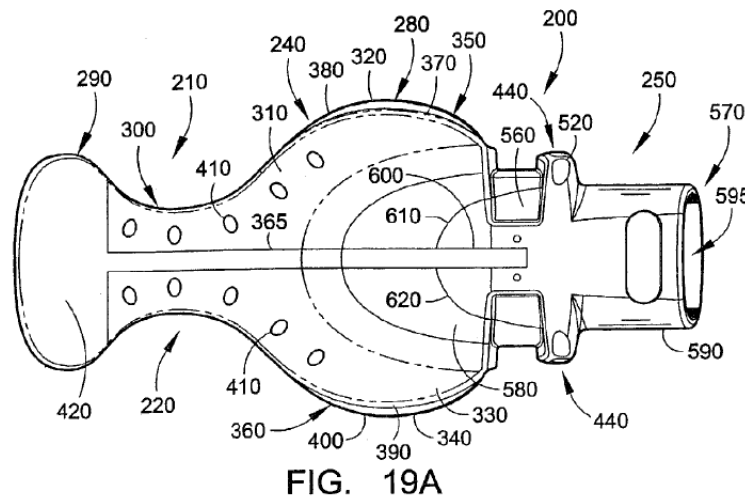


Ex. 1008 at FIG. 1

E. Hirsch (Ex. 1012) (Grounds 2, 5, 7, and 10)

98. Hirsch is generally directed to “dental appliances for illuminating and/or vacuum suction of the mouth of a dental patient for examination and/or operative purposes.” Ex. 1012 at ¶ [0002].

99. As shown in FIG. 19A, Hirsch includes two flaps 310 and 320. A central spine 365 located between those two flaps “may serve as a light pipe and a separator for an upper internal evacuation channel and a lower internal evacuation channel.” Ex. 1012 at ¶ [0078].



Ex. 1012 at FIG. 19A

F. Zheng (Ex. 1021) (Grounds 6-10)

100. Zheng is a Chinese Patent Publication that describes “an oral moisture barrier device that can effectively protect the tongue and buccal mucosa of the patient.” Ex. 1021 at 5.

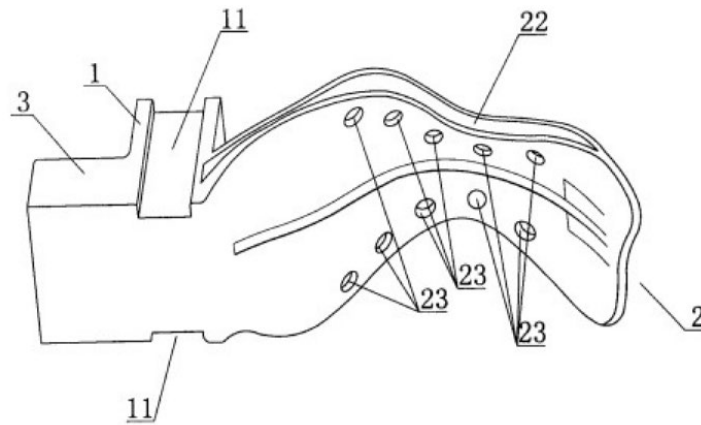


Figure 2

Ex. 1021 at FIG. 2

VII. CLAIM CONSTRUCTION

101. I understand that Petitioner and Dr. Black did not expressly propose any terms or phrases from the ‘329 Patent for construction. Petition at 32-33; Ex. 1003 at ¶¶ 53-56.

102. I am informed and understand that the parties have proposed constructions for some of the terms or phrases in the ‘329 Patent in the Parallel Litigation.

103. I offer certain opinions below regarding claim constructions that may be relevant to the issues in this IPR.

A. Agreed Constructions

104. I am informed and understand that in the Parallel Litigation, the parties agreed to the following construction for the term “trough” in claims 9 and

30 of the '329 Patent: “the points nearest to the second wall that create the gaps between the crests that allow for the transfer of fluids during suction.”

105. I am also informed and understand that in the Parallel Litigation, the parties agreed to the following construction for the phrase “cutout has a shield shape” in dependent claim 10 of the '329 Patent: “a cutout having the general shape of an isosceles triangle with rounded sides.”

B. “Protrusions” (Claims 1, 9, 21, and 30)

106. I am informed and understand that in the Parallel Litigation, the parties have proposed the following constructions for the term “protrusions” in claims 9 and 30.

Term/Phrase	Patent Owner’s Construction	Petitioner’s Construction
“a plurality of protrusions” (Claims 9 and 30)	Plain and ordinary meaning	an internal structure attached to the second wall that prevents the collapse of the first and second wall during suction

107. I am informed and understand that these claim construction proposals only relate to claims 9 and 30, as those are the only asserted claims in the Parallel Litigation. However, the term “protrusions” appears in the other challenged

independent claims as well, i.e., claims 1 and 21. Ex. 1001 at 6:29-31 (claim 1), 9:23-28 (claim 21).

108. I agree with the portion of Petitioner’s proposed construction that specifies that the claimed protrusions are structures “attached to the second wall.” Claims 9 and 30 expressly require that the protrusions protrude from the second wall:

- Claim 9: “wherein the second wall further includes a plurality of protrusions extending from an interior surface of the second wall towards the first wall”
- Claim 30: “the second wall further includes a plurality of protrusions extending from an interior surface of the second wall towards the first wall”

Ex. 1001 at 7:28-31 (claim 9), 10:33-35 (claim 30). These protrusions are attached to the second wall. While I understand that this issue is not disputed in this IPR at this time, for the avoidance of doubt, I note that protrusions that are “attached” would include integral protrusions.

109. Claim 1 recites a “bridge structure,” but specifies that the bridge structure “includes a plurality of spaced protrusions protruding from an interior surface of the second wall.” Ex. 1001 at 6:29-31. Thus, like the protrusions in claims 9 and 30, the protrusions in claim 1 are attached to and extend from the second wall.

110. Similar to claim 1, claim 21 recites “a bridge structure extending from an interior surface of the first wall toward the second wall, the bridge structure including a plurality of wave-like protrusions to ensure the first wall remains separated from the second wall during suction from the suction system.” Ex. 1001 at 9:23-24. In this claim, the bridge structure extends from the first wall and includes the plurality of wave-like protrusions, which would also be understood as attached to and extending from the first wall.

111. In Grounds 1-3, Petitioner and Dr. Black argue that a “transverse wall” in Black that is attached to both the first wall and the second wall is a protrusion as claimed in the ‘329 Patent. Petition at 47. Thus, there appears to be a dispute as to whether a structure that is attached to *both* walls is a protrusion, with Petitioner taking the position that such structure is a protrusion. I do not agree that a POSITA would read the claimed “protrusion” this way.

112. First, I note that Petitioner’s apparent interpretation of “protrusions” is inconsistent with Petitioner’s proposed construction from the Parallel Litigation, which only specifies that the protrusions are attached to the second wall in claims 9 and 30. The construction makes no mention of the protrusions being attached to the first wall in those claims. This makes sense because, as discussed below, such an

interpretation is inconsistent with the surrounding claim language and the specification.

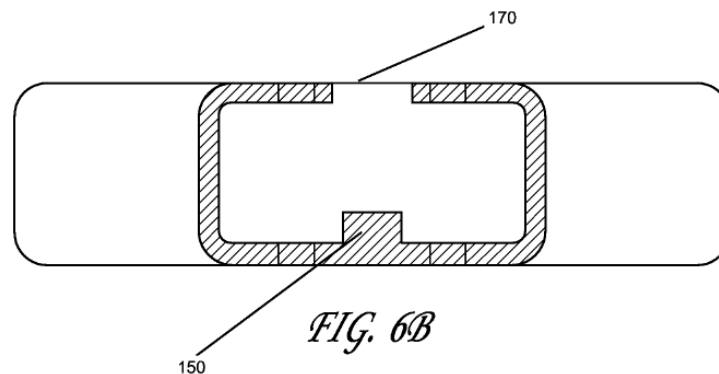
113. The claims of the '329 Patent distinguish between (1) a structure attached to both the first and second walls and (2) a “protrusion” attached to one wall and extending towards the other. For example, claim 1 separately recites a “connecting wall that connects one of the first edges of the first wall to one of the second edges of the second wall.” The fact that the claim only specifies that the protrusion is attached to one wall, while also claiming a structure attached to both walls, confirms that the claimed protrusions are only attached to one wall, just as Petitioner proposed in the Parallel Litigation.

114. The specification also confirms that the “protrusions” are only attached to one wall. The exemplary bridge structure 180 described throughout the specification is “formed as a[] 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.” Ex. 1001 at 4:54-59. Additionally, “[t]he crests provide a plurality of contact points with the anterior wall to keep the anterior wall separated from the posterior wall during suction [while] the troughs provide gaps that allow for

suction of air, fluids, and small debris through the bridge structure.” Ex. 1001 at 2:21-26.

115. The specification never states that the protrusions connect the first and second walls. Indeed, such an embodiment would be contrary to the specification, which teaches the disclosed mouthpieces are autoclavable and are subject to “cleaning and maintenance.” Ex. 1001 at 1:62-64, 3:16-21, 4:45-47. If the protrusions were attached to both walls, then one would not be able to insert a brush through the slot 170 to clean the mouthpiece as contemplated in the specification because the attached bridge structure would block access to the far corners.

116. The specification consistently uses the term “protrusion” to describe features that are only attached to one wall. For example, the specification describes the stability bar 150 as “a protrusion.” Ex. 1001 at 4:22-25. Like the bridge structure, the stability bar 150 is only attached to one of the walls.



Ex. 1001 at FIG. 6B

117. The specification explains that in some embodiments, the posterior and anterior walls “may connect at a superior wall and an inferior wall.” Ex. 1001 at 3:50-51. But the specification never states that a “protrusion” is a structure that is attached to both walls.

C. “Crests” (Claims 9 and 30)

118. As noted above, in the Parallel Litigation, I understand the parties agree on the proper construction for “troughs” but dispute the proper construction for the term “crests,” which appears in claims 9 and 30, and have proposed the following constructions.

