

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FOX Factory, Inc.,

Petitioner,

v.

SRAM, LLC,

Patent Owner.

U.S. Patent No. 10,328,993 B2

Filing Date: December 30, 2014

Issue Date: June 25, 2019

Title: BICYCLE STEERER TUBE WITH VARIANT STIFFNESS

Case No. IPR2024-00491

DECLARATION OF T. KIM PARNELL

I. INTRODUCTION AND QUALIFICATIONS

1. My name is T. Kim Parnell. I make this Declaration in support of Patent Owner SRAM, LLC's ("SRAM" or "Patent Owner") Response to Petitioner Fox Factory, Inc.'s ("Fox" or "Petitioner") Petition for *Inter Partes* Review ("the Petition") of U.S. Patent No. 10,328,993 B2 ("the '993 patent"). I have personal knowledge of the facts set forth below, and, if called upon as a witness, I could and would testify to such facts under oath.

2. For the reasons stated in detail below, my opinion is that, in view of this Petition, claims 1–4, 6, 8, 10, 12, 14–18, 20, 22, 24, 26–29, 31, 33–38, 40, 42, 44, 46–49, 51, 53, 56–64 of the '993 Patent are valid and patentable.

3. I have been retained by the law firm of Lewis Rice LLC ("Lewis Rice") to provide my technical review, analysis, and opinions concerning the Petition's allegations made against the claims of the '993 Patent. I understand that this patent is owned by SRAM.

4. I am a trained Professional Mechanical Engineer (P.E.) licensed in the State of California. I hold three academic degrees: a B.E.S. in Engineering Science (with Highest Honors) from the Georgia Institute of Technology in 1978, followed by a M.S. and a Ph.D. in Mechanical Engineering from Stanford University in 1979 and 1984, respectively.

5. I am an American Society of Mechanical Engineers (“ASME”) Fellow and an Institute of Electrical & Electronics Engineers (“IEEE”) Life Senior Member. These are the primary professional organizations for Mechanical and Electrical Engineering, respectively. I am a Board Member of IEEE-CNSV (Consultants’ Network of Silicon Valley). I am also a member of IEEE-CT (Consumer Technology), IEEE-VTS (Vehicular Technology Society), and IEEE-EPS (Electronics Packaging Society).

6. I have served as an elected officer for several of these groups including as Chair of the IEEE-SCV (Santa Clara Valley) Section (the largest IEEE Section in the US with over 8,000 members in Silicon Valley, CA), Chair of IEEE-CNSV (Consultants’ Network of Silicon Valley), and Treasurer of IEEE-VTS (Vehicular Technology Society). I am also a long-time Member of ASM International (Materials Information Society) and SAE (Society of Automotive Engineers) International. I joined SAMPE (Society for the Advancement of Materials and Process Engineering) to further expand my experience in the areas of cellular materials and composite materials. I served as Vice-Chair for the NAFEMS-CWG (Composites Working Group), which focuses directly on analysis and simulation of components designed and manufactured to take advantage of the unique material properties that are possible with composites. I am currently Vice-President of the

Silicon Valley Engineering Council (*SVEC-ca.org*), which is an umbrella organization for engineering and scientific societies.

7. I currently work as a private, independent consultant through Parnell Expert Consulting. I consult with companies, including law firms, regarding patents, product liability, failure analysis, reliability, and product design/development issues. I have over 30 years of professional experience using and combining analysis, simulation, and laboratory inspection/measurement to understand and solve engineering problems in a variety of industries and applications. Many of my projects involve products that require a multidisciplinary approach and expertise.

8. I began my professional career at Bell Laboratories (“Bell Labs”) in Indianapolis, IN, in 1978 as a Member of Technical Staff (MTS). I worked at Bell Labs before and while obtaining my Stanford M.S.M.E. degree. Bell Labs supported me for the M.S.M.E. degree, and I returned to continue my career at Bell Labs in 1979. In 1980, I took a leave of absence from Bell Labs and returned to Stanford to pursue a Ph.D. in Mechanical Engineering. I completed my Stanford University Mechanical Engineering Ph.D. degree in 1984. My Ph.D. thesis focused on numerical simulation (computer models) for nonlinear analysis of shell structures. My thesis was motivated in part by issues that I studied while at Bell Labs. The techniques that I developed for nonlinear analysis of shells included the analysis of

snap-through buckling, a technology being incorporated into newer and more reliable keypads in the early 1980s.

9. After graduating from Stanford University, I then joined SST Systems, Inc., a Silicon Valley start-up company, as a Principal Engineer and worked there from 1984-1986. In 1986, I joined Failure Analysis Associates, Inc. as a Senior Engineer in the Mechanics and Materials Department. I was promoted to Managing Engineer in 1990. As Managing Engineer, I worked on a wide range of projects as a consultant including aspects such as cyclic fatigue, product failures, product design, and medical device development. In 1990, the company went public as “The Failure Group,” but subsequently changed its name to “Exponent”. In 1998 I was promoted to Senior Managing Engineer at Exponent. In 1999, after leaving Exponent, I joined Rubicor Medical, Inc. as Director of Research & Development. When I left Rubicor in 2000, I started independent engineering consulting with Parnell Engineering & Consulting. In 2024, I formed a corporation named Parnell Expert Consulting to further focus my consulting practice on litigation. I have been an independent consultant since 2000. During that time, I also worked for MSC Software as a Senior Manager (2006-2010) in software Product Management.

10. From 2010-2012, I was a full-time member of the Mechanical Engineering faculty at Santa Clara University and taught classes in Manufacturing, Material Science, Mechanical Design, Finite Element Analysis (FEA), Composite

Materials, and Design of Mechanisms. During this time, I served as the Faculty Advisor for several Senior Design Projects. These “real world” Capstone Design Projects encompassed design, system integration, and manufacturing aspects and provided the students with a full product development experience. I also taught graduate courses in Mechanical Engineering at Stanford University from 1995-1996.

11. My project work includes studies for a broad range of consumer products, recreational equipment, industrial equipment, and manufacturing methods. I have in-depth experience in composite materials, elastomeric materials, metallic materials, and associated manufacturing methods. Manufacturing methods include techniques for forming, extruding, joining, and other related technologies. My practice encompasses design, failure analysis, and reliability issues. I also serve as an expert witness for litigation, and my expert work often involves intellectual property matters.

12. I have consulted and performed inspections on various types of vehicles (human-powered, electrical propulsion, internal combustion engines (ICE)), as well as other types of equipment, during my career. This work has included projects for metal forming, crashworthiness, ruggedized electronic equipment (such as waterproof laptop and keyboard technology). I have also studied ruggedization of vehicles and mechanical equipment, laptop computers and similar electronic instrumentation to withstand severe service conditions in the field. This experience

further includes analyses of materials and material behavior, including elasticity, flexibility, and impact, as well as expansive experience with polymeric materials and manufacturing methods for all material types.

13. I also have direct experience with manufacturing in multiple industries. These applications include vehicle structures, consumer electronics, biomedical, medical device, automotive, petrochemical, paper, metal forming, metalworking, specialty materials, layered composite materials, and others. Equipment at issue for manufacturing often involves injection molding, metal forming and machining, welding, joining, semiconductor packaging, pipelines and piping components, pressure vessels, sensors, and control systems.

14. Based on my education and experience, I am qualified to provide analysis and opinions on the subjects set forth in this Declaration. I have also attached my curriculum vitae as Appendix A, which, *inter alia*, identifies my prior deposition and trial testimony within the last four years.

15. I am being compensated at the rate of \$650 per hour for my work in this matter, including any time spent at deposition and trial.

16. In reaching the conclusions set forth herein, I examined and analyzed all the exhibits and papers filed in this *Inter Partes* Review. I also relied on my professional experience, education, and expertise accumulated during some four decades of industrial consulting experience. To the extent I am provided with

additional documents or information, I reserve the right to supplement my analysis and provide further opinions.

II. RELEVANT LEGAL PRINCIPLES AND BACKGROUND

17. I am not a lawyer, therefore nothing in my Declaration should be interpreted as offering a legal opinion. However, as a technical expert assisting the Board in evaluating issue of patent invalidity, I have applied legal principles as I understand them.

18. I understand that the claims of a patent set forth the scope of the asserted invention. I also understand that the meanings of the terms of the claims are presumed to be the meanings that the terms would have had to a person of ordinary skill in the art at the time of the invention (“POSITA”) here, i.e., the December 30, 2014, the filing date of the initial ‘993 Patent application. I also understand that the meaning of a claim term may be understood by reference to intrinsic evidence, to include the claims themselves, the specification of the patent (including its figures), and the prosecution file history as the communications between the patent applicant and the patent office. If necessary, I will also refer to extrinsic evidence, such as dictionaries or witness testimony.

19. I understand that the Board has not yet construed any of the claims of the ‘993 Patent, but the Board may establish the meaning of certain terms during this proceeding. I also understand that SRAM and Petitioner have submitted competing

interpretations of certain claim terms from the '993 Patent in the district court proceeding. Ex. 2022. Although I believe that all of SRAM's proposed constructions are correct and consistent with the perspective of a POSITA reading those claims in view of the patent claims, the patent specification, the patent prosecution file history, and relevant extrinsic evidence, I have applied plain and ordinary meaning constructions for the purposes of evaluating validity in the manner set forth below. As set forth below, it is my opinion that the claims of the '993 Patent are valid and not anticipated or obvious. I have applied these understandings below and reserve the right to modify my analysis to the extent the Board adopts any claim constructions that differ from my understanding as a person of ordinary skill in the art.

20. With respect to the question of patent validity, I understand that a patent is only valid when the invention claimed in the patent is new, useful, and nonobvious in light of the prior art, such that the invention, as defined by the patent claims, is not anticipated or rendered obvious by the prior art. I further understand that a patent's claims must meet other statutory requirements, such as written description, enablement, and definiteness.

21. With respect to the term "prior art", I understand that this term generally refers to the state of technology in the relevant field at the time of the invention and includes such printed materials as patents and publications, as well as evidence of

actual uses or sales of a technology within the United States. I also understand that categories of prior art can include, among other things, anything that was patented or described in a printed publication anywhere in the world more than one year before the inventor filed the application for the patent, as well as sales, offers for sale, and uses of the claimed invention prior to the date of that invention.

22. I understand that, under 35 U.S.C. § 102, a claim is “anticipated” by the prior art if each and every limitation of the claim is disclosed and arranged as claimed, expressly or inherently, in a single item of prior art, from which a POSITA could practice the invention without undue experimentation.

23. I also understand that, under 35 U.S.C. § 103, a person cannot obtain a patent on an invention if his invention would have been obvious to a person of ordinary skill in the art at the time the invention was made. A conclusion of obviousness may be founded upon one or more items of prior art. In determining whether prior art references render a claim obvious, the following factors are considered: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; (3) the level of skill in the pertinent art, and (4) objective evidence of nonobviousness.

III. TECHNICAL OVERVIEW OF THE INVENTIONS OF THE ‘993 PATENT

24. The ‘993 Patent discloses improvements to a steering tube or “steerer tube” component of a bicycle fork.

A. Steerer Tubes

25. Many, many years ago, centuries ago, in fact, the precursors to bicycles were conceived. These vehicles were known as celeriferos or velocipedes. These vehicles had two rigidly mounted wheels with no steering inputs. It was not until the front wheel was capable of being turned that the velocipede, or what we know of today as a “bicycle”, began to gain some worldly popularity.

26. A steerer tube is a key component of a bicycle fork. Typically, a steerer tube is a hollow tube that runs through the head tube of a separate bicycle frame and is used to provide steering for the bicycle fork. The steerer tube is typically attached at one end to a crown or bridge. The crown or bridge is usually attached to a pair of fork tubes, also known as stanchions, which support a wheel. The wheel is supported by an axle that spans between the stanchions. The other end of the steerer tube is usually attached to one end of a fork stem, with the other end of the fork stem attached to a set of handle bars. The steerer tube is usually made of steel, aluminum, or carbon fiber.

27. Further, the steerer tube typically secures the bicycle fork to a bicycle frame via a head tube of the bicycle frame. Between the steerer tube and the head tube is some means for allowing the steerer tube to rotate relative to the bicycle frame about an axis that extends through the center of the steerer tube's cross section. The means for allowing rotation is typically a headset that includes a pair of bearings. The steerer tube rotates relative to the bicycle frame to assist in any directional change for the related bicycle. As a practical result of these turning maneuvers, the steerer tube experiences significantly different torsional and fore-and-aft forces compared to the primarily vertical forces caused by the rider's weight impacting the bicycle frame.

28. Overall, the steerer tube is an important component of any bicycle fork and related bicycle. The steerer tube allows the wheel and handlebars to be securely attached to the frame, while also facilitating steering of the completed bicycle. The construction, shape, and sizing of the steerer tube can have a significant impact on the performance of the completed bicycle. This rider-actuated steering ability is central to the functioning of a bicycle as we now know it today.

B. Prior Steerer Tubes

29. A typical steerer tube before the '993 Patent had a uniform thickness, which means symmetrical reinforcement around the circumference of the steerer tube. According to the '993 Patent, this symmetrical construction does not provide

an optimal design solution. Overall, the '993 Patent shows that the steerer tube can be tapered and/or have wall thickness that is not uniform around the circumference or along the length of the tube. For the steerer tube, fore-aft loads are typically more significant than lateral or vertical loads. Recognizing this, the '993 Patent's inventors presumably sought to develop greater strength and load capacity where needed in the fore-aft loading directions (the forward and backward directions) while optimizing the amount of material (thus weight) of the steerer tube. The '993 Patent thus provides designs that allow for optimal solutions to this design problem: the optimal balance of strength/stiffness in the primary load direction and overall minimum weight.

30. Bicycles rely on steerer tubes to do what the term says: steer bicycles. Bicycles are typically steered by the rider using a handlebar that is rigidly fixed to a front wheel via a steerer tube. By turning the handlebars, the steerer tube is also turned, along with the front wheel. Ex. 1001 ('993 Patent), 1:6–32. The steerer tube is rotatably connected to the bicycle frame via the head tube of the frame.

31. While the rider sits on the bicycle frame, the frame experiences significant forces in the up-and-down direction. For example, when a rider experiences rough and/or hilly terrain, the rider's weight creates various forces, the vast majority of which are directed downward with the direction of gravity. On the other hand, the steerer tube experiences different significant forces in the fore-aft

direction, due to its orientation in space and the tendency for bicycles to travel in the fore-aft direction.

32. Conventional steerer tubes were circularly cylindrical tubes having a uniform wall thickness across their cross sections, even when reinforced with butted tubes. The designs that came before the '993 Patent had performance drawbacks in strength, stability, comfort, and steering. The '993 Patent explained:

Many conventional steerer tubes are circularly cylindrical. A perfectly cylindrically circular steerer tube, having a uniform wall thickness, will exhibit a uniform stiffness longitudinally, or fore-and-aft and in alignment with plane of travel P, and laterally, or side-to-side and perpendicular to plane of travel P and axis X. But uniformly thick and stiff steerer tubes do not take into account the differences in loads on the steerer tube and stability, comfort and steering requirements.

Ex. 1001 ('993 Patent), 1:34–42.

33. Some bicycle forks before the inventions claimed in the '993 Patent included modifications that would allow the steerer tube to be more flexible in the fore-aft direction while also being stronger in the lateral, side-to-side direction. Moechnig, discussed further in this Declaration, shows this focus in the art before the advent of the inventions of the '993 Patent.

C. Moechnig Teaches That the Maximum Rigidity, Stiffness, and Strength of the Bicycle Steerer Tube Should Be in the Lateral Direction, Not the Fore-and-Aft Direction of the Bicycle's Plane of Travel.

34. Petitioner's primary modifying prior art reference for all of its proposed combinations in each of Grounds 1 through 4 is Moechnig. Petitioner apparently offers Moechnig for its teachings of a bicycle steering tube having a steering axis located in a vertical plane of the bicycle's travel. Rather than supporting Petitioner's hindsight-based Grounds, Moechnig teaches that a POSITA would orient a bicycle steerer tube in a manner that contradicts the stated motivations for and obviousness of Petitioner's same hindsight-based Grounds.

35. Moechnig is directed to a steerer tube, albeit to an entirely different tubing structure compared to the inventions of the '993 Patent. First and foremost, Moechnig does *not* disclose a varying wall thickness for the interior or exterior of the steerer tube body

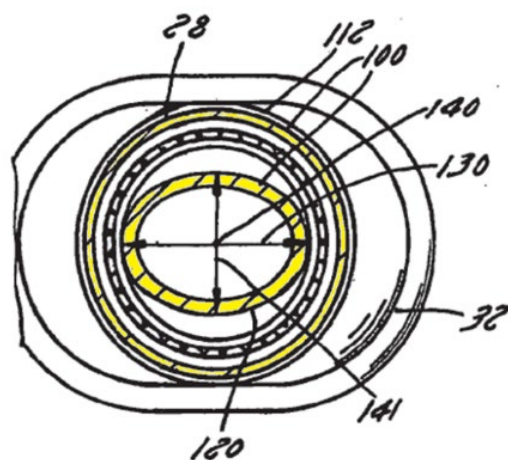


FIG. 4

100. See, e.g., Ex. 1008 (Moechnig), FIGS. 4–6 (showing equal wall thicknesses). An annotated version of Moechnig's Figure 4 is shown here, with the yellow highlights showing the constant wall thicknesses for steerer tube body **100**. *Id.*, FIG. 4.

36. Further, Moechnig's explicitly stated goal is to decrease fore-aft rigidity, stiffness, and strength, as opposed to increasing each of those aspects as taught and shown in the '993 Patent. *Id.*, [0006]–[0010], [0049]–[0050]. I note that, Moechnig was already considered and overcome during the '993 Patent's prosecution for these very reasons. Ex. 1002, 180 (Examiner accepting Applicant's arguments directed to Moechnig), 185–187 (Applicant's arguments directed to Moechnig).

37. Moechnig explains the importance of directionality relating to the bicycle steerer tube to a POSITA in its written description. Specifically, Moechnig states in its Paragraph 0005:

During riding, although the front wheel can be subjected to loading in a variety of radial directions, these loading [sic] are commonly directed in a longitudinal and a lateral direction. As used herein, the longitudinal direction generally refers to directions aligned with a longitudinal axis or a direction of travel of the bicycle. Understandably, the longitudinal direction includes both generally forward and generally rearward directions, or the fore and aft directions, relative to the longitudinal axis of the bicycle. The lateral directions refer to the generally right and generally left directions relative to the longitudinal axis of the bicycle. That is, the generally

opposite left and right sides of the bicycle as compared to the forward and rearward portions of the bicycle.

Ex. 1008 (Moechnig), [0005].

38. Moechnig continues on to explain that an “increase in the fore and aft rigidity of the steerer assembly detrimentally affects the fore and aft stiffness performance of the steering assembly by communicating greater amounts of the fore and aft directed loading of the front wheel to the rider.” *Id.*, [0008]. “As such, such systems adversely affect rider comfort by communicating a greater amount of road bumps and/or impacts to the hands of the rider.” *Id.*

39. Thus, Moechnig’s stated goal is to have less rigidity in the fore-aft direction (i.e., in the direction of the bicycle’s travel) and a more rigidity in the lateral direction for the steerer tube:

Decreasing the fore-aft stiffness of the steerer assembly 16 provides two distinct advantages as compared to prior art steerer tube assemblies. A first advantage is a decrease in the amount of force that is transmitted to the rider therein increasing the comfort level associated with the use of bicycle 10. A second advantage is the distribution of the load associated with testing and/or frontal impacts over a greater duration of an impact or deflection event. ***The increased compliance of steerer assembly 16 to fore and aft loading reduces the peak load that must be accommodated by steerer assembly 16 and the other***

structural members of the fork and bicycle assembly.

Accordingly, steerer assembly **16** can be constructed in a lightweight manner capable of withstanding the fore and aft impact loading as compared to heavier steerer assemblies or constructed to provide greater fore and aft impact performance as compared to steerer assemblies of comparable weight....

With respect to lateral [i.e., side-to-side] stiffness performance, the lateral stiffness performance of a bicycle steerer assembly can be correlated to the steering responsiveness. That is, rather than deflecting or rotating when subjected to a steering instruction input, most riders prefer a more rigid lateral interaction with the steerer assembly.

Id., [0049]–[0050] (bold and italics emphasis added).

40. In other words, a POSITA reviewing Moechnig for its teachings regarding the proper orientation of an asymmetrically stiff steerer tube would understand that the POSITA's focus would be on *decreasing* fore-aft rigidity, stiffness, and strength and *increasing* the same rigidity, stiffness, and strength in the lateral direction.

