

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

PATENT OWNER RESPONSE

TABLE OF CONTENTS

TABLE OF CONTENTS.....	i
TABLE OF AUTHORITIES	iv
TABLE OF EXHIBITS	v
I. INTRODUCTION	1
II. THE ‘993 PATENT INVENTION.....	4
A. The Novel Steerer Tube of the ‘993 Patent.....	4
B. The Stresses Experienced by, and Design Considerations for, a Bicycle Steerer Tube Are Entirely Different From Those on a Bicycle Frame and Its Tubular Components.....	9
C. No Claim Construction Is Needed for the ‘993 Patent Claims.....	13
D. The Level of Person of Ordinary Skill in the Art Requires Experience in the Design of Vehicle Components or Like Technology.....	14
III. THE ‘993 PATENT CLAIMS ARE NOT ANTICIPATED BY ANY OF THE ASSERTED PRIOR ART.	15
IV. DENK IN VIEW OF MOECHNIG AND/OR SCHROEDER DOES NOT RENDER THE CHALLENGED CLAIMS OBVIOUS.	16
A. 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.	16
B. Denk Does Not Disclose a Bicycle Steerer Tube Having a Maximum Wall Thickness in the Bicycle’s Plane of Travel.	20
C. A POSITA Would Not Be Motivated to Combine Denk With Moechnig for Weight and Strength Advantages When Moechnig Is Already Lightweight and Teaches Strength in the Lateral, Not Fore-Aft Direction, the Opposite of the ‘993 Patent.....	24
D. A POSITA Would Not Find It Obvious to Orient Denk in View of Moechnig to Have a Maximum Wall Thickness of the Bicycle Steerer Tube in the Fore-and-Aft Direction of the Bicycle’s Plane of Travel.	27

V.	VALAT IN VIEW OF MOECHNIG, DENK AND/OR SCHROEDER DOES NOT RENDER THE CHALLENGED CLAIMS OBVIOUS.....	30
A.	Valat Does Not Disclose a Bicycle Steerer Tube Having a Maximum Wall Thickness in the Bicycle’s Plane of Travel.	31
B.	A POSITA Would Not Be Motivated to Combine Valat in View of Moechnig and Denk for Strength and Weight Advantages.....	37
1.	Changing Valat to Include Denk’s Alternating Thin and Thick Wall Features Would Defeat Valat’s Primary Purpose of Providing Strength Along the Entire Lower Portion of the Steerer Tube.	38
2.	There Would Be No Actual Benefit to Replacing Valat’s Ribs with Denk’s Alternating Thick and Thin Walls.	41
C.	A POSITA Would Not Find It Obvious to Orient Valat in View of Moechnig and Denk to Have a Maximum Wall Thickness of the Bicycle Steerer Tube in the Fore-and-Aft Direction of the Bicycle’s Plane of Travel.	45
VI.	DEPENDENT CLAIMS 56 AND 59 DIRECTED TO TAPERING THE MAJOR OR MINOR DIAMETERS OF THE INNER SHAPE AS A FUNCTION OF PROXIMITY TO THE UPPER SECTION ARE NOVEL AND NOT RENDERED OBVIOUS BY ANY GROUNDS.....	47
VII.	DEPENDENT CLAIMS 6, 10, 20, 24, 40, AND 44 DIRECTED TO A CIRCULAR INNER SURFACE OF THE UPPER SECTION ARE NOT RENDERED OBVIOUS BY ANY GROUNDS.....	50
VIII.	ALL GROUNDS FAIL TO DISCLOSE OR RENDER OBVIOUS DEPENDENT CLAIMS 2–4, 6–8, 16–20, 22, 27–29, 36–38, 40, 42, 47–49, AND 61–63 CLAIMING A STEERER TUBE ORIENTED WITH ITS MAXIMUM THICKNESS IN THE DIRECTION OF TRAVEL AND AN OUTER DIAMETER THAT IS GREATER IN THE LOWER SECTION THAN THE UPPER SECTION.....	56
1.	Valat Does Not Disclose or Suggest a Steerer Tube With an Outer Diameter That Is Greater in the Lower Section Than the Upper Section.	57
2.	Denk Does Not Disclose or Suggest a Steerer Tube With an Outer Diameter That Is Greater in the Lower Section Than the Upper Section.	58

3.	Petitioner’s Rationales to Combine and/or Alter Denk and Valat Are Legally and Technically Deficient.	60
IX.	CONCLUSION.....	63