Patent Owner’s Construction	Petitioner’s Construction
the points furthest away from the second wall that serve as contact points against the first wall during suction	the full extending distance of a projection of the internal bridge structure

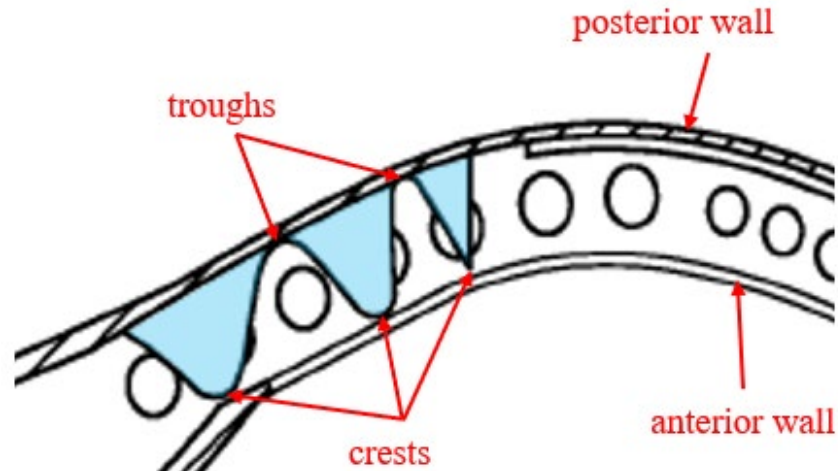
119. Patent Owner’s proposed construction is consistent with how a POSITA would understand this term in light of the specification.

With regard to “crests,” the specification discloses:

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.

Ex. 1001 at 2:13-22 (emphasis added).

120. FIG. 2E of the '329 Patent, reproduced below, illustrates exemplary crests and troughs



Ex. 1001 at FIG. 2E (annotated).

121. The specification provides that the function of the claimed “crests,” which protrude from the second wall, is to provide *contact points* with the first wall during suction. This prevents the posterior and anterior walls from collapsing onto one another during suction, while at the same time allowing the two walls to be separated from one another for cleaning and maintenance of the autoclavable mouthpiece (e.g., to insert a brush between the walls for cleaning). Ex. 1001 at 4:45-47. If the crests were attachment points rather than contact points during

suction, one would not be able to insert a brush through the slot 170 to clean the mouthpiece.

122. Patent Owner's construction is also consistent with dictionary definitions for the word "crest," for example, the Merriam-Webster dictionary definition for "crest" is "something suggesting a crest especially in being an upper prominence, edge, or limit, such as the top of a wave." Ex. 2034.

D. "A Plurality of Wave-Like Protrusions" (Claim 21)

123. Independent claim 21 of the '329 Patent recites: "a bridge structure extending from an interior surface of the first wall toward the second wall, the bridge structure including a plurality of wave-like protrusions to ensure the first wall remains separated from the second wall during suction from the suction system." Ex. 1001 at 9:23-28.

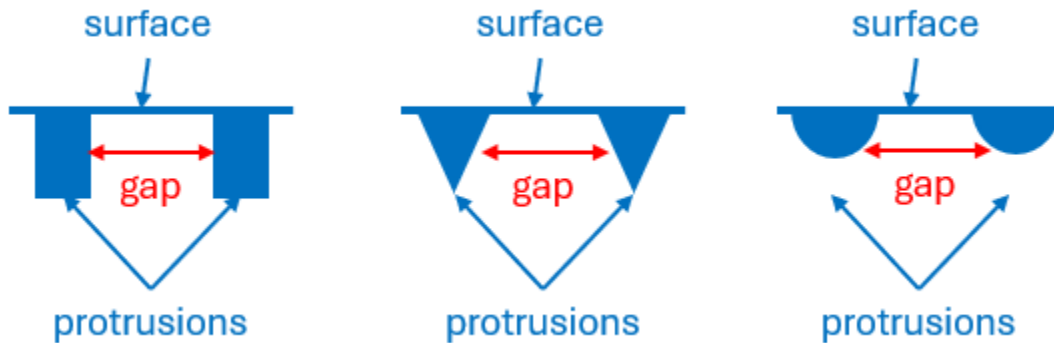
124. I note that Petitioner and Dr. Black do not expressly propose any claim construction for the term "wave-like" (or the broader phrase containing this term). Petition at 76, 116; Ex. 1003 at ¶¶ 53-56. However, the Petition argues that "[i]n light of the specification, this merely means that the bridge structure needs spaced-apart projections with gaps therebetween" and "[t]he resulting shape of any such bridge structure is necessarily a wave shape." Petition at 76. Dr. Black also asserts "the claim's requirement that a bridge structure have 'wave-like' protrusions in view of the specification merely means that you need spaced-apart

projections with gaps therebetween” and “[t]he resulting shape is necessarily a wave shape.” Ex. 1003 at ¶ 180.

125. I disagree. Instead, a POSITA would understand, in light of the plain and ordinary meaning of the claim language, the specification, and the prosecution history, that this phrase means the plurality of protrusions of the bridge structure extend from the interior surface of the second wall in an arrangement forming a pattern of curved surfaces.

126. Starting with the claim language itself, claim 21 recites that the bridge structure includes “a plurality of wave-like protrusions.” The other independent claims of the ‘329 Patent recite “protrusions,” but do not include the “wave-like” modifier. Thus, the term “wave-like” must have meaning and imposes a limitation on the shape of the “protrusions” in claim 21.

127. Any plurality of protrusions (two or more) that protrude from a given surface, regardless of their shape, will have a gap between each protrusion. These gaps define the separate protrusions. If there are no gaps, then there cannot be a plurality of (two or more) protrusions. This is true regardless of how the protrusions are shaped (e.g., rectangular, triangular, semi-circular, etc.).



128. Claim 21 of the ‘329 Patent requires more than just a plurality of spaced-apart protrusions. It requires that “a plurality of *wave-like* protrusions.” This language defines a specific shape or geometry for each of the protrusions that comprise the claimed bridge structure.

129. As noted above, Petitioner and Dr. Black take the position that this entire phrase merely requires “spaced-apart projections with gaps therebetween.” I disagree. A POSITA would not read claim 21 this way because doing so would strip the term “wave-like” of any meaning since any plurality of protrusions will necessarily have a gap between each protrusion. Stated another way, if Petitioner and Dr. Black’s interpretation is correct, then phrase “wave-like” adds nothing to the claim and is superfluous.

130. The specification describes the “bridge structure” feature as follows:

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.

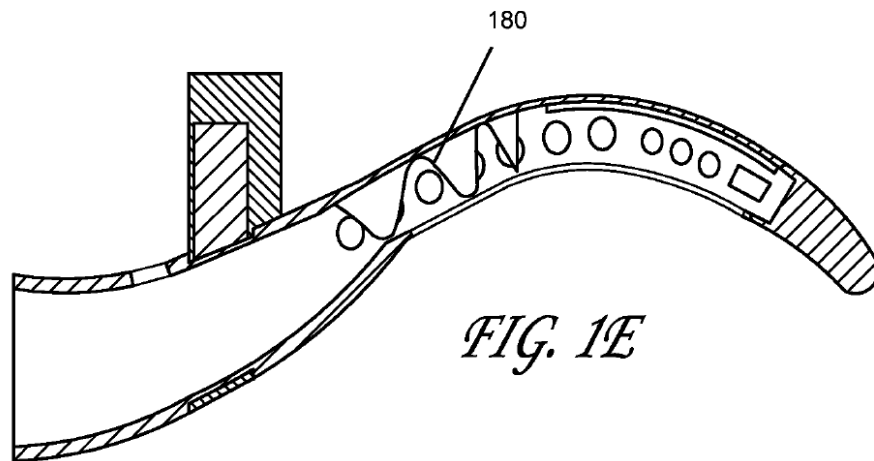
Ex 1001 at 2:18-26.

131. The specification also discloses:

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).

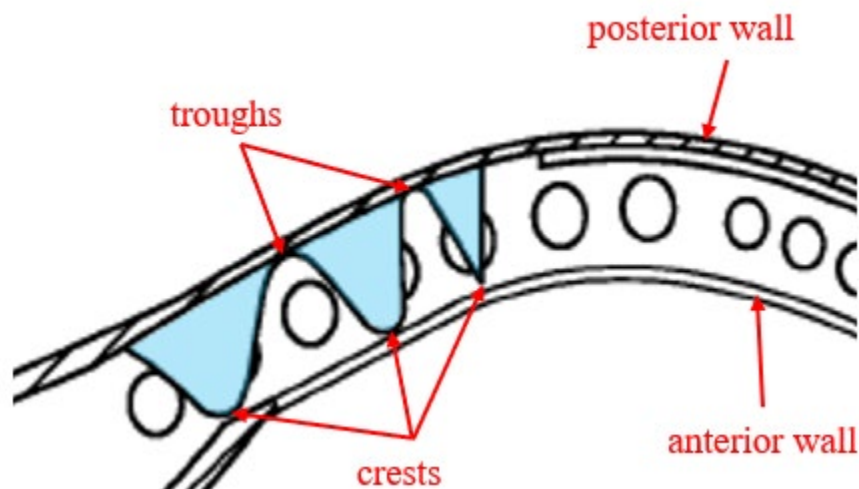
Ex. 1001 at 4:48-67.

132. A cross-sectional view of an exemplary bridge structure 180 with the plurality of protrusions is illustrated in FIG. 1E.



Ex. 1001 at FIG. 1E

A zoomed-in, annotated version of FIG. 1E is shown below illustrating the plurality of protrusions are integral with the interior surface of the posterior wall and protrude toward the anterior wall with crests and troughs in a wave-shaped pattern:

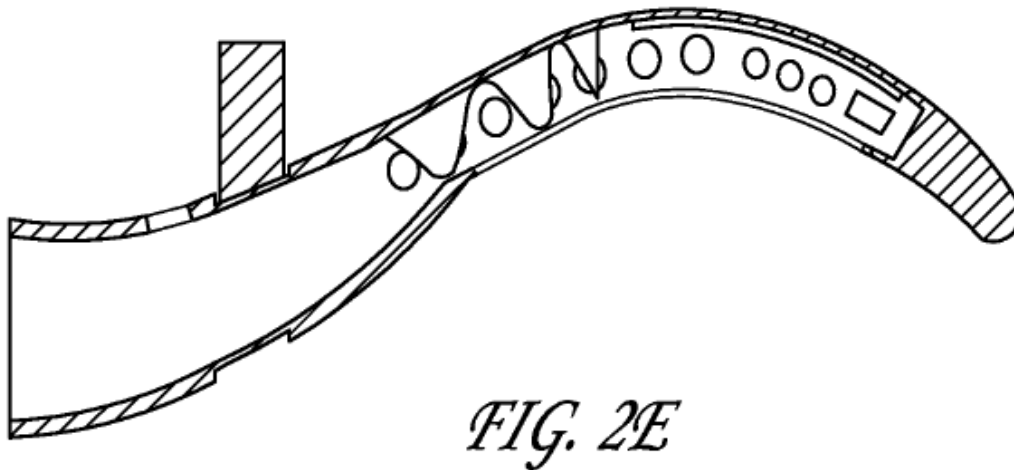


Ex. 1001 at FIG. 1E (excerpted and annotated)

As shown, the wave-shaped pattern has curved surfaces at locations between the crests and troughs.