D. Steerer Tubes of the '993 Patent

41. The '993 Patent's inventions address these prior art problems. Specifically, the '993 Patent discloses steerer tubes that have greater wall thickness

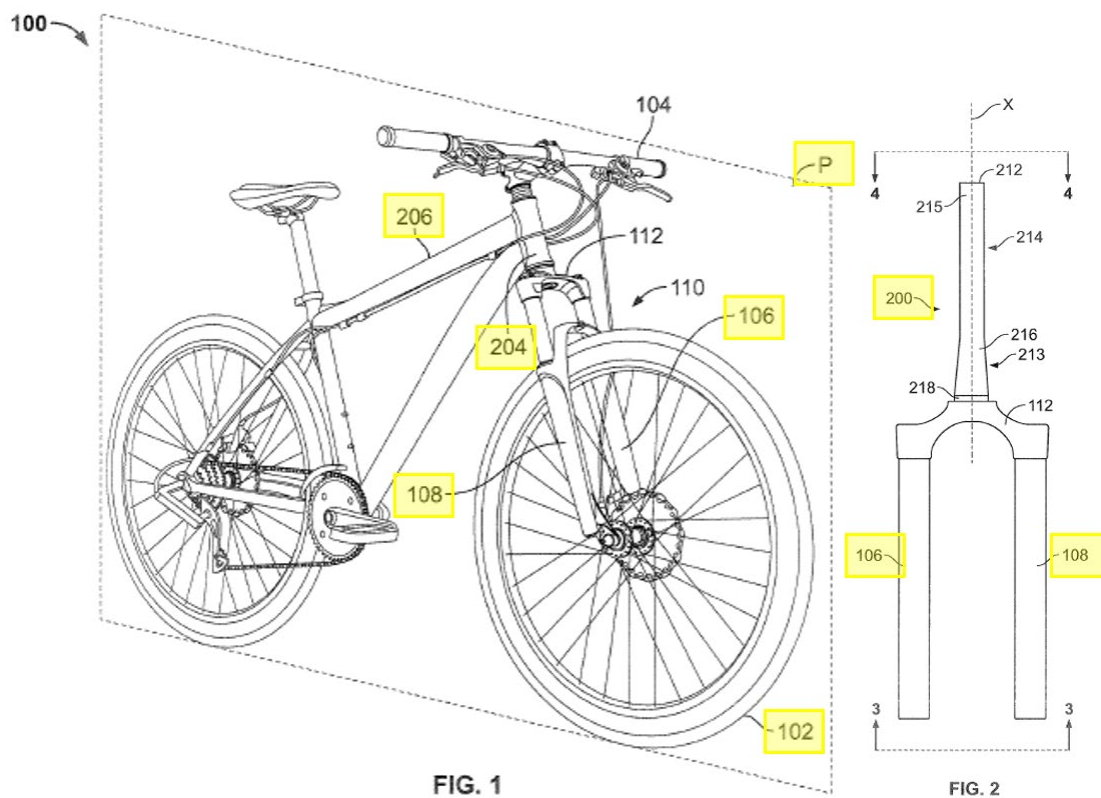
in the fore-aft direction, while having lesser wall thickness in a perpendicular direction. The '993 Patent explains: "Steerer tubes according to the invention have a large stiffness and strength in the fore and aft plane of travel of the bicycle. But since side bending stiffness isn't as critical due to lighter side loads, the wall thickness outside of the plane of travel may be reduced. This permits a lighter weight steerer tube that nonetheless meets all loading requirements." Ex. 1001 ('993 Patent), 2:4–9.

42. The inventions of the '993 Patent provide steerer tubes unlike any that preceded them, with steerer tubes which improve both strength and weight considerations. Specifically, the '993 Patent orients the steerer tube so that the wall thickness of the steerer tube is greatest in the portions of the steerer tube that are directionally aligned with the direction of the bicycle's travel. By orienting the steerer tube's material in this fashion, the steerer tubes of the '993 Patent have an increased stiffness in the fore-aft direction (which is aligned with the direction of travel for the bicycle).

43. In one embodiment, the '993 Patent creates this wall thickness orientation, and benefits that follow, by forming a portion of the interior cross-sectional shape of the steerer tube with an elliptical shape (though other shapes could be used). The combination of the elliptical interior surface shape and the circular exterior surface shape results in the wall thickness of the steerer tube being

at a maximum in the fore-aft direction (which is in the plane of travel of the bicycle), while at a minimum in the perpendicular direction (which is the side-to-side direction). *Id.*, 7:57–65.

44. Figures 1 and 2 of the ‘993 Patent show a bicycle frame **206** including a head tube **204** that is designed to house a steerer tube **200**. The steerer tube **200** is connected to the fork tubes **106**, **108** via a crown **112**, and the fork tubes **106**, **108** are connected to the front wheel **102**. Most of these components participate in steering the front wheel **102**. Figures 1 and 2, shown below, illustrate many of these components in the ‘993 Patent:



Ex. 1001 (‘993 Patent), FIGS. 1–2.

45. The plane of travel extends through the bicycle and the steering axis X of the steerer tube **200**. For example, Figure 3 of the '993 patent shows the plane of travel (**P** in the image below) extending through the steering axis of the steerer tube **200**:

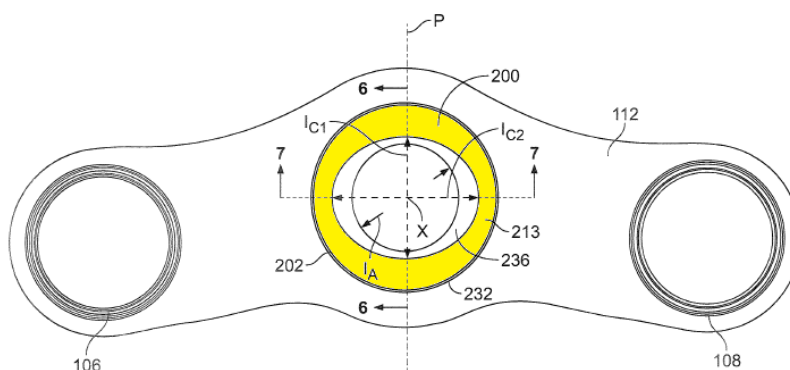


FIG. 3

Ex. 1001 ('993 Patent), Fig. 3. As shown in Figure 3 above with the steerer tube wall colorized in yellow, this asymmetric shaping, coupled with a circular outer cross-sectional shape, results in the wall thickness of the tubing being at a maximum in one direction (fore-and-aft, shown by the plane of travel **P** above), while at a minimum in the perpendicular direction (side-to-side). *Id.*, 7:57–65.

46. An element in the claims of the '993 Patent that helps to capture the benefits of the '993 Patent includes the following, recited in each of Independent Claims 1, 61, and 64 of the '993 Patent: “the body [of the bicycle steerer tube] formed by a wall, a thickness of the wall at any point in the lower section of the body varying as a function of the cross-sectional angle of the point relative to the plane of

travel, the wall thickness being at a maximum in the plane of travel of the bicycle.”
Ex. 1001 (‘993 Patent), 8:15–19 (claim 1), 12:9–13 (claim 61), 12:39–43 (claim 64).

47. Further, I note that there are many benefits that follow forks that use steerer tubes in accordance with the element of Independent Claims 1, 61, and 64 discussed above. For example, there will be increased stiffness in the fore-to-aft direction of the steerer tube, and related fork, when compared to steerer tubes having a lesser wall thickness in the fore-to-aft direction. Moreover, the overall weight of a steerer tube may be reduced for any given fore-to-aft stiffness. Importantly, reduced weight matters in the bicycle field. Typical bicycles are human-powered, which generally means that the rider wants the bicycle to weigh as little as possible. Less weight makes riding the bicycle easier and more energy efficient. *See* Ex. 1001 (‘993 Patent), 2:4–9.

48. In some embodiments, designers may mix and match these weight savings and strength benefits, allowing more degrees of freedom when designing new bicycles and bicycle forks. For example, as shown in various embodiments and claims of the ‘993 Patent, the steerer tube can vary in its internal wall thickness throughout the length of the steerer tube, reducing overall weight while increasing strength and stiffness of the steerer tube in the direction of the bicycle’s plane of travel.

49. An additional, and very practical, benefit is that when the outer shape of the external surface of the steerer tube is circular, typical and common circular bearings may be used when the steerer tube is integrated into a bicycle frame. The uses of common, standard bearings can reduce costs considerably. *Id.*, 1:22–26, FIGS. 1, 3–4.

E. The Design Considerations for a Bicycle Steering Tube Are Entirely Different From Those for the Bicycle Frame and Its Tubular Components.

50. The ‘993 Patent distinguishes the bicycle frame **206** from the steerer tube **200** because these portions of the bicycle have entirely different design considerations. This is made clear in the prior art. For example, the bicycle frame **206** itself must first and foremost manage the rider’s weight as the rider sits on top of the frame. Ex. 1006 (German Patent Application No. DE19629740A1 to Denk (“Denk”)), Col. 2. *See also* Ex. 2019 (Slocum Depo.), p. 93, lines 11–22 (Dr. Slocum admitting that the discussion in Denk’s column 2 related to bicycle frames). In contrast to the tubes of the bicycle frame, the steerer tube **200** and fork **110** are oriented in nearly a perpendicular direction to the plane of the bicycle frame, as shown in Figure 1 of the ‘993 Patent, which is reproduced above. As a result of these, and other, differences weight concerns vary due to the differing forces incident on the bicycle frame compared to those acting on the bicycle steerer tube and fork. *E.g.*, Ex. 1006 (Denk), Col. 2 (discussing differences between vertical forces on

bicycle frame caused by rider weight compared to forces associated with forward movement, such as “negotiating a curve” and “straight-ahead travel”); Ex. 1008 (U.S. Patent Application Publication No. 2010/0259028 A1 to Moechnig (“Moechnig”)), [0005] (noting that “[d]uring riding, although the front wheel can be subjected to loading in a variety of radial directions, these loading [sic] are commonly directed in a longitudinal and a lateral direction.”)

51. Further, the bicycle fork **110** is designed to rotate around an axis **X** that is concentric with the head tube **204**. The bicycle frame **206**, however, travels in what the ‘993 patent refers to as a plane of travel **P**, which is illustrated in Figure 1 above. The fork **110** serves as a pivot point for the bicycle frame **206**, allowing a rider of the bicycle frame **206** to turn left or right by manipulating a rider-operated handlebar **104**. Twisting the handlebar **104** of the fork **110** around the steering axis **X** causes the fork **110** to rotate around the same steering axis **X**. This, in turn, rotates the wheel **102** out of the plane of travel **P**. During this rotational change, the wheel **102** exits the plane of travel **P**, changing the travel direction. As a result, the plane **P** shifts with the travel direction, and the frame **206** is brought into a new direction of travel. Ex. 1001 (‘993 Patent), 1:8–31.

52. Due at least in part to these differences discussed above, the makers and designers of bicycle frames and bicycle steerer tubes/forks are nearly always unrelated parties, especially for offroad bicycles. *See, e.g.*, Ex. 2008 (showing

NOMAD bicycle frame designed by Santa Cruz featuring a RockShox Zeb fork, two unrelated companies); Ex. 2016 (showing HIGHTOWER bicycle frame designed by Santa Cruz featuring a RockShox Lyrik fork, two unrelated companies); Ex. 2017 (showing that Trek does not consider the fork to be a part of a frame). In other words, a bicycle steerer tube and fork have different considerations compared to the bicycle frame because each bicycle component is subjected to significantly different forces during use. For example, bicycle frames are designed for loads and related forces that occur in the vertical (up-to-down) direction. On the other hand, bicycle steerer tubes and forks are designed with loads and related forces in the fore-and-aft direction (and to some extent, the side-to-side direction and a twisting torque). This is because gravity is the main force at issue for a bicycle frame (which force acts in the up-to-down direction), whereas the velocity of the bicycle and its related momentum are the main factors at issue for a bicycle steerer tube and fork (which forces act in the fore-and-aft direction), along with torque forces around the steering axis for steering inputs and wheel deflections. Further, Dr. Slocum agrees that the bicycle steerer tube is not part of the bicycle frame and further is separate and distinct from the bicycle fork legs. Ex. 2019 (Slocum Depo.), p. 46, line 24–p. 52, line 8; *id.*, p. 54, line 19–p. 57, line 16; *id.*, p. 59, lines 4–17; *id.*, p. 63, lines 5–20; *id.*, p. 66, line 21–p. 67, line 14.

53. Before the ‘993 Patent, bicycle fork designers had two overarching considerations: (1) flexibility in the fore-and-aft direction provided shock absorption and compliance that would improve the rider’s comfort while the bicycle frame rode over rough terrain, and (2) stiffness in the side-to-side direction provided increased responsiveness of the fork to torque inputs by the rider at the handlebar, resulting in improved steering ability for the rider. *See* Ex. 1008 (Moechnig), [0009], [0049], [0050].

54. The ‘993 Patent improves bicycle steerer tube technology by going against the teachings of the prior art and **increasing** the stiffness of the steerer tube and fork in the fore-and-aft direction. The ‘993 Patent further explains that this form of strengthening may also reduce the weight of the relevant steerer tube, which would reduce the weight of the related fork and bicycle. Ex. 1001 (‘993 Patent), 2:4–9; 7:57–65. Thus, the ‘993 Patent uniquely discloses both strengthening the steerer tube in the fore-and-aft direction and reducing its overall weight, as shown in a variety of different embodiments throughout the patent. *Id.*; *see also id.*, FIGS. 2, 12, 13, 19, 25, 31.

55. The Petitioner does not appear to consider these issues, which a POSITA would consider, when looking at frame and fork constructions. Additionally, the Petitioner tends to generalize the ‘993 Patent’s disclosure in an effort to apparently support its unreasonable prior art combinations. But the

inventions of the '993 Patent provide clear advantages over the known prior art, especially those prior art references in this matter. In the end, it is clear that a POSITA would not have derived the inventions claimed in the '993 Patent at least because the '993 Patent's teaching were unconventional at the time and went directly against the teachings of Petitioner's main steerer tube reference, Moechnig (Ex. 1008).

F. No Claim Construction Is Needed for the '993 Patent Claims.

56. I agree with Petitioner that the '993 Patent's claim terms do not require special claim construction for purposes of denying this Petition. *See* Petition, 8–9.

G. The Level of Person of Ordinary Skill in the Art Requires Experience in the Design of Vehicle Components or Like Technology.

57. I agree with SRAM that, here, a POSITA is more appropriately connected to, and considers the particularities of, vehicle component and like design. Specifically, one of ordinary skill in the art at the time of the '993 Patent may include a person with a degree in Mechanical Engineering and approximately three years' experience in vehicle component design and like technology, or a Master's degree or higher in Mechanical Engineering with experience in design of vehicle components or like technology.

58. I have held a Ph.D. in Mechanical Engineering for thirty (30) years prior to the filing of the ‘993 Patent, and I have had extensive experience in the design of vehicle components and/or like technology as of 2014.

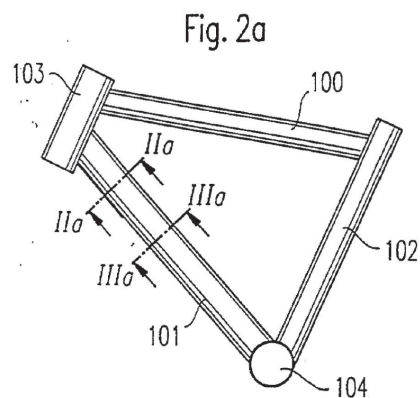
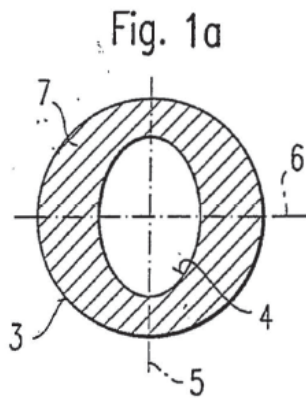
IV. WHY THE CLAIMS OF THE ‘993 PATENT ARE VALID

A. Independent Claims 1, 61, and 64

59. As an initial matter, I note that the Petitioner does not allege that any Grounds or prior art reference anticipates any claim of the ‘993 Patent. In fact, the ‘993 Patent claims a structural arrangement that never existed before the ‘993 Patent, the structural arrangement being one that is not found in the prior art, especially the prior art involved in this matter. *See* Ex. 2019 (Slocum Depo.), p. 22, line 18–p. 23, line 4.

1. Denk Does Not Disclose Using Denk’s Frame Component as a Steerer Tube

60. Denk does not disclose or suggest a “steerer tube for a bicycle” Ex. 1001 (‘993 Patent), Claims 1, 61, 64. *See* Ex. 2019 (Slocum Depo.), p. 80, line 9–p. 87, line 25. Instead, Denk discloses improvements to be made to a typical **bicycle frame**. Ex. 1006 (Denk), FIGS. 2a, 2b, and 2c. Specifically, Denk discloses reinforced tubing to replace “lightweight components for **bicycle frames**.” *Id.*, Col. 1 (emphasis added). A bicycle frame is illustrated in Denk’s Figure 2a, shown below, with one example of Denk’s frame component shown in Figure 1a:



Id., Figs. 1a, 2a. Nowhere does Denk disclose or suggest that its lightweight tubing would be used as a substitute for a bicycle's steerer tube connected between the bicycle handlebars and front fork (not shown as part of Denk's bicycle frame in the figures above), which steerer tube experiences an entirely different set of forces compared to the bicycle frame itself.

61. Bicycle frames and steerer tubes have differing considerations that tend to make the considerations for tubing for frames different from those for tubing for steerer tubes. This is mainly because a steerer tube, when compared to a frame tube, is (1) oriented differently in space than frame tubes; (2) stressed during use at both ends and at the junction with the frame's head tube or the bearings therein; and (3) subjected to more twisting torques (also known as torsional forces), along with side-to-side torques.

62. First, a steerer tube is oriented in a substantially vertical direction during use with a bicycle frame. Although some portions of a bicycle frame, such

as the seat tube, are also oriented vertically, steerer tubes experience stresses not just at the end of the tubing, but also at the points where the steerer tube interacts with the headtube of the relevant bicycle frame. Further, Valat discloses that steerer tubes are subjected to high shear forces, especially near the interface between the steering tube and the crown/bridge of the fork. Ex. 1007 (Valat), 1:15–18, 1:44–51; Ex. 2019 (Slocum Depo.), p. 119, line 2–p. 120, line 16. Significant twisting torques, which are caused by the interaction between the rider using the handlebar to steer the relevant bicycle and the ground surface urging the wheels to turn in either direction, also occur about the rotational axis of the steerer tube. *See, e.g.*, Ex. 2020 (Baltaxe), Abstract, [0001]–[0009] (explaining that fork twisting, which twists the steerer tube, is a significant consideration).

63. On the other hand, Denk uses its frame component to reinforce a bicycle frame. Denk emphasizes this limited use when discussing how the bicycle frame experiences forces from the rider in the vertical direction relative to the frame (designated by numeral **6** in Fig. 1a above), rather than the plane of travel of the bicycle itself:

A consideration of the load on a *bicycle frame*, for example, shows that particularly high loads occur in the vertical plane of the frame, *since the weight of the rider acts essentially in the vertical direction*, and the impact

loads acting on the front and rear wheel likewise essentially occur within a vertical plane.

Ex. 1006 (Denk), Col. 2 (emphasis added).

64. Thus, Denk is concerned with issues specific to frames. And as discussed above, those issues are not applicable to a steerer tube, and as a result, a POSITA would not use Denk's frame component as a steerer tube. In fact, Denk fails to consider the lateral (side-to-side), longitudinal (fore-aft), and torsional (twisting along the length of the tube) forces that are constantly trying to deform a steerer tube. Denk is explicit that the reference is ignoring these other forces in order to focus only on those forces that are derived from gravity pulling the rider down on top of the relevant bicycle frame. It is unreasonable to state that Denk is concerned with these other forces when Denk explicitly states that they are to be ignored. *See* Ex. 1006 (Denk), Col. 2 (stating that "high loads ... since the weight of the rider acts essentially in the vertical direction" and ignoring loads "that occur when negotiating a curve" or "during pedaling").

65. Although Denk discusses using its frame component for "fork tubes," Denk fails to provide any specificity. As discussed above, a POSITA would not consider using a frame component for a steerer tube. The considerations for fork blades, or the "fork tubes" that support the bicycle's front wheel, are more similar to those of a bicycle frame. Further, the image featured on page 13 of the Petition

appears to be created by the Petitioner as a juxtaposition of figures from two separate references, annotated as if they are from the same reference. This shows the Board that it has used the '993 Patent's disclosure as a guide to recreate the inventions of the '993 Patent in its Grounds. This is hindsight. While Petitioner would like to ignore reality, a POSITA would not consider using a frame component as a steerer tube. Thus, a POSITA might use Denk's frame component for fork blades, but not a steerer tube.

66. For all of the reasons discussed herein, a POSITA would not use Denk's frame component as a steerer tube, and a POSITA would not use Denk's frame component as a stand-in for Valat's steerer tube. Denk does not disclose a steerer tube, and steerer tubes are not frame tubes. As a result, Petitioner's use of Denk in Grounds III and IV go against the knowledge of a POSITA at least because a POSITA would not use Denk's frame component as a steerer tube. *See also* Section III.

67. Accordingly, Petitioner fails to show that Denk, alone or in combination with Valat, discloses or suggests using its frame component as a steerer tube. As a result of lacking this claim element, all Grounds fail to show that any of the '993 Patent Claims are unpatentable.