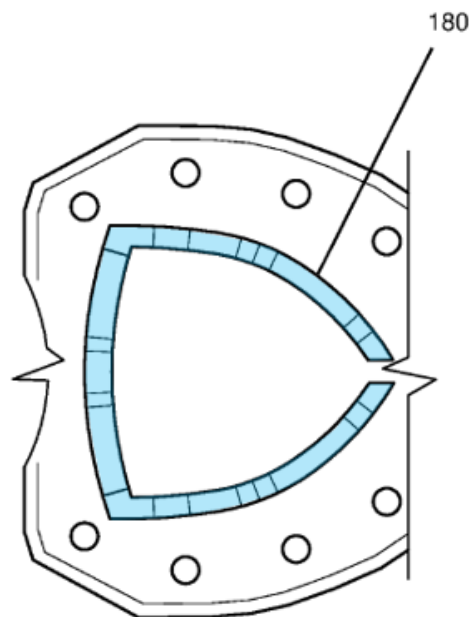
133. I note that in the bridge structure 180 shown in FIG. 1E, it appears in the drawing that the right protrusion of the three protrusions has less curvature between its crest and the adjacent trough. But that is merely because of the angle at which the drawing shows the bridge structure. Considering the bending of the legs of the bridge structure 180 as shown in FIG. 5, in the side view in FIG. 1E, the leg of the bridge structure 180 is either bending into or out of the page (depending on what side one is looking from), which is why the view of the right protrusion of the bridge structure in FIG. 1E appears to have little curvature. As such, a POSITA would understand that, if the viewing angle in FIG. 1E were changed to be more perpendicular to right protrusion, that right protrusion would look much more similar to the central protrusion and the left protrusion shown in FIG. 1E, which is consistent with “wave” shape description for the protrusions of the bridge structure in the specification. Ex. 1001 at 2:16-24, 4:48-67.

134. A cross-sectional view of the bridge structure 180 is also illustrated in FIG. 2E.



Ex. 1001 at FIG. 2E

135. A top view of the bridge structure is shown in FIG. 5 of the '686 Patent (highlighted in blue). The lighter transverse lines are tangency lines depicting the radii of the crests and troughs



Ex. 1001 at FIG. 5 (annotated)

136. There is no example of a “bridge structure” in the specification or drawings of the ‘329 Patent that includes protrusions in a rectangular or square shape.

137. As noted above, the ‘329 Patent’s specification and claims use the term “wave-like” to describe the bridge structure. The most common mechanical “wave” that comes to mind is a wave on a body of water (e.g., a wave in the ocean), and such waves have at least some degree of curvature. This is consistent with dictionary definition of “wave,” which is: “a shape or outline having successive curves.” Ex. 2035 (Merriam-Webster Dictionary).

138. The prosecution history for the ‘329 Patent and related applications/patents, including U.S. Patent No. 8,911,232 (“the Grandparent ‘232 Patent”), U.S. Patent No. 11,744,686 (“the Parent ‘686 Patent”), and U.S. Patent No. 11,589,970 (“the Related ‘970 Patent”) confirm this understanding of the term “wave-like” in claim 21.

139. During prosecution of the Grandparent ’232 Patent, the Examiner rejected the pending claims in a first office action as anticipated by Rhoades or as obvious over Rhoades and Black (the same reference used in the Petition). Ex. 1015 at 49-52. Dependent claims 9-10 rejected based on Rhoades and Black claimed that the bridge structure has a “wave shape” similar to claim 21 of the ‘329 Patent. These claims are reproduced below:

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.

Id. at 25.

140. In the next office action, the Examiner rejected claims 1 and 8 as anticipated by Black, but found that dependent claims 9-10 were allowable over Black because:

the prior art fail to disclose or reasonably teach of a mouthpiece holding comprising, inter alia: a bridge structure protruding from an interior surface of a posterior wall *in a wave shape*, wherein the contact points are at *crests of the wave shape*.

Ex. 1015 at 109-11 (emphases added).

141. In response to this second office action, Applicant amended the pending claims but did *not* include the “wave shape” feature in those amended claims. Ex. 1015 at 124-31. The Applicant’s amendment to pending independent claim 1 relating to the “bridge structure” is reproduced below:

1. (currently amended) 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, 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 bridge structure, and wherein a plurality of troughs between the spaced contact points allow for suction through the bridge structure;

142. The claim was amended to recite that the bridge structure comprises “a plurality of spaced contact points that keep the anterior wall separated from the posterior wall during suction” and “a plurality of troughs between the spaced contact points allow for suction through the bridge structure.” Ex. 1015 at 124. This is similar to Petitioner and Dr. Black’s suggestion that claim 21 of the ‘329 Patent should be construed to merely require spaced-apart projections with gaps therebetween.

143. The Examiner issued a Notice of Allowance after this amendment. However, the Examiner amended the claims to add the “wave shape” feature. Ex. 1015 at 145-48. The interview summary indicates that Hirsch and Black were discussed and mentions the “wave shape” claim language. *Id.* at 147.

Issues Discussed	☐ 101	☐ 112	☒ 102	☒ 103	☐ Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)					
Claim(s) discussed: <u>1 and 21-38.</u>					
Identification of prior art discussed: <u>Hirsch, Black.</u>					
Substance of Interview					
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)					
<u>Proposed examiner's amendment to include the claim language "wave shape" in claim 1 and to correct claim dependency of claims 22-38 were discussed and authorized by Applicant's counsel.</u>					

144. As shown below, the “wave shape” language was added to independent claim 1 to secure an allowance over Black. Ex. 1015 at 148.

1. (currently amended) 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 bridge structure, and wherein a plurality of troughs of the wave shape between the spaced contact points allow for suction through the bridge structure;

145. The prosecution history of the Parent ‘686 Patent further confirms this understanding of the “wave shape” requirement in the claims. During prosecution, the Examiner rejected the pending claims as anticipated by the Black reference. Ex. 2026 at 309-10. The Examiner found that Black discloses a “bridge structure

448c (shown as dashed lines 44c in Fig. 24A) ... wherein the protrusions of the bridge structure 448c protrude in a wave shape comprising one or more crests and one or more troughs (Figs. 24A and 26A).” *Id.* at 310.

The main body 640 further comprises a bridge structure 448c (shown as dashed lines 448c in Fig. 24A) that includes a plurality of protrusions 448c integral with and protruding from an interior surface within the space between the first wall and the second wall, wherein the protrusions of the bridge structure 448c protrude in a wave shape comprising one or more crests and one or more troughs (Figs. 24A and 26A). Note that Fig. 26A shows the protrusions/walls 448c themselves being crests and channels 443 formed therebetween are troughs.

146. In response, the Applicant explained that “Black cannot teach ‘wherein the bridge structure is not attached [to] the first wall’ as claimed” and that “the walls 448c of Black are *rectangular columns* and *do not ‘protrude in a wave shape* comprising one or more crests and one or more troughs’ that protrude from ‘an interior surface of the second wall’ as claimed.” Ex. 2026 at 369-70.

Moreover, the walls 448c of *Black* are rectangular columns and do not ‘protrude in a wave shape comprising one or more crests and one or more troughs’ that protrude from ‘an interior surface of the second wall’ as claimed. Thus, *Black* cannot teach ‘wherein the protrusions of the bridge

147. The Examiner withdrew the rejection based on Black after these arguments. Ex. 2026 at 384. This discussion shows that Patent Owner has been

consistent in its interpretation of the “wave shape” requirement, including the fact that Black’s rectangular columns do not have a wave shape.

148. The prosecution history of the Related ‘970 Patent further confirms this understanding of the “wave shape” requirement in the claims of the ‘686 Patent. In an Office Action dated June 30, 2016, the Examiner applied the Black reference and asserted that it teaches a bridge structure as claimed in dependent claims. Ex. 2019 at 246.

8. **Claims 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rhoades in view of Black (2009/0274991).** Rhoades discloses the invention substantially as claimed except for a bridge structure comprising a plurality of protrusions and wave-shaped bridge structure. Black et al. discloses an intraoral suction device comprising a wave-shaped bridge structure 48c having formed therein the interior wall of the device 40 (Fig. 3B; paragraph 80). Note that the troughs between bridges/transverse walls 48c allow for communication with the suction source. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Rhoades by forming such bridge/transverse walls therein the interior of the intraoral device as taught by Black et al. in order to reinforce the device while still allowing effective suction.

149. In a response dated September 30, 2016, the Applicant made certain claim amendments. Independent claim 1 recited “wherein the bridge structure comprises a plurality of spaced apart protrusions.” Ex. 2019 at 307. Dependent claim 15 recited that “the bridge structure defines a wave shape, and wherein the spaced protrusions are at crests of the wave shape.” *Id.* at 309. The Applicant

argued against the rejection of the dependent claims directed to the “bridge structure” shape as follows:

Regarding claims 13-16, Applicants have cancelled claims 13-14, incorporating the subject matter therein into independent claim 1. The *Office Action* acknowledges that *Rhoades* fails to disclose a bridge structure as claimed. To remedy this deficiency, the *Office Action* relies on the teachings of *Black*, and in particular the internal walls (48c) that form channels 42 and 43 in the *Black* device. Applicants respectfully disagree and submit that the walls of *Black* do not provide a wave shape as claimed in dependent claims 15 and 16. Even assuming that the transverse walls of *Black* were considered to have a wave shape, claim 1 explicitly claims that the protrusions of the bridge structure are unattached to the anterior wall.

As shown above, the Applicant specifically argued that “the walls of Black do not provide a wave shape as claimed in dependent claims 15 and 16.” *Id.*

150. In an Office Action dated April 12, 2017, the examiner withdrew the prior rejections based on Black. Ex. 2019 at 391. The Examiner instead rejected the amended claims based on Hirsch but found that dependent claims 15-16, which recited that the bridge structure has a “wave shape” with “crests and “troughs” were allowable over Hirsch and Black. *Id.* at 387-90.

151. The prosecution history of this patent family shows that the term “wave shape” requires more than a plurality of spaced apart protrusions, and that the “wave shape” feature was a key distinction between the claims and the Black reference.

VIII. OPINIONS ON GROUNDS IN THE PETITION

152. The Petition and Dr. Black's declaration include ten grounds challenging the validity of the '329 Patent. My opinions on each ground follow.

A. Ground 1: Obviousness Based Black (Claims 1-5 and 8)

153. In Ground 1, Petitioner and Dr. Black assert that independent claim 1 and dependent claims 2-5 and 8 of the '329 Patent are obvious over Black. Petition at 39-53; Ex. 1003 at ¶¶ 80-109. For the reasons discussed below, I disagree.

1. Independent Claim 1

154. Limitation 1(f) recites: "a bridge structure that includes a plurality of spaced protrusions protruding from an interior surface of the second wall." Ex. 1001 at 29-34.

155. Petitioner argues Black's "transverse walls 348c are a bridge structure, as claimed." Petition at 47. Dr. Black similarly asserts that "Black teaches transverse walls 348c with channels 342, 343 formed therebetween" and "[t]his is a bridge structure, as claimed." Ex. 1003 at ¶ 94. I disagree.

156. In Black, the transverse walls 348c extend between and are *attached* to *both* the posterior layer 348a and the anterior layer 438b. Ex. 1005 at 14:25-30. This is clear from FIG. 23C of Black, which Petitioner annotated below:

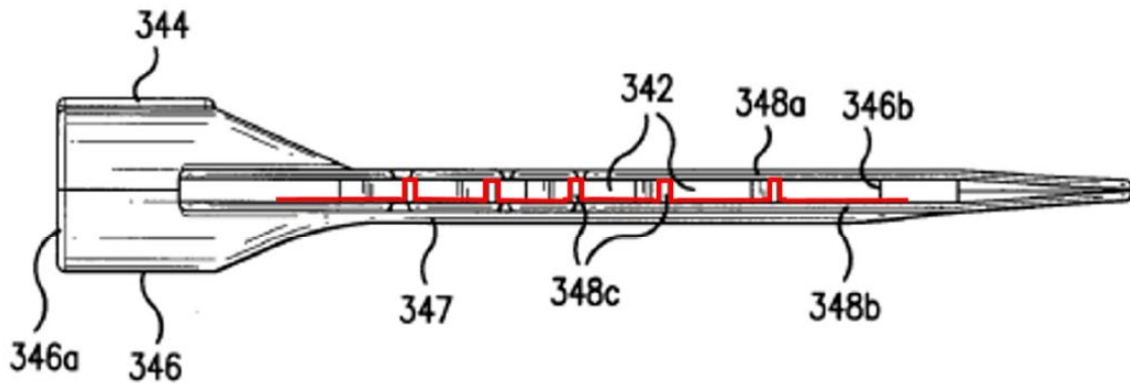
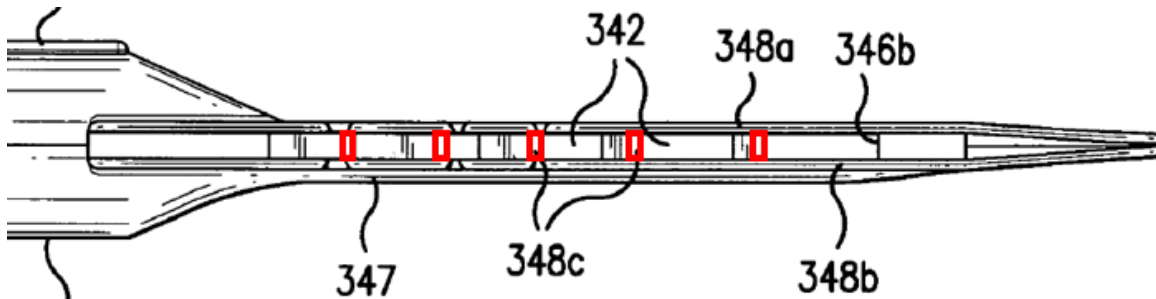


FIG. 23C

Petition at 76 (annotating Ex. 1005 at FIG. 23C)

157. Petitioner's red annotations are misleading because they suggest the transverse walls 348c are not connected to the posterior layer 348a. The annotation below, in my view, more accurately reflects the structure of the transverse walls 348c in Black:



Ex. 1005 at FIG. 23C (annotated)

158. Black's transverse walls 348c are not "a plurality of spaced protrusions protruding from an interior surface of the second wall" as recited in claim 1. As discussed above in the claim construction section of this declaration, a

POSITA would understand that the protrusions in claim 1 are attached to the second wall, but not the first wall.

159. The graphic below illustrates the point. On the left, a structure extends from a second wall towards a first wall. That is a protrusion. On the right, a structure is attached to both the first wall and the second wall. That would not be considered a protrusion but rather a connector between the two walls.



160. Consistent with Black’s terminology, the transverse walls 348c that Petitioner and Dr. Black rely on are *walls* that *connect* or *attach* the anterior and posterior walls, not protrusions extending from one wall towards the other. As noted above regarding claim construction, the ‘329 Patent distinguishes distinction between (1) a “wall” connecting the claimed first and second walls and (2) a “protrusion” extending from the second wall towards the first wall. For example, claim 1 recites a “connecting wall that connects one of the first edges of the first wall to one of the second edges of the second wall.” Ex. 1001 at 6:25-28.

161. Black distinguishes between “walls” and “protrusions.” The term “protrusion” appears 16 times in Black, but never in relation to the transverse walls

346 that Petitioner and Dr. Black rely on as the claimed protrusions. For example, the embodiment shown in FIG. 9 includes mating protrusions 14 and 14b “which project from the upper member 14 of the bite member 10.” Ex. 1007 at 10:4-11. As another example, the embodiment shown in FIGS. 20E, 22A and 22B include “protrusions 313.” *See* Ex. 1007 at 13:1-67. Claim 31 of Black recites “protrusions” and depends from independent claim 1, which recites “a plurality of walls.” Thus, like the ‘329 Patent, Black distinguishes between a “wall” and a “protrusion.”

162. The surrounding claim language further reinforces that Black’s transverse walls 346c are not the claimed protrusions. Claim 1 specifies that the protrusions are “protruding from an interior surface *of the second wall.*” EX1001, 6:29-31. As noted above, even in Petitioner’s proposed claim construction, there is no indication that the claimed protrusion is attached to anything other than the second wall. Petitioner appears to acknowledge this in its arguments in Ground 3, where it asserts that “it makes no difference which wall connects to the projections so long as the projections connect to one of the walls.” Petition at 94. Dr. Black similarly states that (“[i]t makes no difference which wall receives the projections so long as the projections remain spaced apart and project toward the opposite wall.” Ex. 1003 at ¶ 243.

163. The fact that claim 1 of the ‘329 Patent specifies that claimed bridge structure extends “across the distance between the first wall and the second wall through the interior space towards the first wall” does not suggest that the protrusions extending from the second wall can be attached to the first wall. Rather, this language is consistent with the fact that the protrusions of the bridge structure serve as contact points with the first wall when suction is applied during operation of the mouthpiece.

164. For at least this reason, I disagree with Petitioner and Dr. Black’s conclusions for Ground 1 and independent claim 1 of the ‘329 Patent.

2. Dependent Claims 2-5 and 8

165. Petitioner and Dr. Black’s discussion of dependent claims 2-5 and 8 focus on the additional limitations in those dependent claims and does not address the deficiency above with respect to Black’s failure to disclose the claimed “protrusions.” Petition at 50-53; Ex. 1003 at ¶¶ 103-09. Thus, I disagree with Petitioner and Dr. Black’s conclusions for these dependent claims for at least the same reasons as independent claim 1 (from which all of these dependent claims depend).

B. Ground 2: Obviousness Based Black and Hirsch (Claims 6, 7, 9-25 and 27-30)

166. In Ground 2, Petitioner and Dr. Black assert that independent claims 9, 21, and 30, and dependent claims 6, 7, 10-20, 22-25 and 27-29 of the ‘329

Patent are obvious over Black in view of Hirsch. Petition at 53-81; Ex. 1003 at ¶¶ 110-210. For the reasons discussed below, I disagree.

1. Independent Claims 9 and 30

167. Limitation 9(d) of independent claim 9 recites, among other things, “a plurality of protrusions extending from an interior surface of the second wall towards the first wall in a shape having one or more crests and one or more troughs.” Ex. 1001 at 7:28-32. For this limitation, the Petitioner refers back to its discussion for claim 1. Petition at 59 (referring to Section IX.A.1.f). Similarly, Dr. Black refers back to his discussion of the “protrusions” in claim 1. Ex. 1003 at ¶ 129 (“See paragraphs 91-96, which discuss the plurality of protrusions extending from an interior surface of the second wall”).

168. Limitation 30(d) of independent claim 30 similarly recites “wherein the second wall further includes a plurality of protrusions extending from an interior surface of the second wall towards the first wall in a shape having one or more crests and one or more troughs.” Ex. 1001 at 10:33-36. For this limitation, the Petitioner refers back to its discussion for claims 1 and 9. Petition at 81 (referring to “Sections IX.A.1.f., IX.B.3.d, and IX.B.13”). Dr. Black also refers back to his prior analysis when discussing this limitation without adding more. Ex. 1003 at ¶ 206 (“See paragraphs 91-96, 125-128, and 155-159”).

169. Black does not disclose the “plurality of protrusions” in claims 9 and 30 for at least the same reasons that Black fails to disclose the “plurality of spaced protrusions” in independent claims 1 and 21, as I discussed above. Indeed, Petitioner and Dr. Black rely on the same arguments regarding Black and “protrusions” as in claim 1 for claims 9 and 30.

170. Additionally, claims 9 and 30 specify that the plurality of protrusions of the bridge structure have a shape with one or more crests and one or more troughs. As discussed above in the claim construction section of this declaration, the term “crests” should be construed as “the points furthest away from the second wall that serve as contact points against the first wall during suction.” Black’s transverse walls 348c do not have contact points against the first wall during suction. Rather, Black’s transverse walls 348c have *attachment* points with the first wall both during suction and without suction.

171. For at least these reasons, I disagree with Petitioner and Dr. Black’s conclusions for independent claims 9 and 30 in Ground 2.

2. Independent Claim 21

172. Limitation 21(f) of claim 21 recites “a bridge structure extending from an interior surface of the first wall toward the second wall, the bridge structure including a plurality of wave-like protrusions to ensure the first wall remains

separated from the second wall during suction from the suction system.” Ex. 1001 at 9:24-28.