68. Further, it is worth noting that Denk does not specifically disclose a steerer tube. Denk does state that its frame tubing may be suitable for "practically

all tubular components” of a bicycle, the items listed in Denk do not include a steerer tube: “top tube, down tube, seat tube, head tube, fork tubes, rear wheel stay, seat posts, handlebars, handlebar stem, and the like[.]”. Ex. 1006, col. 4. Further, Dr. Slocum stated during his deposition that non-frame “fork tubes” refer to the fork legs that hold the front wheel, but not to the overall fork itself, and have force considerations more similar to those of a bicycle frame. *See* Ex. 2019, p. 66, line 21 to p. 68, line 12; *id.*, p. 122, line 17–p. 123, line 5.

2. A POSITA would not have altered Denk’s frame component to be a steerer tube

69. Petitioner’s sole reason for altering Denk to be a steerer tube is “because it would have the known advantages of reduced weight and improved mechanical strength.” Petition, 16. This conclusory statement is without merit. Specifically, Denk’s frame component is not lighter nor stronger than any particular steerer tube. Neither Denk nor Petitioner provide any data from which a POSITA could extract such a pronouncement. Denk’s frame component may be made to be heavier and weaker than another steerer tube because the weight and strength of such a steerer tube is dependent on many, many factors beyond the shape of the tubing. Moechnig’s disclosure of a steerer tube does not indicate that Denk’s frame component is light or mechanically strong. Petitioner’s conclusory remarks made without any explanation should be rejected.

3. Denk Fails to Disclose a Steerer Tube Oriented With Its Maximum Thickness in the Direction of Travel

70. All Grounds rely on Denk for this feature. Petition, 23–26, 48, 64–68, 83. But Nothing in Denk suggests such an orientation. Further, Petitioner’s arguments to recreate Patent Owner’s claims though hindsight are legally and technically invalid.

71. Petitioner relies solely on Denk and Dr. Slocum. Specifically, Petitioner argues that because Denk suggests orienting its frame component so that the thickest wall portion is in the vertical direction. A POSITA would understand this to mean that when using Denk’s frame component as a steerer tube a POSITA would arrange to have the maximum thickness in the bicycle’s direction of travel. *See, e.g.*, Petition, 25–26; Ex. 1003 (Slocum), ¶57. Petitioner’s argument is not in accordance with Denk’s disclosure.

72. Instead, Denk suggests orienting its frame component as a tube within the frame of a bicycle, wherein the maximum thickness of the wall of Denk’s frame component is aligned with the vertical direction. Specifically, Denk explains “that particularly high loads occur in the vertical plane of the frame, *since the weight of the rider acts essentially in the vertical direction[.]*” Denk, Col. 2 (emphasis added). Denk explains that all forces in other directions, such as in the direction of

travel, “are lower than the forces occurring in the *vertical direction*.” *Id.*, Col. 2.

Denk focuses on its desire for strength in the vertical direction:

The design according to the invention now allows the cross section of the tubular portion of the lightweight component to be designed in such a way that the force absorption capability of the components of a bicycle frame *in the vertical frame direction* is greater than in an arbitrary orientation perpendicular to this plane. As a result, for the same overall strength and rigidity, the weight may be reduced, or for the same weight, the strength and rigidity may be significantly increased *in the load direction specified by the design*.

Id., Col. 2 (emphasis added). Denk is otherwise silent regarding how its frame component might be oriented in a bicycle frame. In fact, Denk explicitly states that Denk only considers these vertical forces, to the exclusion of all others. See Ex. 1006 (Denk), Col. 2. A POSITA would understand that a steerer tube experiences a unique and special set of forces that are not relevant to the forces existing in the vertical direction of a bicycle frame, rendering Denk particularly not useful in the design of steerer tubes.

73. Thus, Denk is not concerned with forces in the fore-aft direction. Petitioner and Dr. Slocum go as far as stating, without proof, that “Denk further discloses that bicycle frames ... need to have high strength and rigidity, particularly

in the vertical plane of the frame where high loads occur during use to prevent undesirable bending or fracturing of the steerer tube during rides.” Petition, 14; Ex. 1003, ¶57 (same). However, Denk does not discuss steerer tubes and does not suggest that steerer tubes are stressed in any particular plane. Petitioner and Dr. Slocum’s *self-serving* statements have no support in the evidence or exhibits in this matter.

74. In addition, forces existing in the vertical direction are somewhat irrelevant to a steerer tube because the tube is essentially arranged to have its lengthwise direction oriented along the vertical direction, which lengthwise direction is typically the greatest strength direction of a tube. As shown in Figure 1 of the ‘993 Patent above, the steerer tube is only slightly out of line with the vertical direction. As a result, Denk’s discussion of reinforcing the vertical direction is meaningless to the orientation of a steerer tube. And it is clear that Petitioner’s reliance on Denk is misplaced. Thus, Denk fails to disclose orienting any steerer tube to have its maximum wall thickness oriented in the direction of travel.

75. The Petition provides no other evidence that Denk would be, or is, oriented to have its maximum wall thickness oriented in the direction of travel. As discussed immediately above, the only support Petitioner relies upon is its incorrect reading of Denk and the conclusory statements of Dr. Slocum. *See, e.g.*, Petition, 13–16, 25–26; Ex. 1003 (Slocum), ¶¶89–92. But Denk fails to suggest

orienting a steerer tube in any case, much less to have the maximum wall thickness oriented in the direction of travel.

4. The Petition's Rationale for Orienting Denk's Component to Have Its Maximum Thickness in the Direction of Travel Is Technically Incorrect

76. The Petition rests its obviousness combination in all Grounds on Denk supplying the rationale to combine and amend Denk's own disclosure, along with conclusory remarks made by Dr. Slocum. Petition, 15–16, 25–26. Nothing else is proffered to support Petitioner's argument that “a POSITA would have known to ... position the areas of maximum cross-sectional thickness of the steerer tube in the vertical plane of the bicycle frame—i.e., the plane of travel of the bicycle[.]” Petition, 15. However, as discussed above, vertical loads are very relevant to a bicycle frame but irrelevant to a bicycle steerer tube because the steerer tube is oriented in space in a way that maximizes vertical strength. Further, the prior art involved in this matter contradicts Petitioner's argument that the highest and most concerning loads occur in the fore-aft direction of travel.

77. Instead, the prior art involved in this matter explains that steerer tube designers were most concerned with lateral loading before the advent of the '993 Patent. For example, Moechnig, relied upon by Petitioner in every Grounds, includes an elliptical-shaped steerer tube with the maximum tube strength oriented perpendicular to the direction of travel, which is the side-to-side or lateral direction.

This shape “provides lateral stiffness to the wheel assembly and ... accommodates longitudinal[, or fore-aft direction,] impact absorption of the fork and wheel assembly.” Ex. 1008 (Moechnig), Abstract. Moechnig explains that increasing strength in the fore-aft direction is undesirable because there would be an increase in fore-aft stiffness, which is, in turn, undesirable because the increased stiffness communicates forces from the fork to the rider’s hands. *Id.*, [0004], [0008]. Moechnig goes as far as proclaiming that “[d]ecreasing the fore-aft stiffness of the steerer assembly **16** provides two distinct advantages as compared to prior art steerer tube assemblies[,]” decreasing the amount of force transmitted to the rider’s hands and better distributing the loading of impacts over time to reduce the peak loads experienced by the steerer tube. *Id.*, [0049]. As a result, the prior art unmistakably held that a steerer tube with a minimum strength (which could be set by thickness) in the fore-aft direction is “capable of withstanding the fore and aft impact loading as compared to heavier steerer assemblies or constructed to provide greater fore and aft impact performance as compared to steerer assemblies of comparable weight.” *Id.*

78. Petitioner and Dr. Slocum, however, directly contradict the prior art involved in this matter by stating that a POSITA would orient Denk’s frame component in the opposite manner. *See* Petition, 15, 25; Ex. 1003 (Slocum), ¶¶46, 59, 89–92. Accordingly, for all of the reasons discussed above, no evidence or prior

art exhibit involved in this matter teaches or suggests orienting any tubing so that the maximum wall thickness is oriented in the direction of travel.

79. Moreover, Petitioner alleges that a POSITA would combine Denk with Moechnig for the purported “advantages of improved mechanical strength and reduced weight”. Petition, 13–14, 16; Ex. 1003, ¶57. But I found that Petitioner does not provide any analysis of the proposed combination beyond these bare conclusions.

80. As a POSITA would understand, weight and strength have long been primary factors in the construction of bicycles and bicycle components. But what Petitioner fails to provide is any evidence or discussion regarding Petitioner’s proposed modifications to Denk’s tubular frame component that would result in reduced weight or added strength when used as a steerer tube. For example, Denk itself provides no indication that it’s frame component would be more lightweight than a standard steerer tube with equal wall thickness and a circular profile, or even weigh less than the “lightweight” Moechnig reference itself. It is my opinion that Petitioner and Dr. Slocum are merely speculating as to any purported reductions in weight or improvements to strength. Petitioner and Dr. Slocum provide no explanation, nor do they cite to any evidence or analysis. Therefore, I can only respond to Petitioner’s conclusions, but not to any support thereof.

81. Similarly, Petitioner provides no evidence other than its expert's speculation that Denk's frame component would itself bolster the strength of a standard steerer tube. Without more analysis, a POSITA would not be able to determine if there would be any benefits to strength or weight in making Petitioner's proposed combination/modification with Denk and Moechnig. As detailed herein, if a POSITA were looking to combine Denk's frame component with Moechnig's steerer tube for purposes of increasing the strength of Moechnig, Moechnig already discloses a lightweight steerer tube with enhanced rigidity and strength. Further, a POSITA looking at the prior art, namely where Moechnig explicitly states that the lateral direction must be bolstered, would only potentially increase the strength of the relevant steerer tube *in the lateral direction* of the steerer tube, opposite to the fore-aft maximum wall positioning claimed in the '993 Patent.

82. In order to form the claimed invention from Denk's broad disclosure, Petitioner relies exclusively on Denk, arguing that Denk supplies a rationale to combine and amend Denk's own disclosure, along with mere conclusory remarks made by Dr. Slocum. *See* Petition, 15–16, 25–26. Specifically, Petitioner's argument that “a POSITA would have known to ... position the areas of maximum cross-sectional thickness of the steerer tube in the vertical plane of the bicycle frame—i.e., the plane of travel of the bicycle” has no other support beyond out-of-context statements in Denk and misguided statements by Dr. Slocum. Petition, 15.

But, as I discussed above, vertical loads are very relevant to a bicycle frame but irrelevant to a bicycle steerer tube because the steerer tube is oriented in space in a way that maximizes vertical strength. And moreover, Moechnig, the only prior art in this matter actually directed to an asymmetric steerer tube, contradicts Petitioner's unsupported argument that the highest or most concerning loads occur in the fore-aft direction of travel. Instead, a POSITA would have been concerned with the lateral loading and reducing the transmission of forces to the rider by limiting the stiffness of the steerer tube in the fore-aft direction.

83. Specifically, Moechnig includes an elliptical-shaped steerer tube with a constant wall thickness and the maximum strength oriented perpendicular to the direction of travel, also referred to as the side-to-side or lateral direction. This shape “provides lateral stiffness to the wheel assembly and ... accommodates longitudinal[, or fore-aft direction,] impact absorption of the fork and wheel assembly.” Ex. 1008 (Moechnig), Abstract. Moechnig explains that increasing strength in the fore-aft direction is undesirable to a rider because there would be an increase in fore-aft stiffness, which is further undesirable because the stiffness communicates forces from the fork to the rider's hands. Ex. 1008, [0004], [0008]. Moechnig goes as far as proclaiming that “[d]ecreasing the fore-aft stiffness of the steerer assembly **16** provides two distinct advantages as compared to prior art steerer tube assemblies[.]” decreasing the amount of force transmitted to the rider's hands

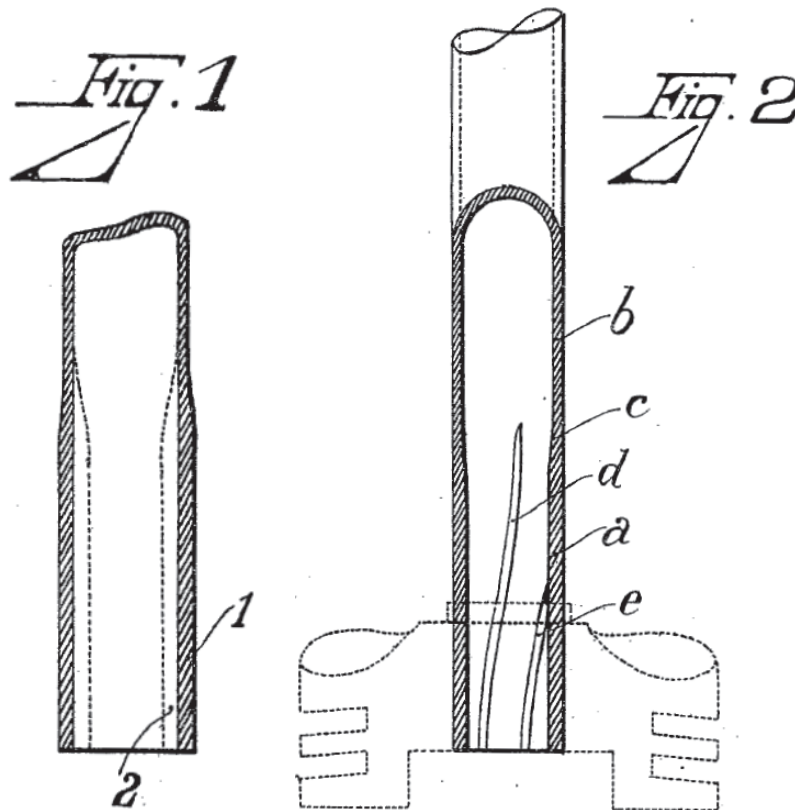
and *better distributing the loading of impacts over time* to reduce the peak loads experienced by the steerer tube. *Id.*, [0049]. As a result, the prior art shows that a steerer tube with a *minimum strength (which could be a thickness)* in the fore-aft direction is “capable of withstanding the fore and aft impact loading as compared to heavier steerer assemblies or constructed to provide greater fore and aft impact performance as compared to steerer assemblies of comparable weight.” *Id.*

84. Stated differently, Moechnig expressly teaches that a stronger wall rigidity and stiffness in the lateral direction is what is needed in a bicycle. Moechnig’s steerer tube construction is directly opposite of the claimed invention of the ‘993 Patent. In view of Moechnig, which Petitioner proposes to modify Denk, a POSITA would not orient Denk’s tubular frame component to gain strength in the fore-aft direction – Moechnig says to do the opposite. Petitioner’s and its expert’s conclusory statements to orient Denk in such a manner directly contradict the only modern steerer tube reference involved in this matter, Moechnig. *See* Petition, 15, 25; Ex. 1003 (Slocum), ¶¶46, 59, 89–92.

5. Valat does not disclose multiple “configurations”

85. Regardless of Petitioner’s and Dr. Slocum’s statements to the contrary, Valat does not disclose different “configurations” or embodiments in Valat’s Figures 1 and 2. *See, e.g.*, Petition, 49; Ex. 1003 (Slocum), ¶49. Instead, Valat’s disclosure clearly states that Figure 1 is an example of a tube before a swaging

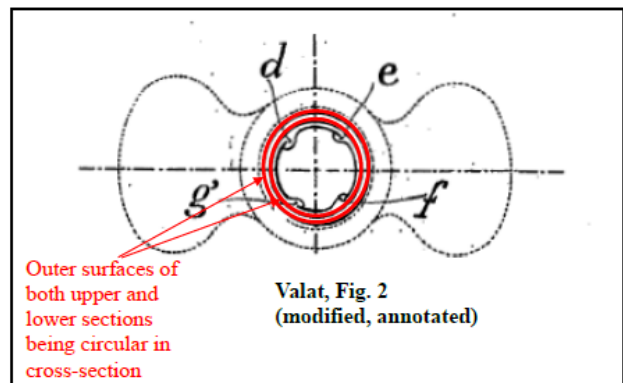
process is performed, and Figure 2 is an example of the resultant tube after swaging. Ex. 1007 (Valat), 1:58–63, 1:96–2:4. Specifically, “Figure 1 shows an axial section of the tube *before* the reinforcements are formed and showing two of them in dotted lines,” as reproduced below (Ex. 1007 (Valat), 1:58–60 (emphasis added)):



86. Further, Valat explains immediately after that “Figure 2 shows *the* finished tube mounted on a fork bridge, with helical reinforcements of long pitch,” as reproduced above. *Id.*, 1:61–63 (emphasis added). Thus, the intermediate product in Figure 1 becomes the steerer tube in Figure 2 after processing, and Valat discloses *only one embodiment* of its steerer tube in Figures 1 and 2. Ex. 2019 (Slocum Depo.), p. 128, line 18–p. 131, line 15.

87. Valat's written description continues on, explaining that Valat's steerer tube has a constant external diameter along its length. *Id.*, 1:70–77. The internal diameter, however, does vary. *Id.*, FIG. 2, 1:70–77, 1:86–90. The tube shown in Figure 1 starts with an external diameter that is greater in section “a,” but the subsequent swaging process results in an internal diameter that is tapered and formed to have helical ribs. *Id.*, 1:97–2:4. This is because the swaging process *squeezes* the extra material on the exterior of the tube shown in FIG. 1 around a mandrel placed inside of the tube during the swaging, the mandrel having an exterior shape that mimics the *inverse* of the desired helical rib pattern. *See id.* As the tube is pressed inwards onto the mandrel, the material forms into the exterior shape of the mandrel. This squeezing process results in a tube having a constant exterior diameter and an interior with shaped ribs. Swaging is a common, well-known metal working process. Further, it is a process that tends to nicely finish the exterior surface of the tubing. Ex. 2019 (Slocum Depo.), p. 126, lines 8–24.

88. Accordingly, it is my opinion that both Petitioner and Dr. Slocum do not appear to understand the disclosure of Valat, and instead, pick and choose from Valat's figures without appreciating what Valat actually discloses. Petition, 49–50, 61–63; Ex.



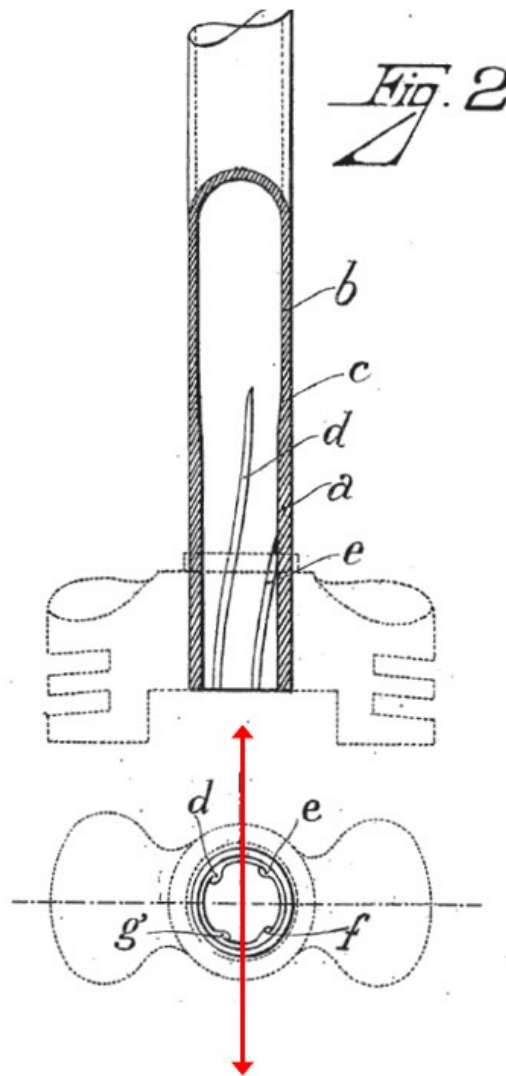
1003 (Slocum), ¶¶49, 181. This is improper and not what Valat would teach to a POSITA. Petitioner goes as far as falsely annotating several figures in Valat, such as the one shown to the above-right, in this case marking nonexistent diameters out nowhere to remake the claims using what could only be hindsight. *See* Petition, 63. All of Petitioner's annotated Valat Figures have similar deficiencies. *See, e.g.,* Petition, 54 (comparing intermediate and finished products as if having the same cross-section), 56, 57 (same), 59, 62–63, 64 (same), 68 (same), 70, 71–72 (same), 75, 76, 78 (same). In any event, there is no support for Petitioner's annotations whatsoever, especially in view of Valat's express statements that the tube has a constant external shape and is formed by swaging.

89. Petitioner's expert argues further that, because Valat's tube is stated as having a diameter, it must be circular. Ex. 1003 (Slocum), ¶182. Many shapes have a diameter, and, in fact, the term is applicable to any chord that passes through the center of a body having any cross-sectional shape. Dr. Slocum even admits that the definition of "diameter" applies to shapes other than circles. Ex. 1003 (Slocum), ¶182. Petitioner's limited definition of the term "diameter" in Valat is without support and amounts to nothing more than unsupported attorney argument.