173. For this limitation, the Petition refers back to its prior analysis of limitation 9(d). Petition at 76 (referring to Section IX.A.1.f). Black does not disclose the “protrusions” of the claimed bridge structure for same reasons I discussed above for independent claims 1, 9, and 30.

174. Regarding the additional “wave-like” shape requirement in claim 21, Petitioner argues that “Black teaches a square wave shape formed by the channels 342 and the transverse walls 348c (i.e., the presence [sic] transverse walls 348c and the gaps therebetween that form the channels 342”). Petition at 76. Dr. Black asserts that “in FIG. 23C, Black teaches a square wave shape formed by the channels 342 and the transverse walls 348c (i.e., the presence [sic] transverse walls 348c and the gaps therebetween that form the channels 342).” Ex. 1003 at ¶ 180.

175. Petitioner annotates this “square” pattern from Black as shown below:

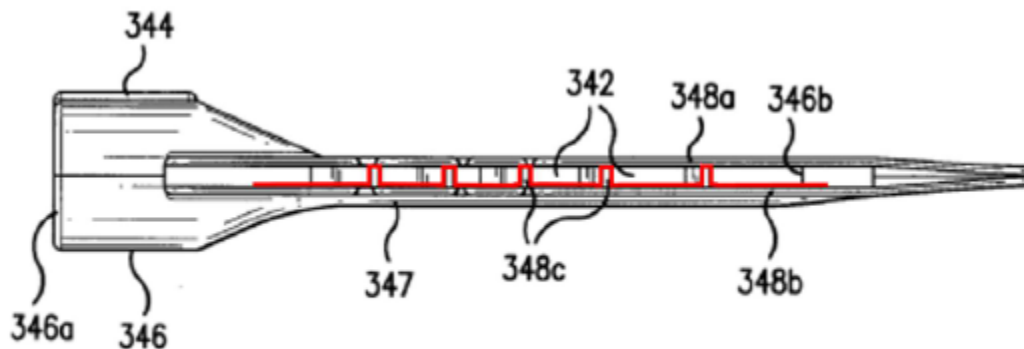


FIG. 23C

Petition at 76 (annotating Ex. 1005 at FIG. 23C)

As noted above, I disagree with this annotation.

176. As I discussed in the claim construction section of this declaration, a “square wave” or a series of rectangular columns is ***not*** a successive pattern of ***curved surfaces***, i.e., the claimed bridge structure as properly construed in light of the surrounding claim language, specification, and prosecution history of the ‘329 Patent.

177. I note that the Applicant specifically argued during prosecution of the Parent ‘686 Patent that Black’s “rectangular columns” (the transverse walls 348c) do not form a wave-like shape as claimed. Ex. 1020 at 369-70.

178. For at least these reasons, I disagree with Petitioner and Dr. Black’s conclusions for claim 21 in Ground 2.

3. Dependent Claims 6, 7, 10-20, 22-25, and 27-29

179. Petitioner and Dr. Black’s discussion of dependent claims 6, 7, 10-20, 22-25, and 27-29 of the ‘329 Patent focus on the additional limitations in those dependent claims and does not address the deficiency above with respect to Black’s failure to disclose the claimed “protrusions” (all independent claims), the claimed “crests” (claims 9 and 30), or “wave-like” shape (claim 21). Petition at 53-56, 63-70, 77-80; Ex. 1003 at ¶¶ 111-17, 140-61, 189-202. Thus, I disagree with Petitioner and Dr. Black’s conclusions for these dependent claims for at least the

same reasons as independent claims 1, 9, and 21 (from which all of these dependent claims depend).

C. Ground 3: Obviousness Based on Park, Baughan, and Johnson (Claims 1-4, 6 and 8)

180. In Ground 3, Petitioner and Dr. Black argue that independent claim 1 and dependent claims 2-3, 6, and 8 of the '329 Patent are obvious based on Park, Baughan, and Johnson. Petition at 81-100; Ex. 1003 at ¶¶ 211-55. As set forth below, I disagree.

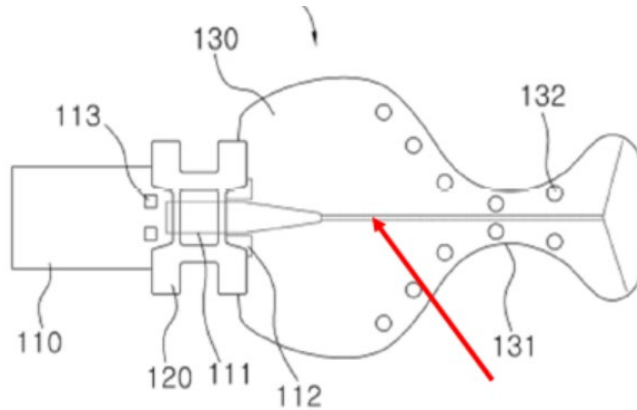
1. Independent Claim 1

181. Limitation 1(f) of independent claim 1 recites: “a bridge structure that includes a plurality of spaced protrusions protruding from an interior surface of the second wall, the bridge structure extending across the distance between the first wall and the second wall through the interior space towards the first wall.”

182. Park does not disclose, teach, or suggest any “bridge structure.” I note that Dr. Black admits that “Park fails to expressly describe or illustrate whether the mouth prop 100 includes any internal features that assist with suction or preventing collapse under suction.” Ex. 1003 at ¶ 233. The Petition likewise admits that “Park is silent regarding whether any structures are formed inside the interior chamber of the main body.” Petition at 89.

183. Both the Petitioner and Dr. Black’s declaration also indicate that they are speculating as to what certain features are in Park’s drawings. For example,

using the annotated version of Park's FIG. 3 below, Dr. Black refers to the central component and says that this "appears to be a light pipe" but concedes that "it is unclear whether this is structural or simply something to assist with lighting." Ex. 1003 at ¶ 233. I agree that this component is not expressly described in Park.



EX1003, ¶233 (annotating EX1005, FIG. 3)

The Petitioner similarly expresses uncertainty as to what this feature is. Petition at 91 ("the line shown in FIG. 3 may not provide any rigidity or anti-collapse features at all and may only assist in guiding light from the light guide 240").

184. Later, Dr. Black says that his "first impression was that the mouth prop 100 includes a spine." Ex. 1003 at ¶ 314. He also indicates that for a least some of the analysis he provides, he "assumes that there is a spine running down the symmetrical axis of the mouthpiece" *Id.* at ¶ 236. For purposes of my analysis, and without necessarily agreeing with Dr. Black, I will apply the same assumption in my analysis of Park.

185. The Petition asserts that Park's lack of details "may be intentional as Park mentions that 'common features,' such as anti-collapse structures, 'are omitted.'" Petition at 89 (quoting Ex. 1006 at ¶ 22). However, I have not seen any evidence in the Petition that the use of an anti-collapse structure like the claimed bridge structure was "common" in the field of dental isolation mouthpieces at the time of the invention. Likewise, I have seen no evidence that such a feature is inherent in Park and necessarily would have been present despite the fact that Park does not expressly describe any such features.

186. Petitioner and Dr. Black propose modifying Park to meet the claimed "bridge structure." The Petition asserts that a POSITA would modify Park to include a bridge structure because Park's walls are "likely to collapse under the suction force." Petition at 89. Dr. Black asserts that "a POSA would know that the anterior and posterior walls (first and second walls) [in Park] are likely to collapse into each other due to the suction force applied by the external suction device 300." Ex. 1003 at ¶ 235 (citing Ex. 1006 at ¶¶ 28, 43-43, 51 and Ex. 1007 at 3:46-48). For at least the reasons discussed below, I disagree. Park does not disclose or suggest to a POSITA that the walls are likely to collapse under suction and therefore motivate a POSITA to modify Park. Similarly, the other references in the Petition do not disclose, teach, or suggest that the walls in Park's dental isolation mouthpiece are likely to collapse under suction.

187. After identifying this alleged problem with Park, Dr. Black asserts that a POSITA would recognize that Park's walls would collapse under suction "given how thin Park's mouth prop 100 appears." Ex. 1003 at ¶ 235. Park does not disclose any dimensions for the walls. Nor does Park indicate that the figures are drawn to scale. I understand that in its IPR Petition challenging the related '969 Patent, Petitioner admitted that "Park . . . is silent regarding the thickness of its various walls." Ex. 2022 at 74. Thus, in my view, a POSITA would not be able to glean the relative thickness of Park's walls based solely on the drawings much less determine that the thickness is such that the walls would collapse under suction.

188. Dr. Black also asserts that a "POSA would recognize this tendency to collapse because Park explains that the mouth prop 100 is made of silicone with 'excellent tactile properties as well as a predetermined elasticity.'" Ex. 1003 at ¶ 235. I disagree. While Park does refer to a "predetermined elasticity," Park does not specify any values for this elasticity. Ex. 1006 at ¶ [0032]. A POSITA would recognize the silicone material described by Park can have varying properties depending on what material is selected.

189. For example, Ex. 2036 is a silicone rubber selection guide that a POSITA might consult when constructing a device made from silicone. The guide shows that multiple silicone products are available with a wide range of properties in terms of hardness, density, tensile strength, elastic modulus, tear strength, and

heat resistance (including sufficient heat resistance for an autoclavable part). A POSITA would know that a silicone material can be selected that is relatively flexible but strong enough to avoid collapsing when a suction force is applied in the application described by Park.

190. Ex. 2037 is a similar product guide for medical grade liquid silicone rubbers (LSR) for healthcare applications. Like the other selection guide discussed above, Ex. 2037 confirms that medical grade silicone can have varying values for hardness, tensile strength, and tear strength. In particular, different durometers are available, including very soft low durometer, mid durometer, and high durometer.

191. I understand that in his declaration concerning the related '969 Patent, Dr. Black referred to the same sentence regarding “elasticity” from Park and stated “the elasticity would retract the cheek tissue,” and further that a POSITA “would understand that elasticity and ‘resiliency’ are essentially synonymous concepts when describing how an elastic device can retract cheek tissue.” Ex. 2040 at ¶ 155. In my opinion, elasticity sufficient to retract the cheek tissue would indicate to a POSITA stiffness sufficient to prevent collapse of the walls during use, further supporting my opinion that the silicone material used in Park could be a resilient material that would not collapse under suction.

192. Additionally, whether Park’s walls would collapse under suction would depend on the applied suction force. Park is silent regarding the suction

forces that are present inside the mouthpiece during operation. A POSITA would know that the suction force would, in part, be a function of the vacuum used to supply the suction force. A POSITA would also know that the suction forces inside the mouthpiece would be a function of the mouthpiece's through holes and internal geometry and dimensions, which again, Park does not disclose. Park also discloses that the mouthpiece is attached to a suction line via a fitting connection portion 210, as shown in FIG. 2.

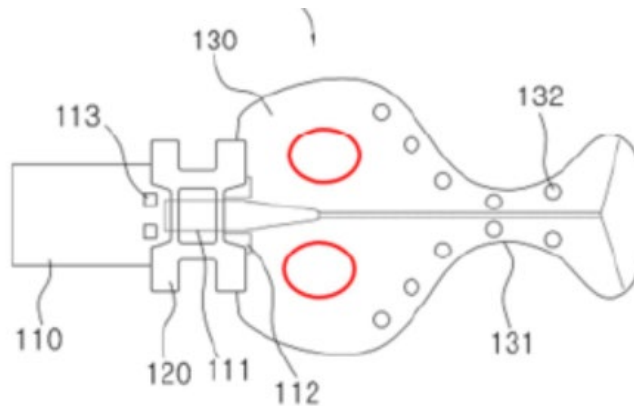
193. A POSITA would further know that the suction forces present inside the mouthpiece would depend in part on the geometry and dimensions of the fitting connection portion. Park does not disclose any dimensions for this component. In my view, it is at best speculative to suggest that Park's walls would "likely" collapse under suction. If anything, there is strong evidence that they would not collapse.

194. Petitioner and Dr. Black's analysis shows that the material used in Park provides at least some rigidity and is not inherently susceptible to collapsing during suction. For example, Dr. Black asserts that Park's mouthpiece has "sidewalls" and that these "sidewalls would assist with preventing collapse under suction." Ex. 1003 at ¶ 235. If Park has "sidewalls," those sidewalls would be made of the same material as the rest of the mouthpiece. According to Dr. Black, the "sidewalls" provide rigidity and resist collapse during suction despite the fact that

they comprise the same silicone material as the walls he believes would collapse under suction given their material. Ex. 1003 at ¶ 235.

195. Dr. Black assumes that Park has a “spine” that runs down the longitudinal axis, and Dr. Black characterizes the spine as “anti-collapsing structure.” Ex. 1003 at ¶¶ 235-36. The “spine” would be made of the same silicone materials as the walls and yet according to Dr. Black is an anti-collapsing structure.

196. Dr. Black circles the areas in red below and says, assuming there is a spine, these are the areas that are most likely to collapse under suction in Park’s mouthpiece:

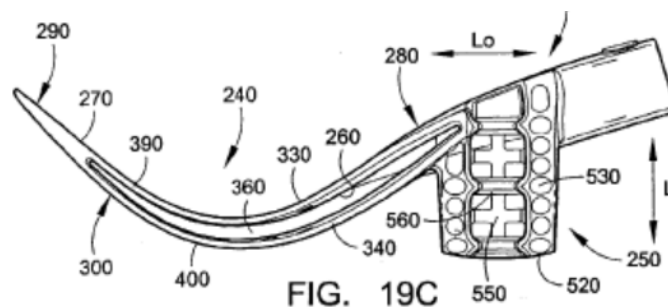


Ex. 1003 at ¶ 235 (annotating Ex. 1006 at FIG. 3)

I disagree with Dr. Black’s assertion that these areas would collapse under suction solely because they are made from a silicone material, for the reasons discussed above.

197. Petitioner and Dr. Black cite the Hirsch reference in their analysis. Dr. Black states that “the designs of Park and Hirsch are very similar – Hirsch simply

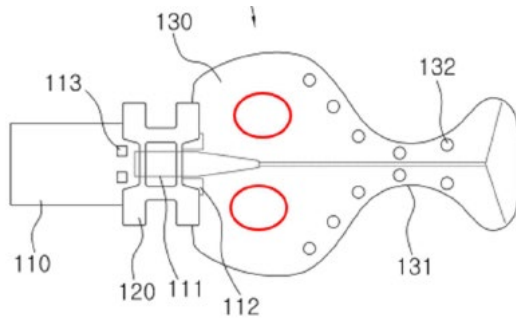
198. I agree with Petitioner and Dr. Black that Park and Hirsch are very similar references. In at least one embodiment, Hirsch lacks a “sidewall,” as shown below:



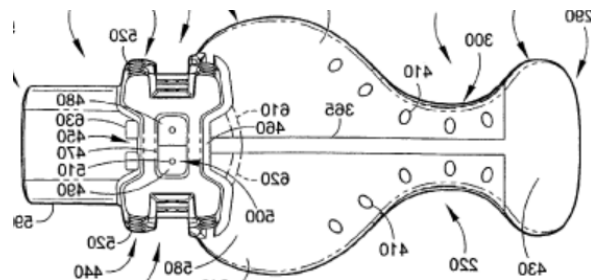
Ex. 1012 at FIG. 19C

Solmetex Ex. 2030
Ascentcare Dental Products v. Solmetex - IPR2025-01104

199. As shown below, in Hirsch, there is no “anti-collapse” structure at the locations identified by Dr. Black as the “weak points” in Park that require reinforcement.



Ex. 1003 at ¶ 235

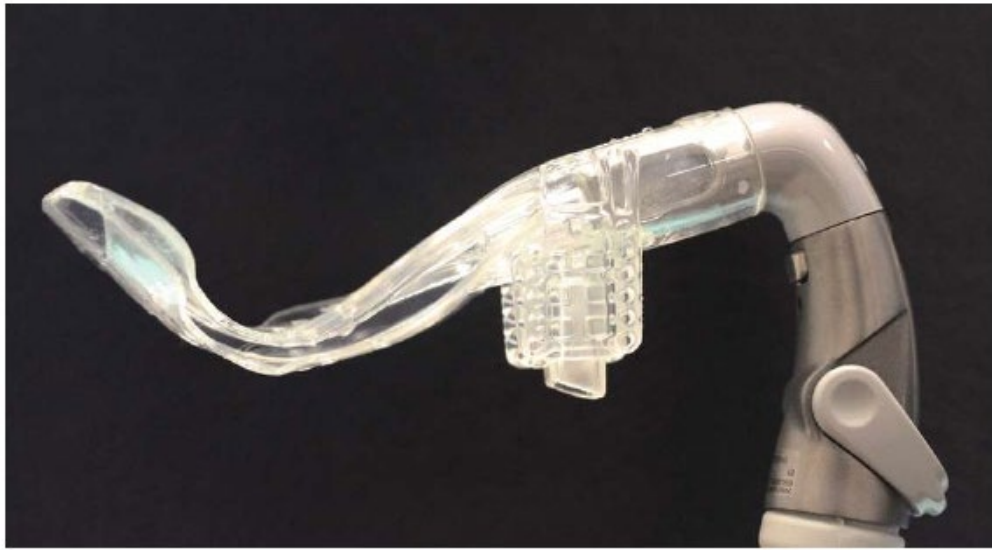


Ex. 1012 at FIG. 19E (rotated)

200. The fact that Hirsch does not contain “anti-collapse structure” at these locations reinforces the conclusion that a POSITA viewing Park would not believe that the walls are susceptible to collapsing and blocking suction.

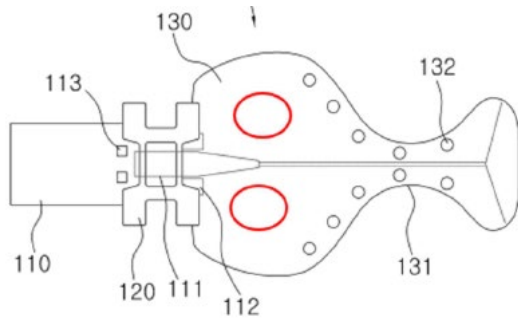
201. Dr. Black discusses a dental isolation mouthpiece product called “Isolite” in the background section of his declaration and provides some photos:





Ex. 1003 at ¶ 11

202. I note that this “Isolite” mouthpiece is similar to Hirsch. I also understand that the corresponding patent associated with Hirsch is assigned to the seller of the Isolite mouthpiece. Like Hirsch, there is no “sidewall” in Isolite, so one would expect at least the same problem with the walls collapsing as Park (if there is such a problem) and likely an even worse problem. Given that the Isolite product uses a transparent material, it is evident from Dr. Black’s photos that there is no “anti-collapse” structure at the locations that Dr. Black claims are likely to collapse under suction in Park.



Ex. 1003 at ¶ 235



Ex. 1003 at ¶ 11

203. Dr. Black’s discussion of the “Isolite” product reinforces my conclusion that Park does not suffer from a problem where its walls would collapse on one another when suction is applied during operation, as alleged by Dr. Black and Petitioner.

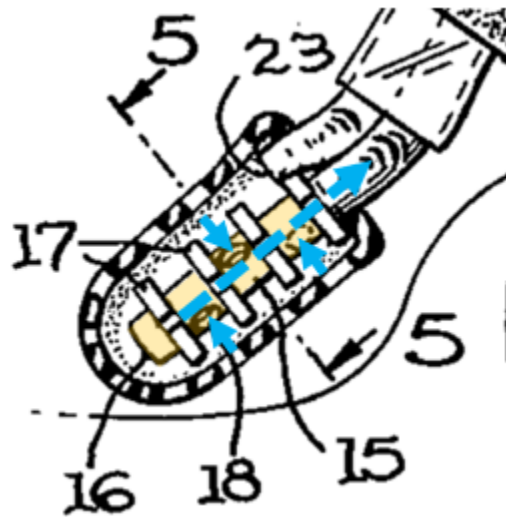
204. The Petition asserts that unless Park is modified in view of Baughan and/or Johnson to include the claimed bridge structure, then “collapsing would occur” in Park. Petition at 89. The Petition then explains what Petitioner believes the consequences of this problem are: “[i]f these areas collapse under suction, suction power would be significantly reduced or blocked entirely.” Petition at 90. Dr. Black similarly states that “[e]ven if the areas identified above do not completely collapse, they may significantly narrow under suction due to the flexible nature of the mouth prop 100.” Ex. 1003 at ¶ 237.

205. Park teaches that its objective is to “form[] a suction line to expel foreign substances from the oral cavity” during dental procedures. Ex. 1006 at ¶

[0012]. If suction were blocked entirely as suggested by the Petition, this would render Park's mouthpiece inoperable for its intended purpose. Even significantly reducing suction power would also render Park inoperable or at least highly ineffective at achieving its intended purpose. Nothing in Park would suggest to a POSITA that the mouthpiece disclosed therein is inoperable for its intended purpose. In other words, if Park's mouthpiece were such that the walls would collapse under suction (and therefore require modifications), then the mouthpiece would not work in the first place.