6. Valat Fails to Disclose or Render Obvious a Steerer Tube Oriented With Its Maximum Thickness in the Direction of Travel

90. The Petition relies upon its misguided reading of Denk to supply the claim element wherein “a thickness of the wall at any point in the lower section of the body varying as a function of the cross-sectional angle of the point relative to the plane of travel, the wall thickness being at a maximum in the plane of travel of the bicycle[,]” as recited in the Independent Claims. However, for at least the reasons discussed with respect to this claim element above, Denk fails to supply any motivation to use its frame component as either a steerer tube or to orient that tube as recited in the Independent Claims.

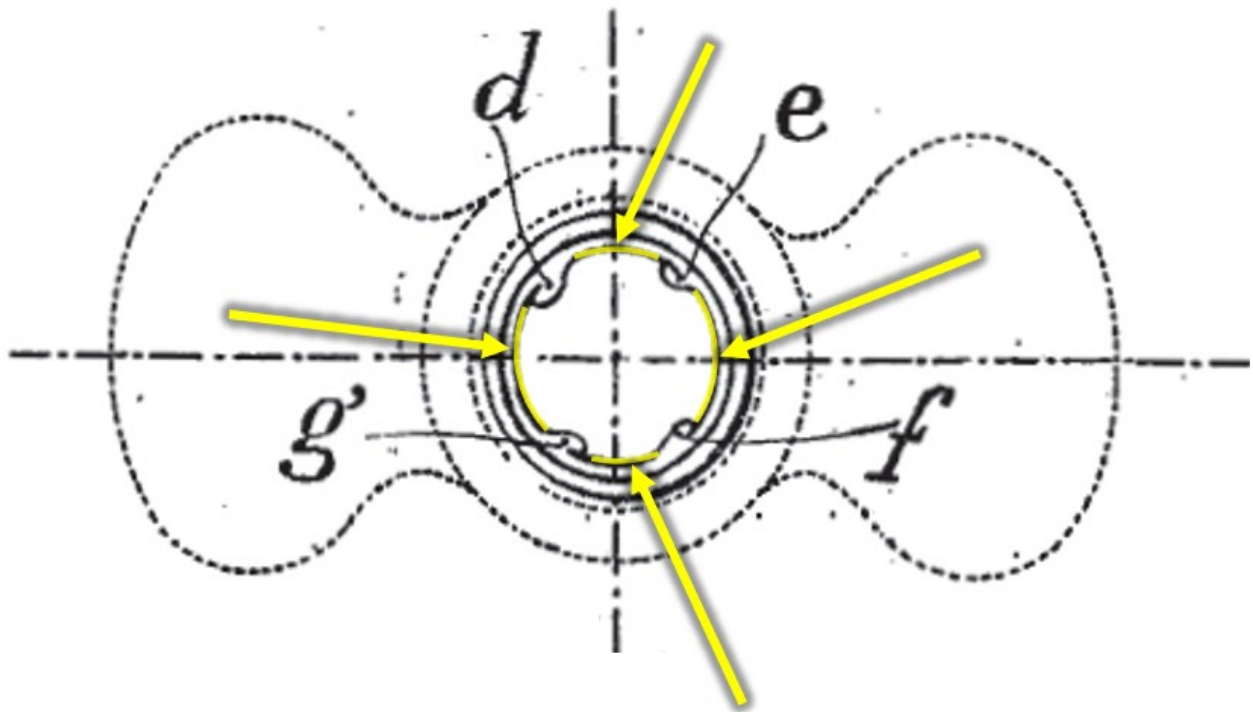
91. Valat shows a steerer tube having ribs (“d,” “e,” “f,” and “g”) formed on the interior in a helical pattern:



Ex. 1007 (Valat), FIG. 2 (annotated). As can be seen the annotated figure above, the wall of the steerer tube is relatively thin in the direction of the bicycle's travel (shown in red) and certainly not at a maximum wall thickness as required by the Independent Claims. Accordingly, in my opinion, Valat fails to disclose or suggest a maximum wall thickness in the plane of the bicycle's travel.

92. Further, Valat discloses that its "body" has portions of the wall that do not vary in thickness as a function of the cross-sectional angle of the point relative

to the plane of travel. These portions of Valat's body are the constant thickness, unvarying sections shown and highlighted in yellow in the annotated Figure 2 of Valat, below:



Further, each of the other embodiments shown in Figures 3, 4, and 5 of Valat show interiors with portions unvarying in thickness, wherein the wall thickness does not change relative to the cross-sectional angle of the point relative to the plane of travel. A POSITA would understand that this is true because, in these regions, adjacent points have the same wall thickness.

93. Petitioner does argue that because “Valat discloses that reinforcements are provided in lower part *a*[,] ... the wall thickness at any point in the lower section of the body—lower part *a* and taper *c*—depends on whether the point is in a region

with reinforcement.” Petition, 65. However, Petitioner’s view of this claim element is entirely too broad, as it would capture any shape, even a circle.

94. The ‘993 Patent explains that the claim term or phrase “body formed by a wall, a thickness of the wall at any point in the lower section of the body varying as a function of the cross-sectional angle of the point relative to the plane of travel” is directed to a *continuously varying interior surface* that is elliptical. *See, e.g.*, Ex. 1001 (‘993 Patent), FIGS. 3, 6–10, 13–17, 19–23, 25–29, 31–36, 6:15–19, 1:60–2:10, 6:59–64. On the other hand, the Independent Claims (1, 61, and 64) exclude circular interior shapes, but Petitioner’s construction incorrectly covers interior circular shapes because a circular interior shape would have a wall thickness that depends on the cross-sectional angle, although the function describing the “dependency” would be a constant for wall thickness. Accordingly, Valat fails to disclose this claim element.

95. Further, as discussed above, although Denk discloses the use of a frame component having continuous changes in wall thickness, Denk does not disclose any orientation of its component relative to a steerer tube. Petitioner does not allege otherwise, especially because Denk does not contemplate using its frame component as a steerer tube. Accordingly, Petitioner fails to show that this claim element is present in the art, instead relying on a combination of Valat, Denk, and the purported motivations of a POSITA to supply this element that is missing in every prior art

reference. As discussed below, the Petition’s motivation to combine is deficient. As a result, the Petition fails to show that any Grounds would render this claim element obvious.

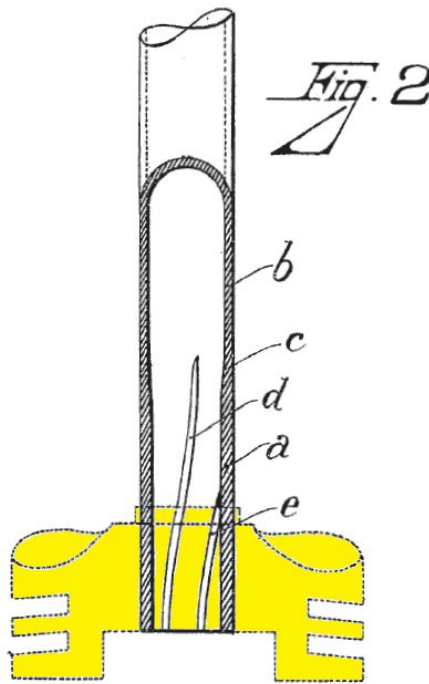
7. Changing Valat to Include Denk’s Frame Component Would Defeat Valat’s Primary Purpose of Providing Strength Along the Entire Lower Portion of the Steerer Tube

96. One primary difference between Valat (Ex. 1007) and Denk (Ex. 1006) is that while Denk is merely concerned with bolstering a frame component in one, vertical direction, Valat is intended to reinforce the steerer tube in all directions in the region where the steerer tube meets the fork bridge. In particular, Valat explains:

Among the parts of a bicycle, motor assisted cycle, or motor cycle most dangerously loaded the steering tube may be cited, *particularly on its perimeter at entry to the fork bridge*. It is frequently in this region that fractures commence, which are rapidly transferred into complete failures.

Ex. 1007 (Valat), 1:44–51 (emphasis added). The “perimeter at entry to the fork bridge” is, by definition, the entire exterior surface of the steerer tube, a full 360 degrees around the tube, near the interface with the crown or bridge. Further, each of the several ribbing patterns shown in Valat’s Figures 2–5 includes significant reinforcement around the entirety of the steerer tube. Thus, unlike Denk, Valat is concerned with all shear stresses around the junction between the steerer tube and

the fork crown. *See also* Ex. 1007 (Valat), 1:15–21. 1:44–51. The crown (also known as a bridge) is highlighted in the annotated version of Valat's Figure 2 to illustrate where this junction occurs:



97. Petitioner, for unknown reasons, suggests weakening Valat at points around the junction between Valat's steerer tube and fork crown/bridge, illustrated above, by providing reinforcement in only one direction. *See, e.g.,* Petition, 52. A POSITA would not make such an alteration in view of Valat's primary purpose of providing consistent, 360 degrees around support at the junction between the steerer tube and the fork crown/bridge. In fact, a change from Valat's ribs to Denk's frame tubing would be an act to intentionally lessen the strength of the tubing on the lateral sides of the steerer tube, as indirectly admitted by Petitioner. *See* Petition, 52

(discussing “reducing the weight of the steerer tube” while also “improving the strength and rigidity” of the same in the fore-aft direction, resulting in a thinner wall in the side-to-side direction). A POSITA would not make such a change to Valat, at least because it is contrary to Valat’s stated goals.

98. Further, Petitioner’s proposed alterations or modification to Valat that would change the principle of operation of Valat. Specifically, Valat’s principle of operation is to reinforce Valat’s steerer tube along the entire extent of the junction between the steerer tube and the crown/bridge using simple-to-form internal ribs. Valat explains that for Valat’s “*invention*[,] the tubes are provided with solid internal ribs or reinforcements by the swaging process so that a continuous external surface is produced, and such reinforcements preferably follow helices of long pitch.” Valat, 1:35–40 (emphasis added). Further, Valat’s claim 1 is focused on this benefit:

A tube for cycle and motor cycle frames provided on its interior with reinforcements extending substantially in the longitudinal direction of the tube, in which the reinforcements are solid and are formed by a swaging process, so that the exterior surface of the tube is continuous.

Ex. 1007, Claim 1. Thus, Valat is pinpoint-focused on a swaged tube having internal ribs. Replacing these ribs is simply nonsensical, at least because these ribs are the

entire purpose of Valat. It is my opinion that a POSITA would not have considered removal of Valat's ribs, and Petitioner's suggestion that a POSITA would do so is not credible nor reasonable.

99. Swaging is a forging process in which the dimensions of an item are altered using dies into which the item is forced. Swaging processes have been well-known in the art for centuries. More than one die may be used, and the process may be automated. Mandrels may also be used to provide shaping for the interior of objects being swaged. The following two websites provide good overviews of swaging in general, as well as various specific swaging processes.

<https://monroeengineering.com/blog/what-is-swaging-in-the-manufacturing-industry/> (last accessed on October 28, 2024); <https://kdmfab.com/tube-swaging/> (last accessed on October 28, 2024).

8. No Benefit to Replacing Valat's Ribs with Denk's Tubular Shaping

100. Petitioner's Grounds III and IV are based on a false premise that Valat would benefit from converting Valat's internal rib structure into Denk's elliptical interior shape. *See* Petition, 67–68. Specifically, Petitioner alleges that a POSITA would have been motivated to make this change “to improve the strength and rigidity properties of Valat's steerer tube in the vertical plane of the bicycle while maintaining light weight[.]” Petition, 67. As discussed above, this is not the purpose

of Valat. Instead, Valat seeks to strengthen its steerer tube *in all directions around the junction between the steerer tube and the fork bridge/crown*.

101. However, if the Board were to determine that Valat and Denk's benefits are the same—lightweight and strengthened tubing in general—then the Petition fails to show *any benefit* to converting Valat's ribs to Denk's component shaping. Stated another way, Petitioner's purported advantages of Denk's frame component are redundant in view of the advantages present in Valat.

102. First, Valat is already a reinforced steerer tube having lightweight properties. For example, Valat begins by stating that Valat's tubing has "equal, if not greater strength" than prior steerer tubes while also helping to produce "a lighter weight[.]" Ex. 1007 (Valat), 1:8–14. Valat's internal ribs significantly increase the strength of these already very lightweight tubes while adding little weight. As a result, Valat discloses a weight- and strength-efficient steerer tube that provides the increased resistance to shear forces needed in Valat's applications, while Valat's overall tubing remains lightweight.

103. Next, I note that Petitioner provides no analysis explaining why Denk's internal shape *would be superior or even preferred* to Valat's internal ribbing. Instead of supplying this necessary rationale or explanation, Petitioner and Dr. Slocum rely solely on a statement in Denk that Denk itself is lightweight. See Petition, 67, 51–55; Ex. 1003 (Slocum), ¶¶189, 155. However, although Denk touts

its frame component as being lightweight, *Denk does not explain that its component would be lighter in weight than the rib-reinforced tube in Valat* (or a similar tube).

Dr. Slocum admitted that he did not compare the weights of Denk and Valat's tubing. Ex. 2019 (Slocum Depo.), p. 142, line 14–p. 143, line 7. Blind reliance on the hyperbolic statements in Denk, without any further analysis or even a comparison between Valat and Denk, is misguided, at best. How does Dr. Slocum know one solution would be superior without additional analysis? Instead, I believe that a POSITA would believe that Valat is the most appropriate tubing for its applications, and further, that Denk is so broad that the “lightness” of its tubing is merely relative to some unknown standard. Truly, Denk's tubing could be much heavier than required, depending on the application. Using the '993 Patent as a guide to show that Denk's shaping is actually lightweight for steerer tubes is certainly based in hindsight.

104. Petitioner and Dr. Slocum similarly rely on broad statements in Denk that a POSITA would have found the purportedly smooth interior of Denk to reduce stress concentration and to be easier to manufacture. Petition, 52 (citing Ex. 1006 (Denk), Col. 3). Once again, Petitioner is somewhat loose in describing its bases for these assertions. However, from what I can glean of Petitioner's argument, the statement about stress concentration in Denk does not consider the helical, internal ribs presented in Valat, and is therefore inapplicable without further analysis. Ex.

1006 (Denk), Col. 3. Said another way, there is no evidence or exhibit involved in this matter that Valat would suffer from increased stress concentrations, especially where Valat reduces stress by having a continuous outer surface. Valat, 1:22–42. Further, neither Valat nor Denk’s reinforcement solutions are inherently superior. Thus, Dr. Slocum’s statements are conclusory and must be afforded no weight.

105. Similarly, the Petition’s statement that Denk’s process would be “easier to manufacture” is conclusory. Petition, 52. The Petition turns to Dr. Slocum for support, but Dr. Slocum merely states “additional helical structures would be required in the mold[.]” Ex. 1003 (Slocum), ¶154. It is unclear what additional structures are being compared against, but in any event, this statement further highlights Dr. Slocum’s misunderstandings about Valat. Valat is produced using a swaging process. Valat, 1:35–40, 1:96–2:4. Swaging is an inexpensive and beneficial process, known to even increase the hardness of the tubing being swaged through the process of work-hardening. Swaging can be used to form internal ribs or internal helical ribs, like those discussed in Valat, on tubing by the use of an internal mandrel. Contrary to Dr. Slocum’s opinion, a POSITA would understand that Valat could be manufactured using relatively easy and low-cost processes. Denk, on the other hand, describes some possible manufacturing processes that are complex and involve welding or machining steps. Such additional steps could add costs or even produce an end product that has clear faults or is inoperable due to the

welding seams. Dr. Slocum even admitted in his deposition that Denk also discloses swaging as an acceptable manufacturing method. Ex. 2019 (Slocum Depo.), p. 98, lines 17–24. Further, Dr. Slocum admitted that he did not quantify any additional costs or difficulties associated with swaging in his declaration. *Id.*, p. 139, lines 4–23.

106. A POSITA would understand that Denk’s tubing could be made to be heavier and/or weaker than Valat’s tubing. Dr. Slocum argues, without support, that removing Valat’s ribs and creating an asymmetric cross-sectional shape would reduce weight. Ex. 1003 (Slocum), ¶155. The strengths and weights of steerer tubes and forks depend on many factors including material properties and specific geometry. Even when accounting for materials used, there is no clear advantage of Denk or Valat’s structures when considering weight or strength alone. Petitioner’s reliance on purported benefits and puffery stated in Denk is unavailing when considering the actual strengths or weights of a finished product. Without more analysis, Dr. Slocum’s bald, conclusory statements must be afforded no weight, and Petitioner’s arguments must be rejected wholly.

9. No Motivation to Orient the Steerer Tube of Valat and Denk as Recited in the Independent Claims

107. Petitioner relies upon the same rationale to orient Denk’s frame component’s maximum thickness in the plane of travel of the bicycle for all

Grounds. *See, e.g.*, Petition, 52–53. Accordingly, for the same reasons discussed in above, a POSITA would not consider orienting Denk’s frame component’s maximum thickness in the plane of travel of the bicycle, especially not as a steerer tube. Further, a POSITA would not have been motivated to substitute Valat’s ribbing with Denk’s interior shape, as discussed above.

108. Specifically, Petitioner relies on conclusory statements from Dr. Slocum that a POSITA would “incorporate Denk’s varying wall thickness to the lower part *a* of Valat’s steerer tube by positioning the maximum thickness areas in the vertical plane of travel as disclosed in Denk” and further that “a POSITA would have understood that the minimum wall thickness would be in the plane perpendicular to the plane of travel and would be designed to have a thickness that meets the lower requirements of strength and rigidity in that plane while minimizing weight of the steerer tube.” Petition, 53 (citing Ex. 1003, ¶157). Here, Petitioner must be discounting the lateral loads, while putting an emphasis on vertical loads that may be relevant to a bicycle frame but are entirely irrelevant to a bicycle steerer tube, which is oriented in space in a way that maximizes vertical strength, as discussed in detail above. Further, as I have discussed throughout this Declaration, Moechnig specifically contradicts Petitioner’s argument that the highest or most concerning loads occur in the fore-aft direction of travel.

109. Further, it is worth repeating that prior to the ‘993 Patent, what is shown in Moechnig and the other evidence in this matter, steerer tube designers were most concerned with *lateral* loading. Specifically, Moechnig teaches that *increasing strength in the fore-aft direction is undesirable* because there would be an undesirable increase in fore-aft stiffness, which uncomfortably communicates forces from the fork to the rider’s hands. Ex. 1008, [0004], [0008]. Therefore, the proper orientation of wall thickness according to Petitioner’s main modifying prior art is to decrease the fore-aft stiffness, rigidity, and strength and thereby provide “two distinct advantages as compared to prior art steerer tube assemblies,” namely, (1) decreasing the amount of force transmitted to the rider’s hands and (2) better distributing the loading of impacts over time to reduce the peak loads experienced by the steerer tube. *Id.*, [0049]; *see also id.* (Moechnig teaching that a steerer tube with less thickness in the fore-aft direction is “capable of withstanding the fore and aft impact loading as compared to heavier steerer assemblies or constructed to provide greater fore and aft impact performance as compared to steerer assemblies of comparable weight.”).

B. Claims 2–4, 6–8, 16–20, 22, 27–29, 36–38, 40, 42, 47–49, and 61–63

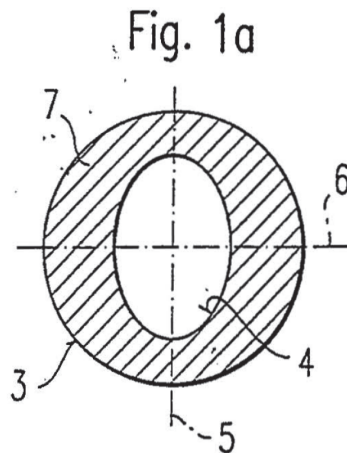
1. Valat Fails to Disclose or Suggest a steerer tube having “an outer diameter of the lower section of the body is greater than an outer diameter of the upper section of the body”

110. For Valat, the Petition fails to show that Valat has this feature because (1) Petitioner and Dr. Slocum misunderstand Valat’s disclosure, believing that Valat’s Figure 1 discloses an embodiment of Valat when it does not, and (2) Valat discloses a constant outer diameter, and, therefore, shape. These issues are discussed at length above. Valat is explicit in stating that Figure 1 is an intermediate product (Ex. 1007, 1:58–63) and that its steerer tube has a constant outer diameter (*id.*, 1:70–77). For Ground III and IV, Petitioner’s incorrect understanding of Valat is the sole basis for arguing that these Grounds disclose this feature. *See* Petition, 74–75. *See also id.*, 61–63 (discussing claim element 1[c] and the purported tapered shape of Valat’s nonextant first configuration). Accordingly, Grounds III and IV fail to disclose or render obvious this feature at least because Valat fails to do so.

2. Denk fails to disclose or suggest a steerer tube having “an outer diameter of the lower section of the body is greater than an outer diameter of the upper section of the body”

111. For Denk, Petitioner relies solely upon Denk’s Figure 11, which purportedly shows a section of tubing with a taper. Petition, 32–33. *See also id.*, 20–21. However, Denk’s disclosure regarding Figure 11 states that Denk’s tubing in Figure 11 is actually *not tapered*. Specifically, Denk states that “**Fig. 11** shows a

longitudinal view of the exemplary embodiment according to **Fig. 1a**.” Ex. 1006 (Denk), Col. 5. Figure 1a shows a single cross-sectional shape:



Denk agrees that “[i]n the exemplary embodiments shown in **Figs. 1a** through 1h, the adjacent cross sections of the tubular body are identical; i.e., each cross section perpendicular to the line 2 has the same cross section.” *Id.*, col. 8. Line 2 is shown exclusively in Figure 11. Accordingly, Denk explicitly states that all cross sections are identical, and therefore, there can be no taper.