206. Baughan is not directed to a dental isolation mouthpiece like the one in Park. Instead, Baughan is directed to a different type of dental equipment called a saliva ejector. Ex. 1007 at 1:6-7. I note that the '329 Patent itself distinguishes the disclosed and claimed isolation mouthpiece from a saliva ejector. Ex. 1001 at 1:31-34. Baughan does not teach or suggest that a dental isolation mouthpiece like the one in Park would collapse under suction without adding an anti-collapse structure.

207. Baughan is directed to a different problem and geometry than the alleged problem in Park. The discs 17 prevent the sleeve 24 from blocking the orifices 18 of the terminal tube portion 15. Ex. 1007 at 3:36-48.



Ex. 1007 at FIG 3 (excerpted and annotated)

208. Baughan's discs 17 are designed to prevent a moveable surface (the sleeve 24) from blocking holes providing suction from a fixed surface (the tube 15). By contrast, in Park, two surfaces are urged toward one another under suction rather than one surface being urged towards the source of suction.

209. The Petition acknowledges that Baughan uses "outward projecting discs" around the circumference of an inner cylindrical tube. Petition at 93. The Petition also acknowledges that Baughan's discs would need to be modified for use with Park and argues that "a PHOSITA using basic common sense, would modify the discs for a tube-shaped embodiment to be projections for a flatter, non-tube embodiment." *Id.* I disagree. The only reference Petitioner alleges teaches this feature is Johnson, which I discuss below.

210. Like Baughan, Johnson is not directed to a dental isolation mouthpiece. Dr. Black asserts that “Johnson shows how to form projections 81-86 on a flat surface 40 for dental application.” Ex. 1003 at ¶ 275. The Petition similarly argues that “Johnson teaches integral projections 81-86 formed on a flat surface in a dental apparatus.” Petition at 37. I disagree. Johnson’s projections are *not* formed on a flat surface – they are formed on a curved or semi-circular surface.

211. Johnson explains: “[i]f deemed necessary or desirable, molded projections 81, 82, 83, 84, 86, 86 are formed on the interior surfaces of the neck sections 28a and 28b, having sharper corners or edges on their downwardly (as viewed in FIG. 3) facing edges in order to more firmly grasp the surface of the vacuum tube 12 and to better clamp the tube against inadvertent withdrawal from the cylindrical receiving opening.” Ex. 1008 at 4:16-23. Johnson does not disclose or suggest that these projections serve the purpose of preventing two surfaces from collapsing onto one another. Johnson’s projections are used to grip or clamp the vacuum tube 12.

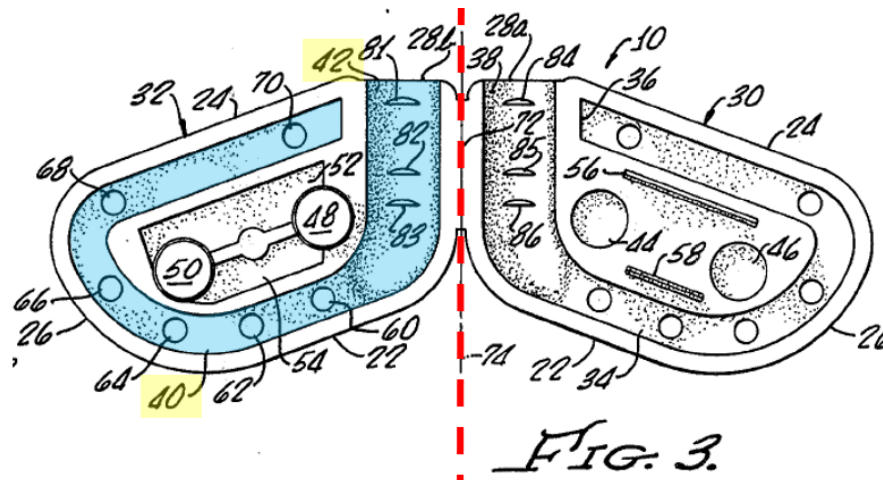
212. I observe that the plates in Johnson are “molded of a suitable rigid or semi-rigid plastic” Ex. 1008 at 4:24-25. Johnson discusses “resilient latch means.” Ex. 1008 at 3:31-52. The presence of a living hinge connecting the two plates in the as-molded condition indicates that the primary embodiment is most likely molded in polypropylene. Further, the geometry of the plates when snapped around

the tube do not suggest anti-collapse features because the faces are depicted in contact (except for the small diameter flow channel). *See* Ex. 1008 at FIGS. 5, 6.

The fact that Johnson's device is rigid further reinforces that, like the other references in the Petition, Johnson does not disclose or suggest the alleged problem with flexible materials collapsing on to one another under suction.

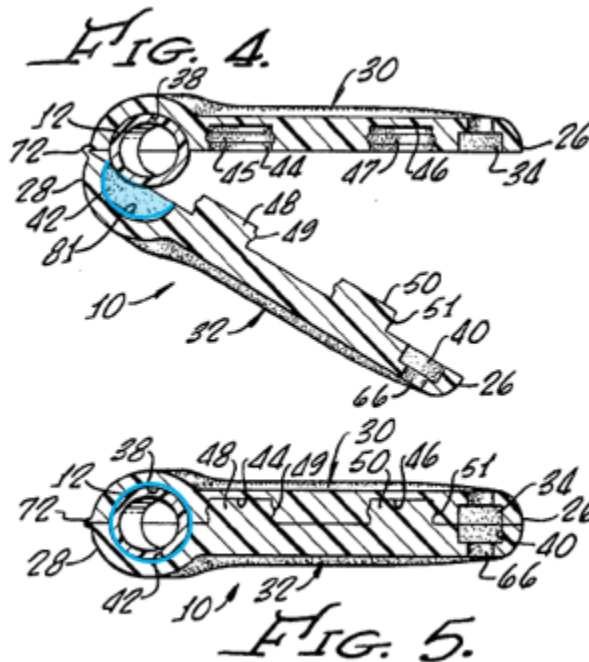
213. Johnson further explains that "[t]he grooves 38, 42, which communicate with the passage recesses 34, 40 of the respective plates 30, 32 are enlarged as compared to the passage recesses and each has a substantially *semi-circular* configuration to collectively define a circular cross-section vacuum tube receiving opening in the neck sections 28a and 28b of the neck 28 of the saliva ejector." Ex. 1008 at 3:66-4:4 (emphasis added).

214. Johnson describes reference numeral 40 in FIG. 3 as follows: "recess 40 extend[s] from a closed end at the top rear edge of the plate forwardly along the edge of the plate, downwardly along the front edge and rearwardly along the bottom edge where it terminates at groove 42 formed in the neck 28b of plate 32." Ex. 1008 at 3:25-30. The plates 30 and 32 "pivot with respect to one another about a hinge axis (denoted by a line 74)." Ex. 1008 at 4:11-13.



Ex. 1008 at FIG. 3 (annotated)

215. As shown in FIGS. 4-5, when the plates 30 and 32 are closed, the recess 40 is not “flat” as asserted by Petitioner and Dr. Black, it is semicircular.



Ex. 1008 at FIGS. 4-5 (annotated)

216. Dr. Black states that the discs 17 in Baughan “essentially the exact same concept I taught in Black when I taught transverse walls.” Ex. 1003 at ¶ 240. I disagree. The transverse walls in Black are not the “same concept” as the discs 17 in Baughan. As described above, the discs 17 go around the circumference of cylindrical tube 15, which contains orifices that apply suction, and prevent another generally cylindrical sleeve from collapsing onto the tube 15 and blocking the orifices. By contrast, the transverse walls in Black merely connect flaps together.

217. Dr. Black asserts that the transverse walls additionally “prevented collapse under suction.” Ex. 1003 at ¶ 240 (citing Ex. 1005 at 5:54-59). The cited portion of Black does not say that the transverse walls 48c were intended to prevent collapse under suction. Ex. 1005 at 5:54-59. Black does not expressly mention collapsing under suction as a problem or potential problem, let alone disclose that transverse walls are the solution.

218. Even if a POSITA were to recognize that the walls in Park’s mouthpiece was likely to collapse under suction (which I disagree with), there would be other options available to address this problem as opposed to modifying Park’s mouthpiece to include a bridge structure. For instance, a POSITA would know if Park’s walls were too “thin,” as Dr. Black asserts, they could simply thicken the walls to reinforce them and increase rigidity.

219. As another example, if Park's material were too flexible and susceptible to collapse, a POSITA would know that they could easily select a stronger material that would more resistive to collapsing while still maintaining enough flexibility for use in a dental procedure.

220. A POSITA would recognize that both options described above would be far simpler and cheaper to implement in Park as opposed to adding a bridge structure as proposed by Petitioner and Dr. Black. Petitioner's proposed modification requires a more complicated mold to create the mouthpiece with additional components compared to simply changing the material or thickening the walls. A POSITA would know that the mouthpiece in Park, which according to Dr. Black has an interior cavity, could be formed by injection molding with a single mold in a single molding process. This mold would include a structure to keep the walls separated and define the cavity. If a "bridge structure" were added to Park, the mold and/or the molding process would need to be modified to create the "bridge structure" that would only be attached to one wall and not the other. For example, the physical mold would need to be modified to include a more complicated geometry. As another example, this might require two separate molding processes to create the mouthpiece. This presents another potential point for failures or defects during manufacturing

2. Dependent Claims 2-4, 6, and 8

221. Petitioner and Dr. Black's discussion of dependent claims 2-4, 6, and 8 focus on the additional limitations of those claims and does not address any of the aforementioned deficiencies with respect to the Park, Baughan, and Johnson combination. Petition at 97-101; Ex. 1003 at ¶¶ 248-55. Thus, I disagree with Dr. Black's conclusions for these dependent claims for at least the same reasons as independent claim 1.

D. Ground 4: Obviousness Based on Park, Baughan, Johnson, and Black (Claims 5, 9-20 and 30)

222. In Ground 4, Petitioner and Dr. Black assert that independent claims 9 and 30 and dependent claims 5 and 10-20 of the '329 Patent are obvious over Park, Baughan, Johnson, and Black. Petition at 101-11; Ex. 1003 at ¶¶ 256-312. As set forth below, I disagree.

1. Independent Claims 9 and 30

223. Limitations 9(d) and 30(d) in independent claims 9 and 30, respectively, recite that "the second wall further includes a plurality of protrusions extending from an interior surface of the second wall towards the first wall in a shape having one or more crests and one or more troughs." Ex. 1001 at 7:28-32 (claim 9) and 10:33-37 (claim 30).