112. Similarly, a POSITA would understand that the methods disclosed in Denk’s Columns 9–11 could not be used to create a tapered tube design. Specifically, Denk discloses (a) a pressing process that is followed by a material removal process (Cols. 9–10; Figures 4a–4c); (b) a rolling process that is followed by folding and welding processes (Col. 10; Figures 5a–5e); and (c) another pressing process where two halves are subsequently joined together. None of these processes

are stated as being capable of producing a taper along the exterior of Denk's frame component.

113. In any event, Denk provides no disclosure of an embodiment that includes a taper like that shown in Figure 11 including an interior having a cross-sectional shape like that in Figure 1a that transitions from a first exterior diameter to a second exterior diameter. Denk does suggest that there may be a number of different embodiments of Denk's frame component, as discussed above. But Denk does not include an embodiment having all of these features. At best, the thrust of Petitioner's argument is that a POSITA *could* make the proposed combination, but this is not the standard for obviousness. Here, Petitioner is mixing and matching Denk's embodiments without a rationale to do so.

3. Petitioner's Rationale to Combine and Alter Denk Is Legally and Technically Deficient

114. Specifically, Petitioner has provided no rationale or motivation to alter Denk's frame component to include a taper. Further, even if Denk's disclosure were to suggest a potential taper, Denk is silent regarding any changes in diameter.

115. Valat also fails to disclose a tapered tube, and Petitioner mistakenly relies on its misunderstanding of Valat to supply this claim element for Grounds III and IV. *See, e.g.*, Petition, 74, 69–70, 61–63 (Petitioner relying on a nonexistent “embodiment” of Valat). This misunderstanding is discussed herein in detail above.

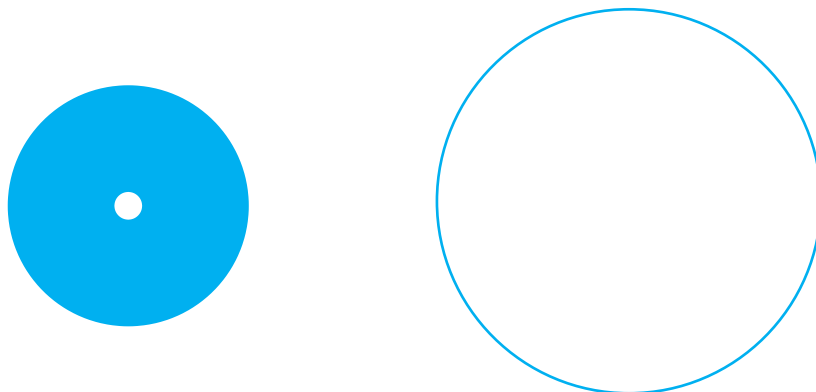
Petitioner's mistaken reading of Valat cannot be a basis for a finding of obviousness at least because it does not evidence the knowledge of a POSITA. Accordingly, the Petition fails to show that Valat or Denk renders obvious the recited "outer diameter of the lower section of the body is greater than an outer diameter of the upper section of the body."

116. Even if Denk did disclose a tapered tubing (which it does not), Petitioner fails to show that Denk discloses or renders obvious orienting the tapered tubing so that *the larger diameter is in the lower section of the tubing*. The Petitioner, implicitly acknowledging that Denk lacks this claim element, states that the claimed orientation would be "suitable" "because the larger outer contour allows for additional reinforcement, such as a thicker wall, in the lower section, which is subjected to more loads or stresses." Petition, 20–21. *See also id.*, 27–28, 70, 74. However, such a statement is both conclusory and inaccurate.

117. First, Petitioner's purported rationale is conclusory for being offered without any explanation or support. Petitioner's "additional reinforcement" is vague and undefined at least because Petitioner fails to explain what this reinforcement might be other than having "a thicker wall." Further, there is no explanation as to why, or even if, a POSITA would create a thicker wall in the purported larger section of Denk's frame component. Certainly, Denk makes no such disclosure, and Dr. Slocum is the sole source of this information. Without more explanation, there

is no indication that either end of Denk's frame component, even if tapered, would have greater strength based on Denk's disclosure. This is primarily because Denk does not state or show wall thickness of the frame component shown in Figure 11, nor does Figure 11 show its interior shape. Without more, no one could determine which end would have a greater strength. Further, as stated above, Denk states that adjacent portions of the frame component in Figure 11 have identical cross-sections, making clear that Denk does not provide any "additional" reinforcement on either side of its frame component.

118. Moreover, Dr. Slocum's basis is technically flawed. Specifically, a larger diameter tube is not necessarily stronger or more reinforced than a smaller diameter tube. For example, a POSITA could make a smaller diameter tube stronger and more resistant to breaking/bending than a wider diameter tube, depending on the relative cross sections and wall thicknesses of each tube. For example, the smaller tube on the left can have a much stronger sidewall than the very thin but larger diameter tubing on the right depending on the relative dimensions:



As can be seen, there is no inherent “strength” to a larger diameter tube because each size may be designed differently. Thus, Petitioner’s and Dr. Slocum’s brief and unsupported statements about the possible benefits of a tapered tube are technically incorrect.

119. Accordingly, Petitioner fails to state any reasonable rationale to modify Denk from its frame tube, existing alone in space, into the recited steerer tube wherein an “outer diameter of the lower section of the body is greater than an outer diameter of the upper section of the body.” As a result, the claims stated above in this Section are not unpatentable in view of any Ground.

120. *But the Petitioner’s problems do not stop here for these claims.* Additional issues affect the other elements of these claims, as discussed throughout this Declaration. And further, each of these other claim elements are not shown in any reference, requiring the fact finder to believe the unsupported and outlandish combinations proposed by Petitioner without sufficient reasoning. In fact, Petitioner’s handling of each claim element shows that Petitioner and Dr. Slocum merely pull unrelated features and embodiments together, from the ether, to recreate Patent Owner’s claims without any legally recognizable reasons to do so.

C. Claims 6, 10, 20, 24, 40, and 44

121. Each of claims 6, 10, 20, 24, 40, and 44 include a requirement that the “inner surface of the upper section is circular in cross section.” Petitioner fails to

show that this claim element exists in the prior art involved in this matter, and fails to show that it would have been obvious to form a steerer tube having the recited arrangement.

122. For Valat, Petitioner fails to show that Valat has a circular inner shape. Petitioner shows an annotated image of Valat's Figure 2 in support, but (1) Petitioner has repeatedly shown that it does not understand Valat's disclosure, (2) Figure 2 does not show the upper portion of Valat's steerer tube, and (3) Valat is unclear and not stated as being drawn to scale.

123. First, as discussed above, Petitioner has shown repeatedly that Petitioner does not understand Valat's disclosure. Moreover, Petitioner is overzealous with its annotations, as the circle highlighted on page 76 of the Petition is not clearly representative of anything, much less the inner surface of the upper portion of Valat's steerer tube. The presence of the ribs **d-g** indicate that this is a cross-sectional view of the lower portion of Valat's steerer tube, contrary to Petitioner's repeatedly false assertions. Thus, Valat's Figure 2 does not even disclose the cross-sectional structure of Valat's steerer tube. Finally, Figure 2 is not sufficiently clear, nor does it indicate that it is drawn to scale, to determine if the interior shape is circular or another shape. I have been advised by counsel for SRAM that when a reference does not disclose that the figures are drawn to scale and is

silent as to dimensions, arguments based on precise aspects of the figures' features are of little value. This is the case here.

124. Second, Petitioner states that “[i]t would have been obvious to a POSITA that the inner surface of the upper section would also be circular in cross-section with an internal diameter and without the reinforcements[,]” citing to Dr. Slocum. Petition, 76. But this is not a motivation to combine, or even the start of an obviousness analysis. Said another way, Petitioner asserts that this feature is just obvious, without reason.

125. Petitioner loosely relies on Valat's use of the word “diameter” and Petitioner's own incorrectly annotated version of a portion of Figure 2 to support its argument. But Petitioner's argument remains based on the false premise that Figure 2 shows a circular cross-section, which it does not. Additionally, Petitioner's argument does not include any motivation or reason why a POSITA would modify Valat to have this internally circular feature, and, in my opinion, a POSITA would not make such a modification based on the teachings of Valat.

126. Petitioner repeats these conclusory remarks that superficially resemble an obviousness analysis, stating that, because “Denk discloses that the cross-sectional shape *can* continually transition along the tube length from the elliptical inner cross-sectional contour into a circular inner cross-sectional contour[,]” “[i]t would have been obvious to a POSITA that in Valat's steerer tube modified in view

of Denk, the transition of the inner cross-sectional contour would occur over taper *c*, such that the upper section of the steerer tube has a circular inner cross-section.” Petition, 76–77. But here again, Petitioner fails to show obviousness. I have been advised by counsel for SRAM that the standard for obviousness is not what a reference indicates *can* be done, but what a POSITA *would* have done. I have also been advised that these structures require a motivation or rationale to alter the prior art as alleged by Petitioner. But here, the Petitioner supplies none.

127. For Denk, Petitioner alleges that (1) Denk discloses that it is possible to have an interior shape that transitions from elliptical to circular; (2) Moechnig discloses a steerer tube having a section with circular interior and exterior shapes and a section with elliptical interior and exterior shapes; and (3) that a design with an interior shape that transitions from elliptical to circular would have been “desirable because it allows for added reinforcement, such as greater wall thickness, in the lower section where loads are greater, but reduces weight by having thinner wall with circular inner and outer cross-sections in the upper section.” Petition, 35–37.

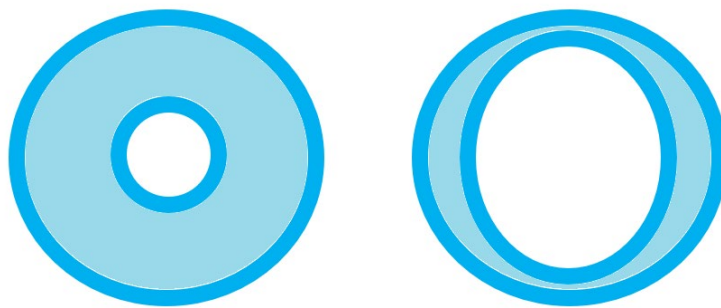
128. For (1) above, simply because Denk suggests that a random frame component might have different interior shapes does not suggest that it would be obvious to form a steerer tube having a lower section with an elliptical interior shape

and an upper section with a circular interior shape. Further, a mere possibility does not meet the bar of providing an obviousness rationale.

129. For (2), the Grounds do not rely upon Moechnig to provide the claimed steerer tube. Further, as Fox's phrasing suggests, Moechnig only shows that it is possible to have an interior shape that transitions between elliptical to circular, not that a POSITA *would* do so in a steerer tube having exterior shapes that differ from Moechnig (as claimed in the '993 Patent's claims). In my opinion, a POSITA would not have modified the interior shape to transition from elliptical to circular based on the teachings of Moechnig.

130. And finally, for (3) above, Petitioner's purported reasons are not accompanied by any evidence, explanation, or rationale to support the otherwise conclusory statements. For example, the Petitioner does not explain the relevance of "added reinforcement." Petition, 36–37. Instead, Petitioner is using a general catchall statement with no true reason for Petitioner's proposed obviousness modifications. As discussed in detail above, Petitioner fails to explain what this reinforcement might be other than having "a thicker wall." There is no explanation as to why, or even if, a POSITA *would create* a thicker wall in the purported larger section of Denk's frame component. Denk makes no such disclosure, and Dr. Slocum is the sole source of this information. Without more explanation, there is no indication that having a transition between elliptical and circular would affect

the strengths of sections having differing interior shapes. Further, Petitioner's argument that this arrangement allows for a thinner wall in the circular section is illogical. The thickness of the sidewall in any given embodiment is unstated in Denk. Further, a POSITA could make any portion of any steerer tube thicker or thinner. Thus, these interior shapes alone would not motivate a POSITA to use Petitioner's proposed arrangement for benefits to weight or thinness. Said another way, Dr. Slocum does not, and certainly could not, explain why circular inner and outer cross-sectional shapes would lead to a thinner wall overall. For example, the images below show two different cross-sectional shapes, each having an circular exterior but differing in internal shape.



The shape with the elliptical interior has a thinner wall than the same sized tubing with a circular shape. Petitioner's argument is not only conclusory for completely lacking any support, but also demonstrably false. Petitioner's rationales throughout the Petition must be evaluated closely, as Petitioner and its expert have been shown to misrepresent facts.

131. In the end, the prior art involved in this matter does not show or suggest this claim element, and Petitioner supplies no legitimate obviousness rationale. As a result, the Petition fails to show that the above-listed claims are unpatentable.

D. Claims 56 and 59

132. Claim 56 includes a requirement that “wherein the minor diameter decreases as a function of proximity to the upper section of the body[,]” and claim 59 includes a requirement that “the major diameter of the lower section tapers from the second portion of the lower section to the first portion of the lower section.” Petitioner fails to show that this claim element exists in the prior art involved in this matter, and fails to show that it would have been obvious to form a steerer tube having the recited arrangement.

133. For Valat and Denk, Petitioner alleges, without additional explanation, that “the major and minor diameters of the elliptical inner contour would decrease from the lower part to the upper part generally over the tapered region as the inner contour transitions from an elliptical contour to a circular contour.” Petition, 78–79 (Valat in view of Denk). *See also id.*, 42 (“It would have been obvious to a POSITA that in Denk’s tube, the major and the minor diameters in the tapering region of the tube body decrease over the tapering region as a function of proximity to the upper section of the body.”). Petitioner’s argument is premised on Denk disclosing a frame component that (1) changes its internal shape from a first region to a second region;

(2) has one region with an elliptical internal shape and the other with a circular internal shape; and (3) has a taper between the two regions that transitions by tapering the internal diameters of the ellipse. *Id.*, 42–43. But Denk does not disclose such an embodiment, and Petitioner fails to disclose a rationale as to why a POSITA would make this specific combination of features out of the myriad of options presented by Denk.

134. First, Petitioner presents its argument as if Denk specifically contemplates such a frame component. However, Denk merely describes a laundry list of frame components and potential features thereof, as discussed at length above. For example, Denk shows no preference in its internal shaping between Figures 1a–1h. Further, Denk states that the internal shape may transition, but Denk does not disclose a specific combination of these features. Thus, without any specific embodiment that combines tapering, the specific form of tapering recited, and the specific shapes of each section, Denk fails to disclose this feature. As a result, Petitioner must rely on only the conjecture of the potential of combining one of, what its own expert describes as, an “infinite” number of embodiments in Denk, along with some type of rationale to combine. Ex. 2019 (Slocum Depo.), p. 99, line 11–p. 106, line 24.

135. But Petitioner fails to disclose a rationale to do so. As discussed above, Petitioner’s motivations to alter Denk as alleged by Petitioner are deficient.

Petitioner provides no new motivation with regards to the claim elements of claims 56 and 59. Petition, 42–44, 78–79, 81.

136. Petitioner does argue that because Moechnig’s steerer tube has a section having elliptical outer and inner shapes, “it would have been obvious to a POSITA that Denk’s tube, which has a tapering neck region as in Moechnig’s steerer tube, would also have a minor diameter of the lower section of the tube decrease as a function of proximity to the upper section of the tube, and have a major diameter of the lower section taper from the second portion of the lower section to an end region of the first portion of the lower section.” Petition, 43–44. ***But this is not a motivation or rationale to amend Denk.*** That Moechnig has some feature does not motivate a POSITA *per se*, as argued by Petitioner. Such a conclusory statement does not meet the standards required for obviousness. Said another way, Petitioner argues that Denk would have these features, but uses buzz words associated with an obviousness argument in doing so. But at no time does Petitioner provide a rationale as to why a POSITA would use Denk in such a fashion. This is hindsight, at best. Moreover, for claim 59, Petitioner has provided no rationale whatsoever as to why the lower section would have any tapering therein. At best, Petitioner has alleged that there will be a tapering region, not that the lower section will have an additional taper.

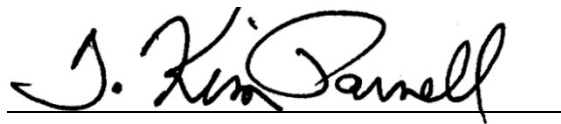
137. Accordingly, Petitioner supplies no legally cognizable obviousness rationale, and as a result, the Petition fails to show that the above listed claims are unpatentable.

V. CONCLUSION

138. For the foregoing reasons, it is my opinion that claims 1–4, 6, 8, 10, 12, 14–18, 20, 22, 24, 26–29, 31, 33–38, 40, 42, 44, 46–49, 51, 53, 56–64 of the ‘993 Patent are valid and patentable.

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief 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.

Dated: October 31, 2024

A handwritten signature in black ink, reading "T. Kim Parnell", is written over a horizontal line.

T. Kim Parnell, Ph.D., P.E.

APPENDIX A

T. Kim Parnell, PhD, PE

1150 Kelsey Drive
Sunnyvale, CA 94087

www.parnell-eng.com

(408) 203-9443 (Cell)

kim.parnell@stanfordalumni.org

Expertise Highlights

- ☐ Medical device/biotechnology – Cardiovascular, Orthopedic, Orthodontic
- ☐ Patents & Intellectual Property
- ☐ Product Liability; Personal Injury
- ☐ Bluetooth, Zigbee, Wireless technology
- ☐ System Specifications & Test Procedures
- ☐ Composite Materials Design & Damage;
- ☐ Plastics, Molding, Manufacturing
- ☐ Telephone set design; touchpads; keypads
- ☐ Piezoelectric components
- ☐ Consumer Electronics & Products
- ☐ Laptop computers; keyboards; displays
- ☐ Materials & Metallurgy
- ☐ Robotic & Laparoscopic Surgical tools;
- ☐ Failure Analysis & Reliability
- ☐ Fracture & Fatigue
- ☐ User experience & system interaction
- ☐ User interface design
- ☐ Finite Element Analysis of Structures & Fluid/Heat Transfer (FEA/CFD)
- ☐ Structural Mechanics, Fluid Mechanics, Heat Transfer, Thermodynamics
- ☐ Transducers, Accelerometers, MEMs
- ☐ Software design, development, QA
- ☐ Green energy: Wind, Solar Trackers, PV Panels; Electric Vehicles, Battery tech
- ☐ Shock & Vibration Sensitivity
- ☐ Vehicle & Heavy-Truck Crashworthiness
- ☐ ATV & Vehicle Design, Crashworthiness
- ☐ Numerical Multi-Disciplinary Analysis
- ☐ Group Manager & Project Leader;
- ☐ Strategic & Budgetary Planning responsibility

Education

Year	University	Degree Awarded
1984	Stanford University	Ph.D., Mechanical Engineering
1979	Stanford University	MSME, Mechanical Engineering
1978	Georgia Tech	BES, Engineering Science & Mechanics (Highest Honors)
2004	San Jose State University	Silicon Valley Executive Business Program (SVEBP)
2014	Stanford Continuing Education	“A Crash Course in AI”

Ph.D. Thesis: “Numerical Improvement of Asymptotic Solutions and Nonlinear Shell Analysis”, June, 1984.

Professional Associations and Achievements

- Registered Mechanical Engineer (PE, M025550) in the State of California
- ASME Fellow; American Society of Mechanical Engineers (ASME)
- IEEE Life Senior Member; Institute of Electrical and Electronics Engineers (IEEE)
- R42 Fellows Program – XPrize Healthspan Prize Superteam
- Silicon Valley Engineering Council (SVEC-ca.org) Vice President-2024
- Society for the Advancement of Material & Process Engineering (SAMPE); Society of Automotive Engineers (SAE), Member
- ASM International Member; SMST (Shape Memory and Superelastic Technologies) Member; EDFAS (Electronic Device Failure Analysis Society) Member
- IEEE-SCV Santa Clara Valley Section Award for Member Promoting Women in Engineering; 2024
- IEEE-SCV Santa Clara Valley Section Leadership Award; 2018
- IEEE Santa Clara Valley (IEEE-SCV) Section; Chair-2011, Vice Chair-2010
- IEEE Consultants’ Network of Silicon Valley (IEEE-CNSV), Board Member; Chair: 2008-2009
- NAFEMS Member – Composite Materials Working Group (CWG), Vice-Chair 2018-2023;
- IEEE Vehicular Technology Society (IEEE-VTS); Vice-Chair, 2012-2018; Treasurer 2018-present

- IEEE Consumer Technology Society (IEEE-CT), IEEE Computer Society (IEEE-CS), IEEE Engineering in Medicine & Biology (IEEE-EMBS), IEEE Electronics Packaging Society (IEEE-EPS)
- Reviewer: *Journal of Composite Materials (JCM)*; *International Journal of Forensic Engineering (IJFE)*; *Shape Memory and Superelasticity*, *International Journal of Technology Transfer and Commercialization (IJTTC)*.
- Chinese American Semiconductor Professional Association (CASPA)

Employment History

From: 2000 **Parnell Expert Consulting; Parnell Engineering & Consulting**
 To: Present Sunnyvale, CA; Web: parnell-eng.com
 Position: *Principal & Founder*
 Provides independent engineering consulting & expert witness services for high-technology applications including:

- ☐ Medical device/biotech product development & concept design
- ☐ Medical device cardiovascular applications across wide product range
- ☐ Medical device orthopedic, spinal, prosthetic devices – IP, design
- ☐ VC technical due-diligence for prospective medical device investment
- ☐ Patent & intellectual property – litigation, IPR, research, due diligence
- ☐ Expert Witness & Litigation Support services – multiple technologies
- ☐ Nitinol, shape-memory applications; biomaterials applications
- ☐ Portable devices, keypads: robust design, reliability & durability
- ☐ Cell phone Li-Ion battery failure & fire; protective enclosures;
- ☐ Bluetooth, Cellular, Zigbee, Wireless technology
- ☐ Solar panel tracker technology; PV Panel technology
- ☐ Manufacturing technology; materials applications (metals, polymers)
- ☐ Reliability and failure analysis services; accelerated testing
- ☐ Research in application & damage of composite materials
- ☐ Teaching intensive workshops & training seminars on simulation, design, and reliability for practicing engineers
- ☐ Lecturer in Prof. Steve Tsai's *Stanford Composites Design Workshop*
- ☐ Composite materials design & applications
- ☐ Wind Energy, Solar Energy, Alternative Energy – technology
- ☐ Electric vehicles, battery systems: design & development
- ☐ Heavy-Truck Rollover, Vehicle & ATV Crashworthiness; Barriers
- ☐ Software design, development, user experience, QA, testing
- ☐ Applications of CAE, FEA, and High-Performance Computing (HPC)
- ☐ Digital Twin Technology—FEA Simulation & Test

From: 2010 **Santa Clara University**
 To: 2012 Santa Clara, CA
 Position: *Faculty, Mechanical Engineering Department*
 Taught courses covering a range of topics including Materials Science, Manufacturing Methods, Composite Materials, Finite Element Methods, Mechanism Dynamics, Computer Graphics, & Design. Advised students on Design, Safety, and Simulation for Student Projects including SAE Formula-Hybrid Vehicles. Research in Composite Materials and High-Performance Computing. Interaction with Industry Advisory Board (IAB) & ABET

Certification. Teamed with other faculty for strategic initiatives and equipment/tool grants for research. Promote IEEE, ASME, cross-disciplinary initiatives & social media avenues for student networking, professional development & project support.

From: 2006

To: 2010

Position:

MSC Software Corporation

Sunnyvale, CA

Senior Manager, User Experience; Lead Application Engineer

Integrated feedback from customers into user interface design & specifications; Beta testing of prototypes with users; CAE software Product Management role for user interface and analysis tools including:

- ☐ Product quality, testing, and improvement; drove customer satisfaction
- ☐ Application of advanced analysis technology in design & manufacturing
- ☐ Led corporate Wind Energy initiative & revival of Fatigue product
- ☐ Composite materials – acknowledged corporate & customer expert
- ☐ Customer training courses, workshops, webinars; developed & taught
- ☐ Software design, development, QA, testing of commercial apps
- ☐ Mentoring and development of junior staff; interviewed & hired staff for India; developed and trained staff using distance learning

Applied finite element technology to applications including automotive, medical device, energy, and electronics. Created customer satisfaction via:

- ☐ Customer support & analysis process development; Digital Twin
- ☐ Material testing & data reduction for development of properties

From: 1999

To: 2000

Position:

Rubicor Medical, Inc.

Redwood City, CA

Director of R&D

Led the R&D team for this start-up medical device company developing breast diagnostic and therapeutic devices. Designed device considering interaction of Physician with Device and human factors. System included a mechanical subsystem and RF generator/control electronics. Developed initial prototypes and conceptual designs; researched IP and competing technologies.

From: 1986

To: 1999

Position:

Exponent, Inc. and Failure Analysis Associates (FaAA)

Menlo Park, CA

Senior Managing Engineer

Delivered consulting services for failure analysis, accident investigation, product liability, patent/IP, insurance-related litigation, medical device and biotechnology product development, FDA submission, and forensic/failure investigation. Performed analyses involving stress, thermal, & fluid applications; testing of material properties and use of laboratory techniques such as SEM & Optical Microscopy for inspection of material samples. Led the SAE Heavy Truck Crashworthiness, Phase II project with testing & simulation of heavy-truck cabs in rollovers. Managed the Engineering Analysis Group and had profit/loss responsibility for the Engineering Computer Center. Maintained high personal utilization/billable hours and had increasing personal/group profitability with significant consulting services revenue generation.

From: 1995 **Stanford University**
To: 1996 Stanford, CA
Position: *Visiting Associate Professor, Mechanical Engineering Department*
Taught graduate courses in Theory of Plates and Theory of Shells in the Applied Mechanics Division (now Mechanics & Computation) of Mechanical Engineering. Part-time appointment while full-time staff-member at Exponent.

From: 1984 **SST Systems, Inc.**
To: 1986 Sunnyvale, CA
Position: *Principal Engineer in Pressure Vessels, Piping & Structures Division*
Managed software development, facilitated university collaboration, developed product specifications and enhancements based on customer feedback, supported and trained over 30 new customers, and created standardized product documentation. Provided sales and technical marketing support to CEO during product launch; formulated go-to-market campaign.

From: 1980 **Stanford University**
To: 1984 Stanford, CA
Position: *Research Assistant, Mechanical Engineering Department*
Established the theoretical basis and developed computational tools for nonlinear shell mechanics. Emphasized computational mechanics and engineering applications, including linear & nonlinear finite element methods and other numerical analysis techniques. Algorithm & software development

From: 1978 **AT&T Bell Laboratories**
To: 1980 Indianapolis, IN
Position: *Member of Technical Staff (MTS), Physical Design Group*
Design, development, and manufacturing of high-volume telecommunication components. Researched and designed dials, keypads, electromechanical systems, and piezoelectric polymer applications. Employed range of materials including elastomers, metals, polymers, and piezoelectrics for keypad and transducer applications. Emphasis on cost, reliability, and manufacturing simplicity. Developed new technologies to ultimately drive field improvements. Applied finite element simulation to improve designs and reduce prototypes.

From: 1976 **General Motors Corporation**
To: 1977 Atlanta, GA
Position: *Engineering Assistant, Plant Engineering Department*
Production line design and manufacturing applications for the GM Lakewood assembly plant. Supervised demolition and production line installation during changeover. Installed automated spotweld robot for sheet metal panels. Studied automotive manufacturing & assembly operations from start to finish.

Selected Grants & Research Programs

SA Photonics, Inc.

- 2013 – Phase I Navy SBIR – Post-IED Hull Inspection Tool, Topic N123-156

Stanford University

- 2012 – Phase II Army SBIR – Development and Implementation of Micro-Mechanics of Failure (MMF) Model for Composites in Commercial Finite Element Codes

Santa Clara University

- 2012 – Kuehler Summer Undergraduate Research Grant – student support for composite materials testing & characterization
- 2011 – Technology Innovation Grant – Acquisition of advanced DSC/TGA System for improved lab capability
- 2011 – Technology Innovation Grant – Acquisition of High-Performance Workstation for advanced simulation of large dynamic and nonlinear systems
- 2011 – Technology Innovation Grant – Materials Laboratory equipment upgrades and reorganization

Selected Presentations

- “SMA Seismic Damping Devices: Fabrication, Testing, Analysis, and Projections”, SMST-2014, Monterey, CA, May, 2014.
- “Mechanical Design for Reliability: What does it Mean?”, ASME Santa Clara Valley Section, Sunnyvale, CA, Mar, 2014.
- “Prosthetic Feet using Carbon Fiber Composites: Design, Simulation, & Testing”, ASME Santa Clara Valley Section, Jun, 2013.
- “Mechanical Design for Reliability: Beating the Tough Problems”, IEEE-SCV Reliability Society, Santa Clara, CA, Jun, 2013.
- “Prosthetic Feet using Carbon Fiber Composites: Design, Simulation, & Testing”, MSC Software 50th User Conference, Irvine, CA, May, 2013.
- “Composite Materials: Improved Understanding of Composite Failure Mechanisms with DIC Testing & Analysis”, Trilion User Conference, Philadelphia, PA, Sep, 2012.
- “Medical Device Failures – ‘Not so Good, Very Bad, and Truly Ugly’!!”, ASM (Materials Information Society) Santa Clara Valley Chapter, May, 2012.
- “C-Ply Bi-Angle NCF Tape Seam Assessment & Design Considerations for Automated Tape Laying”, Composites Design Forum, JEC Composites Conference, Paris, Mar, 2012.
- “Failure of Structures Designed with Composite Material – Delamination”, *‘Meet the Experts’ Forum on Composite Materials*, Joint with Prof. Steve Tsai, SMP Tech, Feb 28, 2012.
- “Shape Memory Alloy Fundamentals & Advanced Simulation Techniques for Medical Products”, *‘Meet the Experts’ Forum on Nitinol Properties and Unique Behavior for Medical Product Design*, SMP Tech, Sep 14, 2011.
- “Stiffness and Strength of Laminates Fabricated with Bi-Directional Tape”, ICCM-18 (International Conference on Composite Materials, Korea, Aug, 2011, (with Daniel D. Melo & Christine Tower))
- “Composite Materials – Damage & Delamination”, Santa Clara University, Mechanical Engineering Seminar, Feb, 2011
- “Composites Damage, Delamination, Failure & Curing” and “Workshop on Mic-Mac/FEA” with Prof. Steve Tsai, Stanford Composites Design Workshop, 2010-2012
- “Composite Damage, Delamination, and Failure” and “Workshop on Mic-Mac/FEA” with Steve Tsai, Stanford Composites Design Workshop, Jan, 2010
- “Composite Failure Methods – Application Comparisons”, Composites Durability Workshop-14 (CDW-14), UCLA, Jul, 2009
- “Composites Damage, Delamination, and Failure Analysis”, Stanford Composites Workshop, May 2009

- “Finite Element Analysis using a Thermomechanical Shape Memory Alloy Model”, SMST-2006, Monterey, CA, 2006.
- “Medical Device Issues & Trends”, in “Biomedical Wave: Opportunities for Non-Biologists”, MedTech Bridge Seminar Series, 2005.
- “Medical Device Development and Entrepreneurship”, IEEE Consultants’ Network of Silicon Valley (IEEE-CNSV), www.CaliforniaConsultants.org , 2004.
- “CFD Fundamentals and Applications in Biotechnology”, ASME Professional Development Seminar, 2003 & 2004.
- “Medical Device Business Opportunities in China”, multiple presentations to key government and industry representatives, CASPA Delegation, Oct, 2003.
- “Using Simulation with Testing for Maximum Benefit”, WESCON 2003, Low Cost Tools: Alternatives for Problem Solving in Development, Design and Application, San Francisco, CA, Aug, 2003.
- “Fracture Mechanics: Overview and Applications”, Aeronautics & Astronautics Department, Stanford University, May, 1999.
- “Integrated Fluid/Thermal/Structural Analysis of a Turbine Blade”, American Society of Mechanical Engineers Bay Area Technical Conference, May, 1995.
- “Failure Analysis Projects”, Mechanical Engineering Department, Stanford University, May. 1992.
- “Finite Element Applications in Failure Analysis”, Mechanical Engineering Department, Stanford University, Mar, 1991.
- “Soil-Pipeline Interaction Associated with a Process-Plant Explosion”, Seminar in Solid Mechanics, Stanford University, Nov, 1989.
- “*Typical Failures: Causes and Consequences*”, Construction Engineering and Management Program, Civil Engineering Department, Stanford University, 1989.
- “Shell Analysis Using Personal Computers”, Solid Mechanics Seminar, Stanford University, 1985.

Selected Publications

- "Numerical evaluation of SMA-based multi-ring self-centering damping devices.", (2021). Smart Materials and Structures. DOI: <https://doi.org/10.1088/1361-665X/ac1d94>. (with M. Salehi, R. DesRoches, and D. Hodgson).
- “Numerical Simulation of Seismic Response Control of Frame Structure Using High-Temperature Shape Memory Alloy Wire”; Proceedings of: International Conference on Earthquake Engineering (SE-50EEE), At MAEE, Skopje, Macedonia, May 2013, (with Md. Golam Rashed and Raquib Ahsan).
- “Equivalent Properties for Finite Element Analysis in Composite Design”, JEC Composites Magazine, No.68 (Bi-Angle NCF Special Issue), Oct, 2011, (with Stephen W. Tsai)
- “Stiffness and Strength of Laminates Fabricated with Bi-Directional Tape”, ICCM-18, Aug, 2011, (with Daniel D. Melo & Christine Tower)
- "How Reliable Is Your Product: 50 Ways to Improve Product Reliability"*, Mike Silverman, 2011 (2-Book Chapters contributed by T. Kim Parnell).
- “Heavy Truck Roll Cage Effectiveness”, IMECE2009-12423, Proceedings of IMECE: ASME-Mechanical Engineering Congress and Exposition, Nov, 2009, (with Stephen Batzer, Bruce Enz, Grant Herndon, Chandrashekar Thorbole, Robert Hooker, and Mariusz Ziejewski).
- “Composite Failure Methods – Application Comparisons”, Proceedings of Composites Durability Workshop-14 (CDW-14), UCLA, Jul, 2009

- “Thermoelastic Shape Memory Modeling of Medical Devices with FEA”, SMST-2006, The International Conference on Shape Memory and Superelastic Technologies, ASM International, May, 2006, (with Sanjay Choudhry and Jesse Lim).
- “Finite Element and Fatigue Analysis of CardioVasc Stent Graft”, CardioVasc, Inc., 2004.
- “Analysis of Rail Cracking and Development of a Rail Screening Guideline Based on Fracture Mechanics Principles”, Fatigue & Durability Assessment of Materials, Components & Structures, Proceedings of the Fifth International Conference of the Engineering Integrity Society, Queen's College, Cambridge, UK, Apr 7-9, 2003.
- “Finite Element and Fatigue Analysis of CP Stent Expansion”, NuMed, Inc., 2003.
- “Evaluation of a Failure in a Chlorine Production Facility”, Proceedings of IMECE 2001, ASME International Mechanical Engineering Congress and Exposition, Nov, 2001, New York, NY (with S. Andrew, R. Caligiuri, and L. Eiselstein).
- “Physical Testing for Good Analysis: Experimental Validation for Quality Finite Element Analysis of Medical Devices”, feature article for *ANSYS Solutions*, Fall 2000 (Machine Design Custom Media, Penton Media, Inc.).
- “Finite Element Simulation of 180° Rollover for Heavy Truck Vehicles”, ASCE Engineering Mechanics Conference, Baltimore, MD, Jun, 1999 (with Christopher V. White and Shari E. Day).
- “Finite Element Analysis of the S670 Cardiovascular Stent”, Arterial Vascular Engineering, Inc., 1999.
- “Finite Element Analysis of the S660 Cardiovascular Stent”, Arterial Vascular Engineering, Inc., 1999.
- “Finite Element Analysis of the Six Crown Extra Support Renal Stent – Minimum Dimensions”, Arterial Vascular Engineering, Inc., 1998.
- “Finite Element Analysis of the SVG Stent”, Arterial Vascular Engineering, Inc., 1998.
- “Finite Element Analysis of the GFX-II Cardiovascular Stent”, Arterial Vascular Engineering, Inc., 1998.
- “Analysis of Drill Pipe Joint Failures and Recommendations For Service”, Failure Analysis Associates, Inc. Report, Nov, 1997 (with R.D. Caligiuri, L.E. Eiselstein, M. Wu, R. Huet).
- “Finite Element Analysis of the GFX Cardiovascular Stent”, Arterial Vascular Engineering, Inc., 1997.
- “Stress Analysis: AVE MicroStent-II Cardiovascular Stent”, Arterial Vascular Engineering, Inc., 1997.
- “SAE Report CRP-12 Heavy Truck Crashworthiness – Phase II (180° Dynamic Rollover, Static Roof Crush Simulation)”, SAE Headquarters, 1997.
- “Heavy Truck 180° Dynamic Rollover and Static Roof Crush Simulation”, Failure Analysis Associates, Inc. Report, Apr, 1996 (with C. White, S. Day, T. Khatua, and L. Cheng).
- “Fracture Toughness by Small Punch Testing”, *Journal of Testing and Evaluation*, Vol. 23(1), pp. 3-10, Jan, 1995 (with J. R. Foulds, P. J. Woytowicz and C. W. Jewett).
- “Safety Analysis of Custom Designed Manufacturing Equipment”, Proceedings, American Society of Mechanical Engineers Winter Annual Meeting, Safety Engineering and Risk Analysis, New Orleans, Louisiana, Nov, 1993, Vol. 1, pp. 111 (with G. L. Rao and R. D. Caligiuri).
- “American Azide Corporation Reactor and Dryer Safety Studies”, Failure Analysis Associates, Inc. Report, Jan, 1993 (with G. L. Rao, V. B. Rao, and R. D. Caligiuri).
- “Combustion Tests on and Chemical Analysis of Therminol 66 Heat Transfer Fluid Used at American Azide”, Failure Analysis Associates, Inc. Report, 1993 (with A. Reza and R. D. Caligiuri).
- “Gas Release from Leaky Natural Gas Pipeline: The PEPCON Explosion in Henderson, Nevada”, Failure Analysis Associates, Inc. Report, 1992 (with A. Reza, M. El-Fadel and R. D. Caligiuri).

- “Computational Modeling of Dynamic Failure in Armor/Anti-Armor Materials”, Failure Analysis Associates, Inc. Final Report to U.S. Army Research Office, Contract DAA-L03-88-C-0029, May, 1992.
- “Analysis of Cracking in the Windsor Recovery Boiler Superheater”, Failure Analysis Associates, Inc. Report to Domtar, Inc., Apr, 1992 (with R. D. Caligiuri, C. H. Lange and S. P. Andrew).
- “Analysis of the Dynamic Response of a Buried Pipeline due to a Surface Explosion”, *Computational Aspects of Impact and Penetration*, L.E. Schwer and R.F. Kulak, eds., Elme Press International, 1991 (with R. D. Caligiuri).
- “Failure Analysis of Aerzen Screw Compressor Male Thrust Bearings”, Failure Analysis Associates, Inc. Report to AECI Chlor-Alkali & Plastics, Ltd., Sep, 1991 (with C. C. Schoof).
- “Gas Flow and Heat Transfer in a Pipe Tee Joint”, Failure Analysis Associates, Inc. Report to Chevron Corporation, Nov, 1990 (with R. D. Caligiuri and A. Reza).
- “Development of Dynamic Failure Criteria for Ceramic Armor Materials”, Failure Criteria and Analysis in Dynamic Response Symposium, ASME Winter Annual Meeting, Nov, 1990, H.E. Lindberg, ed.
- “DYNA3D Analysis of the Dynamic Response of a Buried Pipeline due to a Surface Explosion”, DYNA3D User Group Conference, Bournemouth, Dorset, United Kingdom, Sep, 1990.
- “Con Edison Hellgate Facilities Gas Main Rupture”, Failure Analysis Associates, Inc. Report to Consolidated Edison Company of New York, Inc., Feb, 1990.
- “Stress and Fracture Mechanics Analysis of Weld Cracking in a Rotary Ball Mill”, American Society of Mechanical Engineers Winter Annual Meeting, Paper 89-WA/DE-17, San Francisco, California, Dec, 1989 (with C. A. Rau, Jr., H. F. Wachob and E. L. Kennedy).
- “Analysis of the Plunger-to-Plunger Rod Joint in an Automotive Fuel Injector”, Failure Analysis Associates, Inc. Report to Hitachi, Ltd., Oct, 1988 (with P. R. Johnston and B. Ross).
- “Analysis of the Circumferential Seam Weld Cracking of Raw Grinding Mills”, Failure Analysis Associates Report to Kaiser Cement Corporation, Nov, 1986 (with C.A. Rau, Jr., H.F. Wachob).
- “Local Flexibility and Stresses in Cylindrical and Spherical Shells Due to External Loadings on Nozzles and Lug Attachments”, A.F.I.A.P. Conference, Paris, France, Oct, 1986.
- “Analysis of Piping Systems with Local Nozzle Flexibility Using Personal Computers”, American Society of Mechanical Engineers Pressure Vessel and Piping Conference, New Orleans, LA, 1985.
- “Numerical Improvement of Asymptotic Solutions and Nonlinear Shell Analysis”, Ph.D. dissertation, Stanford University, Jun, 1984.
- “Numerical Improvement of Asymptotic Solutions for Shells of Revolution with Application to Toroidal Shell Segments”, *Computers & Structures*, Vol. 16, No. 1-4, 1982.