224. For limitation 9(d), the Petition refers back to its analysis of limitation 1(d), which includes the "bridge structure" requirement. Petition at 104. Similarly,

for limitation 30(d), the Petition refers back to its analysis for limitation 9(d). *Id.* at 111. I note that the Petition does not expressly address the phrase “shape having one or more crests and one or more troughs” in these claims.

225. In his declaration, Dr. Black repeats the same analysis he provided for the “bridge structure” requirement in claim 1 when addressing limitation 9(d). Ex. 1003 at ¶¶ 268-80. The table below summarizes the correspondence between

paragraphs of Dr. Black’s declaration addressing limitation 1(d) and addressing limitation 9(d):

Dr. Black Paragraph Addressing Limitation 1(d)	Dr. Black Corresponding Paragraph Addressing Limitation 9(d)
233	268
234	269
235	270
236	271
237	272
238	273
239	275
240	276
241	277
242	278
243	279
244	280

226. I note that like the Petition, Dr. Black does not mention the claim terms “crests” or “troughs” at all in paragraphs 268-80 where he discusses limitation 9(d).

227. For limitation 30(d), Dr. Black refers back to paragraphs 265-280 of his declaration, which address limitation 9(d), and paragraph 301, which addresses dependent claim 19. Ex. 1003 at ¶ 308.

228. I disagree with Dr. Black and Petitioner’s arguments for claims 9 and 30 of the ‘329 Patent in relation to Park, Baughan, and Johnson for at least the same reasons I provided above with respect to claim 1 because Petitioner and Dr.

Black rely on the same flawed motivation to combine analysis for these claims as for claim 1.

2. Dependent Claims 5 and 10-20

229. Petitioner and Dr. Black's discussion of dependent claims 25 and 10-20 of the '329 Patent focus on the additional limitations of those claims and does not address any of the aforementioned deficiencies with respect to the Park, Baughan, and Johnson combination. Petition at 101-02, 106-10; Ex. 1003 at ¶¶ 257-58, 292-303. Thus, I disagree with Dr. Black's conclusions for these dependent claims for at least the same reasons as the independent claims from which they depend.

E. Ground 5: Obviousness Based on Park, Baughan, Johnson, and Hirsch (Claims 7, 21-25, and 27-29)

230. In Ground 5, Petitioner and Dr. Black assert that independent claim 21 and dependent claims 7, 22-25, and 27-29 of the '329 Patent are obvious over Park, Baughan, Johnson, and Hirsch. Petition at 111-19; Ex. 1003 at ¶¶ 313-45. For the reasons discussed below, I disagree.

1. Independent Claim 21

231. Limitation 21(f) in independent claim 21 recites "a bridge structure extending from an interior surface of the first wall toward the second wall, the bridge structure including a plurality of wave-like protrusions to ensure the first

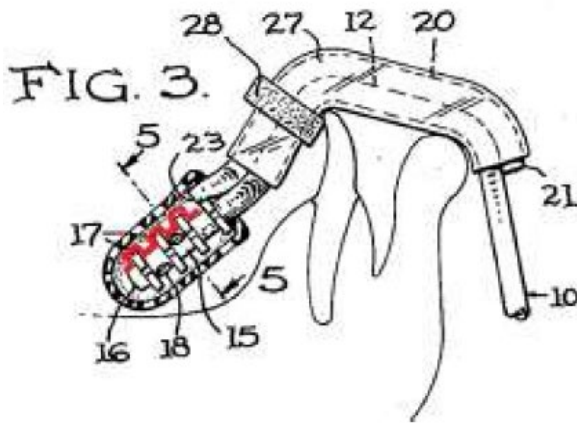
wall remains separated from the second wall during suction from the suction system.” Ex. 1001 at 9:23-28.

232. For this limitation, the Petition refers back to its analysis for “Section IX.D.2.d,” which relates to limitation 9(d). Petition at 115. Dr. Black’s analysis of limitation 21(f) refers to paragraphs 268-280, which as I noted above, address limitation 9(d). Ex. 1003 at ¶ 330. I note that none of those paragraphs address the claim term “bridge structure” because that term is not recited in claim 9.

233. For the reasons I provided above, I disagree with Petitioner and Dr. Black’s assertions regarding combining Park, Baughan, and Johnson and therefore disagree with their assertions for limitation 21(f) for at least the same reasons I already provided for independent claims 1, 9, and 30.

234. Additionally, unlike the other independent claims of the ‘329 Patent, claim 21 includes the term “wave-like.” As I discussed above in the claim construction section of his declaration, in my view, a POSITA would understand this term to require curved surfaces.

235. To address the “wave-like” requirement in claim 21, the Petition argues that “Baughan teaches that the spaced-apart discs result in a square wave shape having crests and troughs” and “notches 19 in the disc also form a square wave shape.” Petition at 116-17. Petitioner annotates this “square’ pattern from Baughan as shown below:



Petition at 116 (annotating Ex. 1007 at FIG. 3)



Petition at 117 (annotating Ex. 1007 at FIG. 5)

236. As I discussed above in the claim construction section, a “square wave” is *not* a successive pattern of *curved surfaces*, i.e., the claimed bridge structure as properly construed in light of the surrounding claim language, specification, and prosecution history. I again note that the Applicant argued during prosecution of the Parent ‘686 Patent that “rectangular columns” are not a wave-like shape. Ex. 2026 at 369-70. Thus, even if one were to combine Park with Baughan and Johnson as Petitioner and Dr. Black propose (which I disagree with), the Park-Baughan-Johnson-Hirsch combination does not meet the “wave-like” shape requirement for the “bridge structure” in claim 21. I therefore disagree with Petitioner and Dr. Black for claim 21 for this additional reason.

2. Dependent Claims 7, 22-25, and 27-29

237. Petitioner and Dr. Black’s discussion of dependent claims 7, 22-25, and 27-29 of the ‘329 Patent focus on the additional limitations of those claims and

does not address any of the aforementioned deficiencies with respect to the Park, Baughan, Johnson and Hirsch combination. Petition at 111-13, 117-19; Ex. 1003 at ¶¶ 314-17, 334-45. Thus, I disagree with Dr. Black's conclusions for these dependent claims for at least the same reasons as the independent claims from which they depend.

F. Ground 6: Obviousness Based on Black and Zheng (Claims 1-5 and 8)

238. In Ground 6, Petitioner relies on the same § 103 arguments based on Black for claims 1-5 and 8 of the '329 Patent as in Ground 1 and adds an argument that it would have been obvious to modify Black in view of Zheng to include "two walls that are separated for a short distance in the cheek retractor before merging together to form the cheek retractor." Petition at 119; Ex. 1003 at ¶ 346. Because this proposed combination with Zheng does not address Black's failure to disclose the claimed "bridge structure," as I discussed above, I disagree with Petitioner and Dr. Black's arguments for Ground 6 for at least the same reasons I provided for Ground 1.

G. Ground 7: Obviousness Based on Black, Hirsch and Zheng (Claims 6, 7, 9-25 and 27-30)

239. In Ground 7, Petitioner and Dr. Black allege that claims 6, 7, 9-25 and 27-30 of the '329 Patent are obvious based on Black for the same reasons as Ground 2 and additionally argue the same combination with Zheng as in Ground 6.

Petition at 119; Ex. 1003 at ¶ 346. Because this proposed combination with Zheng does not address any of the deficiencies with respect to Black in Ground 2, I disagree with Petitioner and Dr. Black's conclusions for Ground 7 for at least the same reasons I provided for Ground 2.

H. Ground 8: Obviousness Based on Park, Baughan, Johnson, and Zheng (Claims 1-4, 6 and 8)

240. In Ground 8, Petitioner and Dr. Black rely on the same § 103 arguments based on Park, Baughan, and Johnson for claims 1-4, 6 and 8 of the '329 Patent as in Ground 3 and additionally argue that it would have been obvious to modify Park in view of Zheng to include "two walls that are separated for a short distance in the cheek retractor before merging together to form the cheek retractor." Petition at 120; Ex. 1003 at ¶ 347. However, this proposed modification with Zheng does not address the deficiencies discussed above for the Park-Baughan-Johnson combination. Thus, I disagree with Petitioner and Dr. Black's conclusions for Ground 8 for at least the same reasons I provided for Ground 3.

I. Ground 9: Obviousness Based on Park, Baughan, Johnson, Black, and Zheng (Claims 5, 9-20 and 30)

241. In Ground 9, Petitioner and Dr. Black allege that claims 5, 9-20 and 30 of the '329 Patent are obvious based on Park, Baughan, Johnson, and Black for the reasons stated in Ground 4 and also with view of Zheng for the reasons stated in Ground 8. Petition at 120; Ex. 1003 at ¶ 347. Because Zheng does not address

the deficiencies in the Park-Baughan-Johnson combination, I disagree with Petitioner and Dr. Black's conclusions for at least the same reasons I provided above for Ground 4.

J. Ground 10: Obviousness Based on Park, Baughan, Johnson, Hirsch and Zheng (Claims 7, 21-25 and 27-29)

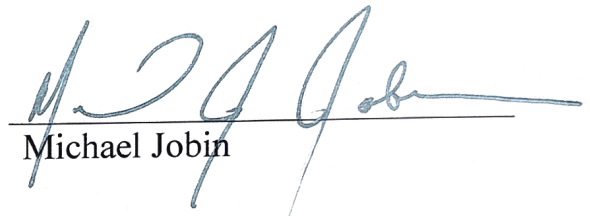
242. In Ground 10, Petitioner and Dr. Black allege that claims 7, 21-25 and 27-29 of the '329 Patent are obvious based on Park, Baughan, Johnson, Hirsch and Zheng and advance the same arguments based on Park, Baughan, Johnson, and Hirsch as Ground 5 and the same combination with Zheng they proposed in Ground 8. Petition at 120; Ex. 1003 at ¶ 347. Because Zheng does not address the deficiencies in the Park-Baughan-Johnson combination, I disagree with Petitioner and Dr. Black's conclusions for at least the same reasons I provided above for Ground 5.

IX. CONCLUSION

243. I reserve the right to modify or supplement my opinions, if necessary, based on further review and analysis of the evidence in this case, including review and analysis of information that may be provided to me subsequent to the date of this Declaration.

I declare that all statements made herein of my own knowledge are true and all statements made on information and believe are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Date: October 15, 2025



Michael Jobin