Consulting Projects - Selected

Client: NanoBio Genomics, Inc.
Project: Confidential

Client: Aquedon Medical, Inc.
Project: Product development associated with implantable Nitinol medical device for aortic aneurysm; Duett product; Radial Stiffness Assessment; Correlate Test & Simulation

Client: Silver Spring Networks, Inc.; Ops A La Carte LLC
Project: Mechanical Accelerated Life Testing and Reliability Assessment of Commercial IoT Network-Connected Natural Gas Metering Equipment; Failure Analysis support; plastic component design, accelerated life testing; remote monitoring;

Client: F-Prime Capital Partners (former Fidelity Biosciences)
Project: Technical Due-Diligence review of prospective stealth-mode medical device investment

Client: SI-Bone, Inc.
Project: Design review of iFuse sacroiliac (SI) joint fixation devices; Competitive comparison

Client: TexasLDPC, Inc.
Project: Business Advisor; Flash Memory Technology development for error-correction; LDPC – Low-Density Parity Check; start-up

Client: Cerevatech Medical, Inc.
Project: Business Advisor; Medical Device developer of innovative Nitinol neurovascular stent and flow diverter devices, start-up

Client: Promed Medical Inc.
Project: Evaluation of deployment failure associated with Nitinol scaffold and bioabsorbable PLGA cover material. Test protocols; assessment of data and development of strategy to increase device reliability.

Client: Topera Inc.
Project: Evaluation of Nitinol device failure in test and clinical setting used for 3D mapping associated with treatment of arrhythmia. Comparison of current design with proposed redesign.

Client: LC Therapeutics
Project: Assessment of Nitinol coronary device.

Client: CrossRoads Extremity Systems
Project: Design evaluation of Nitinol orthopedic devices for bone fixation with focus on foot & ankle devices including staples and plates; Report for 510K submission to FDA

Client: Bridgelux, Inc
Project: Design evaluation of LED Outdoor Lighting Module (OLM) for assembly and service conditions; assessment of polymeric, injection-molded components including FRP (fiber-reinforced plastic)

Client: Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.
Project: MEMs Patent Portfolio review and assessment

Client: Design Standards Corporation (DSC)
Project: Design analysis & report for injection-molded surgical ligation clip;

Client: Sirius Engineering LLC
Project: Nitinol Vena-Cava Filter; Implantable cardiovascular medical device

Client: Nitinol Technology, Inc.
Project: Design and assessment of large-scale nitinol components for seismic damping in civil structures (buildings, bridges, roadways); analysis & testing collaboration

Client: Varian Medical, Inc.
Project: Medical radiation oncology capital equipment; shipping hazard assessment

Client: Atsina Surgical LLC
Project: Injection molded surgical ligation clip; material testing; product design, development, and optimization

Client: Home Dialysis Plus
Project: Development of reliability & accelerated testing protocols for innovative dialysis system including mechanical, electronic, & software components

Client: Freedom Innovations, LLC
Project: Carbon Fiber Prosthetic Foot – failure analysis, simulation

Client: Ops A La Carte LLC
Project: Mechanical Design for Reliability classes; failure analysis; simulation of mechanical & thermal performance; accelerated testing and root-cause analysis; TTi Sunseeker solar tracker failure analysis, redesign after full system loss due to damage from high winds;

Client: OLT Solar
Project: Product improvement under high-temperature exposure

Client: VX Aerospace
Project: Composite material product design and validation

Client: Fidelity Biosciences
Project: Medical device due-diligence and technology evaluation pre-investment

Client: DJS Associates
Project: Automated food packaging equipment - failure analysis and assessment of root cause issues

Client: Tribal Engineering, LLC
Project: Various simulation and customer training projects

Client: Gerson Lehrman Group
Project: MEMs Sensors; Various other projects

Client: Ops A La Carte LLC
Project: Various Reliability Consulting projects; Mechanical Design for Reliability Training

Client: Revascular Therapeutics, Inc (acquired by Boston Scientific)
Project: Implantable medical device for treatment of calcified lesions

Client: City and County of San Francisco
Project: Glass failure; Trial prep

Client: Sagalio LLC
Project: Retractable screen for portable cellular devices

Client: New Energy Technologies, Inc
Project: Alternative Energy concept assessment & review

Client: Square One Medical
Project: Implantable medical device design, development, simulation

Client: Kyphon
Project: Device improvement for spinal interventional device

Client: ProMed, Inc
Project: Implantable medical device for spinal application

Client: Nuvation
Project: Instrumentation assessment

Client: Ovalis, Inc
Project: Nitinol PFO Closure Device development and design improvements

Client: Gateway Medical
Project: Vascular Closure Device

Client: Ensure Medical
Project: Vascular Closure Device

Client: Abbott Laboratories
Project: Continued development and cost reduction aspects for StarClose device.

Client: Integrated Vascular Solutions (IVS) (acquired by Abbot Labs)
Project: Design & development of StarClose nitinol closure device for arterial closure following interventional procedures. 2005 MDM Excellence Award

Client: Prolifix Medical
Project: Nitinol device to excise plaque buildup from arteries

Client: Coapt Systems
Project: Bioabsorbable devices for surgical and cosmetic procedures

Litigation Support Experience

Litigation Cases; Depositions & Expert Reports as Shown:

2023 to Present	Client:	Lewis Rice LLC
	Case:	<i>SRAM LLC v Fox Factory, Inc.</i> , Case 1:23-cv099492-SCJ in the Northern District of Georgia, Atlanta Division.
	Project:	Patents; Various specialized bicycle components
	Status:	Expert Declaration
2023 to Present	Client:	Baker & Hostetler LLP
	Case:	<i>Bote LLC v Twitch LLC</i>
	Project:	Patents; Drop-Stitch, Inflatable Stand-Up Paddle Boards (SUPs)
	Status:	IPR Expert Declarations
2023 to Present	Client:	Merchant & Gould P.C.
	Case:	<i>Smarte Carte Inc. and Charles E. Bain v. Innovative Vending Solutions LLC and Innovative Strollers LLC</i> No. 1:19-cv-08681-NLH-AMD in United States District Court District of New Jersey
	Project:	Patents; Dispensing System for Wheeled Device
	Status:	Deposition, March 2024; Infringement Expert Report; Validity Rebuttal Report; 2024
2023 to Present	Client:	Lipsius-BenHaim Law, LLP
	Case:	<i>Silverwing Medical LLC v. Adorama Inc. and Kitchen Winners NY Inc. (E.D.N.Y.); and Kitchen Winners NY Inc. v. Rock Fintek LLC (S.D.N.Y.)</i>
	Project:	Inspect, Review, and Chemical Assessment of surgical gloves
	Status:	
2023	Client:	Manning & Kass LLP
	Case:	<i>Serra Aladag v Williams-Sonoma, Inc., et.al.</i> , Case No. 22STCV33894, Superior Court of California for the County of Los Angeles
	Project:	Personal Injury (burns) and alleged Product Defect & Product Liability associated with a Water Bottle
	Status:	Settled
2023 to Present	Client:	Wise Morrissey, LLC
	Case:	<i>David Ness and Nicole Ness v. Grundfos Pumps, Corp</i> , Case No. , Circuit Court of Cook County Illinois
	Project:	Personal Injury, Product Liability associated with Workpiece ejected from a CNC Lathe
	Status:	

2023	Client:	Johnston & Hutchinson LLP
	Case:	<i>Childers v Restoration Hardware</i> , Case No. CIV1801659, Superior Court of California for the County of Marin
	Project:	Personal Injury, Product Liability associated with coating material composition and flaking on a Table
	Status:	Settled
2022 to Present	Client:	McCaulley Law Group; Haley Guiliano LLP
	Case:	<i>Surgical Instrument Service Company, Inc. v Intuitive Surgical, Inc.</i> , Case No. , United States District Court, Northern District of California
	Project:	Anti-Trust case associated with EndoWrist devices for Da Vinci surgical robots. Engineering evaluation of repaired devices.
	Status:	Deposition, March 2023; Expert Reports 2023;
2022 to Present	Client:	Spector Roseman & Kodroff, P.C.
	Case:	<i>RE: Da Vinci Surgical Robot Antitrust Litigation</i> , Lead Case No. 3:21-cv-03825-vc, United States District Court, Northern District of California
	Project:	Anti-Trust case associated with EndoWrist devices for Da Vinci surgical robots. Engineering evaluation of repaired devices.
	Status:	Deposition, March 2023; Expert Reports 2023;
2022	Client:	Calfee, Halter & Griswold, LLP
	Case:	<i>LG Electronics, Inc v. Multiple Respondents</i> , Certain Refrigerator Water Filtration Devices and Components Thereof, Investigation No. 337-TA-1290, United States International Trade Commission (ITC), Washington, D.C.
	Project:	ITC Investigation regarding alleged Validity and Infringement of 3 LGE patents for Refrigerator Water Filtration technology.
	Status:	Settled; Invalidity & Non-Infringement Declarations, June 2022. Deposition, July 2022.
2021 to 2022	Client	Banner Witcoff
	Case:	<i>Aspen Medical Products, LLC v Breg Inc.</i> Case No.3:21-cv-00631-WQH-MDD in the United States District Court, Southern District of California
	Project:	Patent matter regarding medical body and cervical support braces
	Status:	Settled.
2021 to 2022	Client:	Dovel & Luner, LLP
	Case:	<i>Rebotix Repair LLC v Intuitive Surgical, Inc.</i> , Case No. 8:2020cv02274, United States District Court, Middle District of Florida, Tampa Division.
	Project:	Anti-Trust case associated with EndoWrist devices for Da Vinci surgical robots. Engineering evaluation of repaired devices.
	Status:	Settled; Expert Report, Aug 2021; Deposition, Sep 2021;

2021 to 2022	Client:	Gibson, Dunn & Crutcher, LLP
	Case:	United States District Court, Central District of California.
	Project:	Patent matter associated with beverage systems and components
	Status:	Settled.
2021	Client:	Schlichter & Shonack, LLP
	Case:	<i>KV Inc v Heartstitch, Inc.</i> , Case No. 30-2019-01051080-CU-BC-NJC in the Superior Court for the State of California, County of Orange
	Project:	Assessment of FDA regulated custom manufactured medical device components for heart surgery. Assessment of conformance and quality.
	Status:	Settled
2021	Client:	Dentons, London, UK
	Case:	Confidential Case - <i>European Patent Office review</i>
	Project:	Medical device patent; Support review process
	Status:	European Patent Office (EPO) Declaration 2021;
2021 to 2023	Client:	Rosen & Perry, P.C.
	Case:	<i>Chamber v. Dollar Tree Store, et.al.</i> ; Case No. , Superior Court, Pennsylvania
	Project:	Personal Injury, warnings, device evaluation; – material and load evaluation of hair device; tissue damage due to pressure
	Status:	Settled.
2021 to Present	Client:	Cogan & Power, PC
	Case:	<i>Michele Volk v. Stryker Medical, et.al</i>
	Project:	Investigate microcatheter failure during medical procedure.
	Status:	Ongoing.
2021	Client:	Thompson Coburn LLP
	Case:	<i>Widdenmeyer v. Zoll Medical, Ranken-Jordan Hospital, et.al.</i> Case No. , Superior Court, St.Louis, MO
	Project:	Investigate alleged malfunction and defect in AED (Automated External Defibrillator). Site inspection.
	Status:	Resolved
2020 to Present	Client:	Klarquist Sparkman, LLP
	Case:	Various - Patent
	Project:	Medical device patent issues; infringement, validity
	Status:	Ongoing.

2020	Client:	Morrison & Foerster, LLP on behalf of Apple, Inc.
	Case:	In RE: Macbook Keyboard Litigation; Various Plaintiffs, vs. Apple Inc.; Case No. 5:18-CV-02813-EJD-VKD United States District Court Northern District of California, San Jose Division
	Project:	Potential Class Action and Class Certification; Laptop Keyboard technology; design, performance, repair rates.
	Status:	Resolved; Expert Report, Sep 2020; Deposition, Oct 2020;
2020	Client:	Baker & Hostetler, LLP
	Case:	<i>NEXTracker vs. Solar FlexRack and Northern States Metals Co.</i> , United States District Court, District of Delaware
	Project:	Patents; Solar tracker technology patents associated with Guide Rails, Clamps, etc.
	Status:	Settled; IPR Declaration Oct 2020;
2020 to 2021	Client:	Merchant & Gould P.C.
	Case:	<i>Otter Products, LLC and Treefrog Developments, Inc. vs Fellowes, Inc.</i> United States District Court, Northern District of Illinois, Eastern Division;
	Project:	Patents; Consumer Electronics technology for protection of personal electronics (cell phones, tablets, etc.) against drop, moisture, etc.
	Status:	Settled; IPR Declarations: 2-Aug 2020; 2-Dec 2020; 1-Jan 2021; Patent Infringement;
2020 to 2022	Client:	Bienert Katzman PC
	Case:	<i>Julie Hall, vs. Torax Medical, Inc., Ethicon, Inc., Johnson & Johnson, John Lipham, MD, et.al</i> , Case No. 30-2019-01078281-CU-PL-CJC in the Superior Court for the State of California, County of Orange
	Project:	Personal injury, product liability associated with medical device to treat Gastric Reflux Disease (GERD)
	Status:	Settled
2020 to Present	Client:	The Cottle Firm
	Case:	<i>Richard vs. American Honda Motor Co., Inc., Home Depot USA, Inc., et.al</i> . Case No. A-19-791675-C in the Nevada State District Court, Clark County, Nevada
	Project:	Personal injury, product liability associated with rototiller
	Status:	Deposition Nov 2021; Expert Report May 2020, Aug 2021; Ongoing.
2020 to Present	Client:	Todd Tracy Law Firm
	Case:	<i>Hendricks v DTNA, Freightliner. et.al</i> ; Cause No. 103610-86 in the District Court, Kaufman County, TX, 86 th Judicial District
	Project:	Heavy-truck rollover & crashworthiness; design assessment; product liability
	Status:	Ongoing.

2020	Client: Todd Tracy Law Firm Case: <i>Guerra v Navistar</i>; Case No. 1:18-CV-00321-KG-JFR, United States District Court for the District of New Mexico Project: Heavy-truck rollover & crashworthiness; design assessment; product liability Status: Deposition, Aug 2020; Settled
2019 to 2020	Client: Singer Davis LLC Case: <i>McIntosh vs. EVMS Academic Physicians & Surgeons Health Services Foundation, Covidien Holding, Inc., Cook Medical, LLC, et.al.</i> Case No. CL18-4817 in the Circuit Court for the City of Norfolk Virginia Project: Personal Injury, Product Liability related to Percutaneous Tracheostomy Tube; Status: Settled
2019	Client: Venable LLP Case: <i>Disc Disease Solutions, Inc., vs. VGH Solutions, Inc. Dr-Ho's Inc., Hoi Ming Michael Ho.</i> Case No. 1:15-cv-00188-LJA, United States District Court, Middle District of Georgia, Albany Division Project: Patents; Medical Device, Back-Pain Relief; Status: Settled; Claim construction, invalidity, non-infringement; Claim construction Declaration Aug 2019;
2019	Client: Baker & Hostetler, LLP Case: <i>Zadro Products, Inc. vs. SDI Technologies, Inc. d/b/a iHOME.</i> Case No. 17-1406 (WCB) in the United States District Court for the District of Delaware Project: Patents; Consumer products, LED lighting, mirrors Status: Settled
2019	Client: Gardella Grace P.A. Case: <i>Fulfillium, Inc. vs. ReShape Medical, LLC, SV Health Investors, LLC, Intersect Partners, LLC and ReShape Lifesciences, Inc.</i> Case No. 8:18-cv-01265-RGK-PLA United States District Court, Central District of California, Western Division Project: Patents; medical devices, balloons, weight control Status: Settled; Deposition Aug 2019; Expert Report Aug 2019; Declaration on Motion for Summary Judgement Aug 2019;
2019	Client: Merchant & Gould Case: <i>Carlson Pet Products, Inc. v. North States Industries, Inc..</i> Case No. 17-cv-02529- PJS-KMM, United States District Court for the District of Minnesota Project: Patents, Consumer product; Pet barrier Status: Settled; Declaration, Oct 2019;

2019 to Present	Client:	Todd Tracy Law Firm
	Case:	Multiple cases
	Project:	Heavy-truck rollover & crashworthiness; design assessment; product liability
	Status:	Ongoing.
2019	Client:	Sterne, Kessler, Goldstein & Fox, P.L.L.C. (SKGF)
	Case:	<i>Lutron v. Geigtech</i>
	Project:	Patent Post-Grant Review (PGR); Other PTAB actions
	Status:	Suspended
2019 to Present	Client:	Faegre Baker Daniels LLP
	Case:	Confidential MDL Product Litigation
	Project:	Confidential
	Status:	
2019 to 2022	Client:	Rouda Feder Tietjen McGuinn
	Case:	<i>Margo Schein v. Peak Pilates</i>
	Project:	Inspection of Pilates Reformer equipment; Accidental injury root-cause assessment; Personal Injury; explain accident scenarios; Support for mediation;
	Status:	Resolved;
2019	Client:	Manning & Kass, Ellrod, Ramirez, Trester LLP
	Case:	<i>Randy and Giselle Hoehn v. Summit to Sea LLC, Pet Pressure LLC.</i>
	Project:	Hyperbaric pressure chamber inspection, operation, and design review. Accidental injury investigation.
	Status:	Settled
2018 to 2020	Client:	Beasley, Allen, Crow, Methvin, Portis & Miles, P.C.
	Case:	<i>Miriam Naramore v. Daimler Trucks North America, LLC.</i> Civil Action No. 1:18-CV-00156 in United States District Court for the Middle District of Georgia, Albany Division.
	Project:	Heavy-truck rollover & crashworthiness; design assessment
	Status:	Settled
2018 to 2021	Client:	Maddin, Hauser, Roth & Heller, P.C.
	Case:	<i>Larry Eskilsen and Renie Eskilsen v. Oakland Orthopedic Appliances, Inc.</i> ; Case No. 18-036354-NO-1 Saginaw Circuit Court
	Project:	Alleged failure of orthopedic leg prosthetic; personal injury
	Status:	Settled; Deposition, Sep 2020;
2018 to 2019	Client:	Klein, DeNatale, Goldner, LLP
	Case:	<i>H&M Gopher Control, Allen Hurlburt v. Benchmark Pest Control, Inc., Andrew Ozanich.</i> Case No. 1:17-CV-01700-JLT, United States District Court for the Eastern District of California
	Project:	Patent technology for control of rodents
	Status:	Settled; Expert Report, Jan 2019;

2018 to 2019	Client:	Cypress LLP
	Case:	<i>Kore Essential, Inc v. Nexbelt, LLC</i> . Case No. 3:17-CV-02129-CAB-JMA, United States District Court for the Southern District of California
	Project:	Patent technology for Ratchet Belt system
	Status:	Settled; Expert Report, Feb 2019;
2018 to 2019	Client:	Pillsbury Winthrop Shaw Pittman, LLP
	Case:	<i>Lite-On Technology Corp v Darfon Electronics Corp</i> , Case No. 3:18-cv-02776, United States District Court, Northern District of California.
	Project:	Keyboard technology patents
	Status:	Settled; IPR Declaration Dec 2018;
2018 to 2020	Client:	Honigman Miller Schwartz & Cohn LLP
	Case:	<i>Tim A. Fischell, Robert E. Fischell, and David R. Fischell v. Cordis Corp, Abbott Laboratories and Abbott Cardiovascular Systems, Inc.</i> , United States District Court for the District of New Jersey; Civil Action No. 3:16-cv-00928-PGS-LHG
	Project:	Patent family associated with cardiovascular stents
	Status:	Settled; Declaration, Apr 2019;
2018	Client:	Akerman, LLP
	Case:	<i>Qbex Computadores S.A v. Intel Corporation</i> , United States District Court, Northern District of California, San Jose Division.
	Project:	Cellular phone ARM microprocessor, alleged product design defect associated with CPU overheating
	Status:	Settled
2018 to 2019	Client:	Davidson, Davidson & Kappel LLC
	Case:	ArcelorMittal Project; <i>Inter Partes Review Proceeding Against Array Technologies Inc. U.S. Patent 8,459,249</i>
	Project:	Patent IPR associated with solar panel trackers
	Status:	Settled; Deposition Dec 2018; IPR Declaration Mar 2018;
2018 to 2019	Client:	Ropes & Gray LLP
	Case:	<i>CPI Card Group, Inc. v. Multi-Packaging Solutions, Inc</i> , United States District Court for the District of Colorado
	Project:	Patent associated with secure packaging of transaction/gift cards; Testing
	Status:	Resolved
2017 to 2018	Client:	Rimon Law
	Case:	<i>Imogene D. Johns v. Invacare Corporation</i> , Tulare County Superior Court Case No. 270201
	Project:	Alleged medical equipment product defect
	Status:	Settled

2017 to 2018	Client:	The Scranton Law Firm
	Case:	<i>Cesar Lopez & Moses Sepulveda v. DOES-I</i>
	Project:	Alleged design defect in ATV Rollover Protection System (RoPS); Design and Failure Analysis
	Status:	Resolved;
2017 to 2018	Client:	Troutman Sanders LLP; Vinson & Elkins
	Case:	<i>Blackbird Tech LLC d/b/a Blackbird Technologies v. Lenovo (United States) Inc.</i> ; C.A. No. 16-cv-140-RGA, United States District Court for the District of Delaware
	Project:	Patent infringement allegations around laptop computer screen display technology
	Status:	Settled; Declaration May 2018; Deposition Feb 2018; Reply Report Dec 2017; Non-Infringement Report Nov 2017; Invalidity Report Sep 2017;
2017	Client:	White & Case LLP
	Case:	<i>Maquet Cardiovascular LLC v. Abiomed Europe GmbH and Abiomed R&D, Inc.</i> ; C.A. No. 1:16-CV-10914, United States District Court for the District of Massachusetts
	Project:	Resolved; Multiple Patent & Technology dispute associated with Implantable Circulatory Support System Pumps
2017 to 2018	Client:	Baker & Hostetler, LLP
	Case:	<i>SCA Hygiene Products AB et.al., SCA Tissue North America, LLC v. Tarzana Enterprises, LLC</i> ; United States District Court, Western District of Wisconsin, No. 3:16-cv-00728
	Project:	Patent infringement claims associated with paper goods manufacturing, stacking, folding, and packaging methods and equipment
	Status:	Settled; Depositions (2) Sep 2018; IPR Response Declarations, Jul 2018 (2), May 2018;
2017	Client:	Vinson & Elkins
	Case:	<i>Inter Partes Review of U.S. Patent No. 7,129,931; Lenovo (United States) Inc. v. Blackbird Tech LLC d/b/a Blackbird Technologies; Blackbird Technology LLC v. Lenovo, Civil Action No. 1:16-cv-00140 in the District of Delaware</i>
	Project:	Patent IPR and alleged infringement involving laptop computer display apparatus
	Status:	Deposition Feb 2018; Expert Report; IPR Declaration May 2017;
2017 to Present	Client:	The Joe C. Savage Law Firm
	Case:	<i>Bauer v. Parks, Hyundai Motors America, and Deskins Motor Company and other related cases</i> ;
	Project:	Vehicle Accident Investigation, Design, Crashworthiness, Fire
	Status:	Settled

2017 to 2018	Client:	Hill, Kertscher & Wharton, LLP
	Case:	<i>Trans Technologies Company v. Hendrickson USA LLC, et.al.</i> , United States District Court for the Northern District of Georgia, Atlanta Division, Civil Action No. 1:16-cv-01778-AT
	Project:	Patent litigation involving heavy-truck tire inflation/deflation technology
	Status:	Settled; Deposition Jul 2018; Deposition Apr 2018; IPR Declaration Aug 2017; IPR Reply Declaration Feb 2018;
2017 to 2018	Client:	Morgan, Lewis & Bockius LLP
	Case:	<i>Advanced Circulatory Systems, Inc. v. AutoMedx, Inc.</i> , and <i>AutoMedx, Inc v. ZOLL Medical Corp.</i> , <i>Advanced Circulatory Systems, Inc.</i> ; CPR Institute for Dispute Resolution, CPR File No. G-16-07
	Project:	Medical Ventilator Technology Development; Medical equipment
	Status:	Settled
2017	Client:	Dorsey & Whitney LLP
	Case:	<i>Hovik Nazaryan v. FemtoMetrix Inc.</i> , Superior Court of the State of California for the County of Orange Case No. 34-30- -2015- 00795246-CU-BC-CJC
	Project:	Semiconductor lithography equipment technology development
	Status:	Settled
2016 to Present	Client:	Casper, Meadows, Schwartz & Cook
	Case:	<i>Rovner v. Medtronic, Inc. et.al.</i> Contra Costa Superior Court, Case No. C16-01768
	Project:	Medical Device defect of NSC spinal lumboperitoneal (LP) Shunt/Valve for hydrocephalus shunting of excess cerebrospinal fluid (CSF); associated personal injury
	Status:	Settled
2016 to 2018	Client:	Rimon Law
	Case:	<i>Heather Ciechanowski v. Invacare Corporation, Folsom Care Center, Bluff Enterprises, Inc. and Calvin Callaway</i> , Sacramento County Superior Court Case No. 34-2016-00188724
	Project:	Alleged medical equipment product defect
	Status:	Settled
2016 to 2017	Client:	Rucka, O'Boyle, Lombardo & McKenna
	Case:	<i>Concepcion Hernandez v. Helen of Troy, Inc.</i> ;
	Project:	Medical equipment personal injury
	Status:	Settled

2016 to 2017	Client:	Quinn Emanuel Urquhart & Sullivan, LLP
	Case:	<i>TriReme Medical LLC v. AngioScore, Inc.</i> , Northern District of California; Case No. 14-cv-2946
	Project:	Patent litigation involving cardiovascular medical device
	Status:	Deposition, Dec.2016; Expert Reports, Nov.2016 & Dec.2016; Settled
2016 to 2017	Client:	Baker Manock & Jensen, PC
	Case:	<i>California Fire-Roasted LLC v. General Mills Operations, LLC</i> ; Sacramento County Superior Court Case No. 34-2014-00170784-CU-BC-GDS
	Project:	Patent licensing and royalty case for food-processing equipment
	Status:	Settled
2016 to 2017	Client:	DLA Piper, LLP
	Case:	<i>Inter Partes</i> Review of U.S. Patent No. 6,099,882; <i>Olam West Coast, Inc. v. California Fire-Roasted LLC</i>
	Project:	Patent IPR involving food-processing equipment
	Status:	Settled; IPR Declarations (2) Oct.2016;
2016 to 2018	Client:	Plews Shadley Racher & Braun, LLP; Bradshaw Law, LLC
	Case:	<i>Rick C. Sasso, M.D., and SEE LLC v. Warsaw Orthopedic, Inc., Medtronic Inc., Medtronic Sofamor Danek, Inc.</i> , Indiana State Court, Case No. 43C01-1308-PL-44.
	Project:	Patent litigation involving coverage for spinal medical device
	Status:	Deposition Aug 2018; Patent Trial Testimony Nov 2018 ; Jury Verdict for Plaintiff; Upheld on Appeal Dec 2020;
2016 to Present	Client:	Christensen Fonder, P.A.
	Case:	<i>Willis Electric Co., Ltd v. Polygroup Limited (Macao Commercial Offshore), Polygroup Macau Limited (BVI), Polytree (H.K.) Co. Ltd.</i> , 15-cv-3443, 3:15-cv-00552, United States District Court for the District of Minnesota.
	Project:	Patent litigation involving modular mechanical and electrical connectors
	Status:	Settled
2016 to Present	Client:	Locke Lord LLP
	Case:	<i>Denneroll Holdings Pty Limited and Denneroll Industries International Pty Limited v. ChiroDesign Group, LLC and Marie L. Webster, Individually and D/B/A ChiroDesign Group</i> ; Civil Action No. 4:15-cv-740; United States District Court for the Southern District of, Houston Division.
	Project:	Patent litigation involving chiropractic pillows
	Status:	Settled; Infringement Expert Report, May 2016; Validity Expert Report, June 2016

2016 to Present	Client:	Mass Montes LLP
	Case:	<i>Logan W. Hensley vs. Michael J. Skyhar, MD.; Cayenne Medical, Inc., and DOES 1 thru 40, inclusive</i> ; Case no. 37-2015-00005140-CU-MM-NC, Superior Court for the State of California for the County of San Diego, North County Division.
	Project:	Personal injury involving failed medical device and medical practice
	Status:	Settled
2016 to Present	Client:	Hamrick & Evans, LLP
	Case:	<i>Laurence Johnson vs. Raytheon Company, Systems XT, Inc. Brownco Construction Company, Inc., Power Edge Solutions, Inc. (aka PES Controls), et.al.</i> United States District Court for the Central District of California; Case No. 2:15-cv-00132-MWF-E.
	Project:	Personal Injury; Product Performance & Product Liability
	Status:	Settled
2015 to 2016	Client:	Nixon Peabody LLP
	Case:	<i>Johnstech International Corp v. JF Microtechnology SDN BHD</i> United States District Court for the Northern District of California; Case No. 3:14-cv-02864-JD
	Project:	Patent litigation involving semiconductor test technology
	Status:	Invalidity Expert Report, Non-Infringement Expert Report – Dec 2015; Patent Trial Testimony – Sep 2016. Jury Verdict.
2015	Client:	Susman Godfrey LLP
	Case:	<i>Bonutti Skeletal Innovations, LLC v. Globus Medical, Inc</i>
	Project:	Patent litigation involving spinal medical devices
	Status:	Settled
2015	Client:	Richardson, Patrick, Westbrook, & Brickman, LLC
	Case:	<i>Smart v. PACCAR</i>
	Project:	Heavy-Truck Rollover & Crashworthiness
	Status:	Settled
2014 to 2018	Client:	Harris and Graves, P.A.
	Case:	<i>Raven N. Dineen v. Sprint Corp, Asurion Protection Services, LLC and Apple, Inc.</i> , District Court, Greenville Division, District of South Carolina, No. 6:16-cv-01549-MGL
	Project:	Investigation of alleged cellular telephone defect and Lithium-Ion battery breach; Personal injury (victim sustained burns) due to ignition & combustion of cell phone; Non-Destructive & Destructive Inspections
	Status:	Settled; Deposition Oct 2017; Expert Report, July 2015, July 2017;

2014 to 2019	Client: Law Offices of David McQuade Leibowitz, P.C. Case: <i>Ricardo Garza v. Daimler Truck of North America (DTNA), Freightliner LLC</i>; Texas Circuit Court, Bexar County, Texas Project: Heavy Truck Crashworthiness Status: Trial Testimony Sep 2019; Deposition Jul 2018; Expert Report Apr 2018; Jury Verdict;
2014	Client: Kolisch Hartwell, P.C. Case: <i>TMI Products, Inc. v. Rosen Entertainment Systems, L.P</i> United States District Court for the Central District of California; Case No. EDCV12-02263 RGK (SPx) Project: Patent case involving consumer electronics & vehicle entertainment applications Status: Settled; Deposition March 2014; Declaration & Report March 2014; Declaration & Rebuttal Report March 2014;
2014 to 2018	Client: Corsiglia, McMahon, & Allard Case: <i>Avalos v. Balt, Stanford Hospital & Clinics, et.al.</i> Project: Personal Injury during Medical Procedure & Medical Device Product Liability; Failure analysis of micro-catheter for neurovascular treatment; embolization of a cerebral AVM during procedure at Stanford Hospital Status: Settled
2014 to 2015	Client: The Previant Law Firm, S.C. Case: <i>Kaminski v. DongGuan, et.al.</i> Project: Personal injury (eye damage) due to failure of consumer product (elastomeric strap tie-down); Failure analysis, material testing, and evaluation of elastomeric material components Status: Settled; Expert Report, July 2014
2013 to 2015	Client: Guajardo & Marks, LLP Case: <i>Bertha A. Flores Individually and as Representative of the Estate of Jose Flores, et.al. v Daimler Trucks North America, LLC.</i> United States District Court for the Southern District of Texas, Corpus Christi Division, and is Civil Action No. 2:13-cv-87 Project: Heavy-Truck Rollover & Crashworthiness Status: Settled, Mar 2015 Deposition, Feb 2015; Report, Oct 2014
2012 to 2014	Client: Edwards Life Sciences; Kilpatrick, Townsend & Stockton, LLP Case: <i>Medtronic v. Edwards</i> Case No. 11-CV-1650-JNE/JSM (D. Minn.) Project: Medical device patent claims, infringement & invalidity Status: Settled Invalidity Report Aug 2013; Non-Infringement Report Oct 2013; Deposition Oct 2013, Oct 2012

2013 to 2014	Client:	US Securities and Exchange Commission
	Case:	<i>Securities and Exchange Commission (SEC) v. Inteligentry, Ltd., Plasmerg, Inc., PTP Licensing, Ltd., and John P. Rohner in Civil No. 2:13-CV-00344-GMN-NJK</i>
	Project:	Securities associated with “Plasmic Transition Process Engine” technology; Technology assessment
	Status:	Resolved
2013 to 2015	Client:	Beasley, Allen, Crow, Methvin, Portis & Miles, P.C.
	Case:	<i>Walker v. PACCAR, Inc.</i> Alabama Circuit Court, Barbour County; 06-CV-2013-900032.00
	Project:	Heavy-Truck Rollover & Crashworthiness
	Status:	Settled
2013	Client:	Retained in a metal component manufacturing technology patent litigation case.
	Case:	<i>Confidential</i>
	Project:	Metal manufacturing process patent for smart-phone and consumer electronics applications
2013 to 2015	Client:	Beasley, Allen, Crow, Methvin, Portis & Miles, P.C.
	Case:	<i>Lacy v. Freightliner</i>
	Project:	Heavy-Truck Rollover & Crashworthiness
	Status:	Settled Mar 2015
2013 to 2015	Client:	Beasley, Allen, Crow, Methvin, Portis & Miles, P.C.
	Case:	<i>Jones vs. Daimler Truck North America (DTNA)</i> Alabama Circuit Court
	Project:	Heavy Truck Rollover & Crashworthiness
	Status:	Settled Nov 2015; Deposition Jan 2014
2012	Client:	Smart-phone technology patent litigation case involving embedded electro-mechanical components
	Case:	<i>Confidential</i>
	Project:	Patent issues associated with specific user-feedback technologies
	Status:	
2010 to 2015	Client:	Warren & Associates, LLC
	Case:	<i>Jones vs. MSE Hauling</i>
	Project:	Heavy Truck Rollover
	Status:	Settled Nov 2015; Deposition Jan 2014
2009 to 2014	Client:	Schwarz & Mongeluzzi; Nelson, Levine, DeLuca & Horst
	Case:	<i>Carrera v. Navistar</i>
	Project:	Heavy-Truck Rollover & Crashworthiness
	Status:	Settled 2014; Deposition Feb 2013

2010	Client:	Sico, White, Hoelscher & Braugh L.L.P.
	Case:	<i>Ramirez v. Sterling Truck</i>
	Project:	Heavy-Truck Rollover & Crashworthiness
	Status:	Settled; Expert Report; Deposition May 2010
2008 to 2010	Client:	Beasley, Allen, Crow, Methvin, Portis & Miles, P.C.
	Case:	<i>Thibadeaux vs. PACCAR</i>
	Project:	Heavy-Truck Rollover Accidents
	Status:	Settled; 2010.
2008 to 2010	Client:	Beasley, Allen, Crow, Methvin, Portis & Miles, P.C.
	Case:	<i>Price vs. Navistar</i>
	Project:	Heavy-Truck Rollover Accidents
	Status:	Settled; 2010.
2008 to 2009	Client:	Beasley, Allen, Crow, Methvin, Portis & Miles, P.C.
	Case:	<i>Martin vs. Kenworth</i>
	Project:	Heavy-Truck Rollover Accidents
	Status:	Settled; 2009.
2007	Client:	Beasley, Allen, Crow, Methvin, Portis & Miles, P.C.
	Case:	<i>Strode v. Freightliner, LLC</i> ; Civil Action No. 02-132 Circuit Court of Greene County Alabama
	Project:	Heavy-Truck Rollover Accident
	Status:	Settled; 2007. Testified at trial.
2006	Client:	Gibson, Dunn, & Crutcher
	Case:	<i>Jang v. Boston Scientific Corp., et.al.</i> United States District Court, Central District of California; Eastern Division – Riverside; Case No: EDCV 05-00426 VAP (SGLx)
	Project:	Patent case for matters involving design features of Cardiovascular Stents.
	Status:	
2005	Client:	Beasley, Allen, Crow, Methvin, Portis & Miles, P.C.
	Case:	<i>Mongan vs. MACK Truck</i>
	Project:	Retained as fact witness in heavy truck rollover accident.
	Status:	Settled, 2005
2005	Client:	Lucas Wash Petway Tucker & Stephens, P.C.
	Case:	<i>Gable v. International Truck & Engine Corporation</i> United States District Court, Middle District of Pennsylvania; Civil Action No: 3:03-CV-01353
	Project:	Heavy-Truck Rollover Accident
	Status:	Closed; Deposition June 2005.

2004	Client: Kenyon & Kenyon Intellectual Property Law Firm Case: <i>Medtronic Vascular, Inc. vs. Boston Scientific Corp., et al.</i> C.A. No. 98-478-SLR (D-Del) Project: Patent case involving Cardiovascular Stent design Status: Closed; Expert Report filed;
1997	Client: Grimaldi, Pearson, and Weyand, P.C. Case: <i>Herbolsheimer v. Warner-Swasey</i> Case No. 9357487NP Project: Product defect of CNC machine equipment Status: Closed; Deposition.
1994	Client: Jones, Jones, Close & Brown Case: <i>Pioneer Chlor-Alkali Co., Inc. v. National Union Fire Insurance Co.</i> , United States District Court, District of Nevada, Case No. CV-S-93-276-HDM (RLH) Project: Accident investigation, insurance claim. Status: Closed; Deposition.
1994	Client: Clapp, Moroney, Bellagamba, Davis and Vucinich Case: <i>Thomas Fujisaka and Sandra Fujisaka v. Livermore Valley Unified School District</i> , Superior Court of the State of California In and For the County of Alameda, Case No. 700921-1 Project: Accident Investigation, Personal Injury Status: Closed; Deposition.
1994	Client: GEA In-House Counsel Case: <i>GEA Power Cooling Systems, Inc. v. Hyspan Precision Products</i> , Superior Court of the State of California for the County of San Diego, Case No. 669769 Project: Product Liability; Failure analysis root cause. Status: Closed; Deposition.
1993	Case: <i>Bobbie J. Phaneuf v. Edith D. Roman</i> , Superior Court of the State of California County of Alameda, Case No. H - 154330-4 Project: Product Design. Status: Closed; Deposition, Trial.
1993	Case: <i>Patricia C. Barbera v. H. B. Instrument Company</i> , Superior Court of the State of California In and For the County of Marin, Case No. 138929 Project: Product Design. Status: Closed; Deposition, Trial.

1990 Client: Chevron In-House Counsel
 Case: *Secretary of Labor v. Chevron U.S.A, et al.*, Occupational Safety
 and Health Review Commission, Region 9,
 OSHRC Docket No. 89-3125
 Project: Accident investigation; Failure analysis root cause.
 Status: Closed; Deposition.

Trials & IPRs:

2024 Status: *Bote LLC v Twitch LLC*
 Status: IPR Declarations May,Jun, 2024;

2020 Case: *NEXTracker vs. Solar FlexRack and Northern States Metals Co.,.*
 United States District Court, District of Delaware
 Status: IPR Declaration Oct 2020;

2020 Case: *Otter Products, LLC and Treefrog Developments, Inc. vs Fellowes,*
 Inc. United States District Court, Northern District of Illinois,
 Eastern Division.
 Status: IPR Declarations 2-Aug 2020; 2-Dec 2020; 1-Jan 2021;

2019 Case: *Ricardo Garza v. Daimler Truck of North America (DTNA),*
 Freightliner LLC; Texas Circuit Court, Bexar County, Texas
 Status: Testified in Trial, Sep 2019

2018 Case: *Lite-On Technology Corp v Darfon Electronics Corp*, Case No.
 3:18-cv-02776, United States District Court, Northern District of
 California.
 Status: IPR Declaration Dec 2018;

2018 Case: *Rick C. Sasso, M.D., and See LLC v. Warsaw Orthopedic, Inc.,*
 Medtronic Inc., Medtronic Sofamor Danek, Inc, Indiana State Court,
 Case No. 43C01-1308-PL-44.
 Status: Testified in Patent Trial, Nov 2018

2018 Case: *SCA Hygiene Products AB et.al., SCA Tissue North America, LLC*
 v. Tarzana Enterprises, LLC;
 United States District Court, Western District of Wisconsin,
 No. 3:16-cv-00728
 Status: IPR Response Declarations, July 2018 (2), May 2018;

2018 Case: Davidson, Davidson & Kappel LLC; ArcelorMittal Project
 Status: IPR Declaration, Mar 2018;

2017	Case: <i>Trans Technologies Company v. Hendrickson USA LLC, et.al.</i> , United States District Court for the Northern District of Georgia, Atlanta Division, Civil Action No. 1:16-cv-01778-AT
	Status: IPR Declaration Aug 2017; IPR Response Declaration Feb 2018;
2017	Case: <i>Lenovo (United States) Inc. v. Blackbird Tech d/b/a Blackbird Technologies</i> , Review of U.S. Patent No. 7,129,931;
	Status: Deposition Feb 2018; Expert Report; IPR Declaration May 2017;
2016	Case: <i>Olam West Coast, Inc. v. California Fire-Roasted LLC; Inter Partes</i> Review of U.S. Patent No. 6,099,882
	Status: IPR Declarations (2), Oct 2016;
2016	Case: <i>Johnstech International Corp. v. JF Microtechnology SDN BHD</i> ; Action 14-cv-02864-JD, US Federal Court, District of Northern California
	Status: Testified in Patent Trial, Sep 2016
2007	Case: <i>Strode v. Freightliner, LLC</i> ; Civil Action No. 02-132 Circuit Court of Greene County Alabama
	Status: Testified in Product Liability/Personal Injury case;
1995	Case: <i>Bobbie J. Phaneuf v. Edith D. Roman</i> ; Superior Court of the State of California County of Alameda, Case No. H-154330-4
	Status: Testified in Product Liability/Personal Injury case;
1994	Case: <i>Patricia C. Barbera v. H. B. Instrument Company</i> ; Superior Court of the State of California In and For the County of Marin, Case No. 138929
	Status: Testified in Product Liability case;