TABLE OF AUTHORITIES

Cases

<i>Abiomed, Inc. v. Maquet Cardiovascular, LLC</i> , Case No. IPR2017-01025, 2017 WL 4317629 (PTAB Sept. 26, 2017).....	60
<i>Belden Inc. v. Berk-Tek LLC</i> , 805 F.3d 1064 (Fed. Cir. 2015)	53, 54, 60
<i>Hockerson-Halberstadt, Inc. v. Avia Group Int’l.</i> , 222 F.3d 951 (Fed. Cir. 2000)	51
<i>Kinetic Concepts, Inc. v. Smith & Nephew, Inc.</i> , 688 F.3d 1342 (Fed. Cir. 2012)	41
<i>KSR Int’l Co. v. Teleflex, Inc.</i> , 550 U.S. 398 (2007)	26, 50
<i>Ortho-McNeil Pharm., Inc. v. Mylan Lab’ys, Inc.</i> , 520 F.3d 1358 (Fed. Cir. 2008)	27, 60
<i>TQ Delta, LLC v. CISCO Systems, Inc.</i> , 942 F.3d 1352 (Fed. Cir. 2019)	26, 50
<i>Virtek Vision Int’l ULC v. Assembly Guidance Sys., Inc.</i> , 97 F.4th 882 (Fed. Cir. 2024)	27

TABLE OF EXHIBITS

Exhibit	Description
Ex. 2001	Order Denying Fox Factory, Inc.’s Motion to Transfer to the Northern District of California and Order to Show Cause as to Why Sanctions Are Not Appropriate, dated March 6, 2024, <i>SRAM, LLC v. FOX Factory, Inc.</i> , Case No. 1:23-cv-00492-SCJ (United States District Court – N.D. Georgia)
Ex. 2002	Thomson Reuters’ Westlaw Litigation Analytics Report (United States District Court – N.D. Georgia)
Ex. 2003	LexisNexis Analytics (United States District Court – N.D. Georgia)
Ex. 2004	United States Department of Justice District Court Caseload Statistics
Ex. 2005	Scheduling Order, dated May 31, 2023, <i>SRAM, LLC v. FOX Factory, Inc.</i> , Case No. 1:23-cv-00492-SCJ (United States District Court – N.D. Georgia)
Ex. 2006	Fox Factory, Inc.’s Brief in Opposition to SRAM’s Motion to Stay, dated Jan. 8, 2024, <i>FOX Factory, Inc. v. SRAM, LLC</i> , Case No. 1:23-cv-00313-RM-KAS (United States District Court – D. Colorado)
Ex. 2007	Fox Factory, Inc.’s Preliminary Invalidity Contentions, dated June 16, 2023 (including Exhibits 4 and 5), <i>SRAM, LLC v. FOX Factory, Inc.</i> , Case No. 1:23-cv-00492-SCJ (United States District Court – N.D. Georgia)
Ex. 2008	Website capture for Santa Cruz NOMAD bicycle featuring RockShox Zeb fork
Ex. 2009	Declaration of Michael Durbin
Ex. 2010	Thomson Reuters’ Westlaw Litigation Analytics Report (Honorable Steve C. Jones Case Statistics)

Exhibit	Description
Ex. 2011	Joint Preliminary Report and Discovery Plan dated April 17, 2023, <i>SRAM, LLC v. FOX Factory, Inc.</i> , Case No. 1:23-cv-00492-SCJ (United States District Court – N.D. Georgia)
Ex. 2012	March 7, 2024 Through March 15, 2024 Email Exchange Between Counsel for Patent Owner and Counsel for Petitioner
Ex. 2013	June 4, 2024 Through June 14, 2024 Email Exchange Between Counsel for Patent Owner and Counsel for Petitioner
Ex. 2014	Second Declaration of Michael Durbin
Ex. 2015	Declaration of Richard Walsh, Jr.
Ex. 2016	Hightower Frame and Bicycle Webpage from Santacruz bicycles.com
Ex. 2017	1120 Frameset Webpage from trek.com
Ex. 2018	Order, dated September 27, 2024, <i>SRAM, LLC v. FOX Factory, Inc.</i> , Case No. 1:23-cv-00492-SCJ (United States District Court – N.D. Georgia)
Ex. 2019	Deposition of Dr. Alexander Slocum, dated October 23, 2024
Ex. 2020	US Patent Pub. No. 2014/0145413 A1 to Baltaxe et al.
Ex. 2021	Declaration of Dr. Kim Parnell
Ex. 2022	Joint Claim Construction Statement, dated July 8, 2024 (including Exhibit A), <i>SRAM, LLC v. FOX Factory, Inc.</i> , Case No. 1:23-cv-00492-SCJ (United States District Court – N.D. Georgia)
Ex. 2023	Third Declaration of Michael Durbin

I. INTRODUCTION

Stretching back centuries, the first iteration of a bicycle (known then as a celerifere or velocipede) was originally a machine with two rigidly mounted wheels, incapable of being steered. It was not until the front wheel was capable of being turned/steered that the velocipede / bicycle truly gained rapid popularity around the world. This rider-actuated steering ability is central to the functioning of a bicycle. Ex. 2021, Declaration of Dr. Kim Parnell (“Parnell Dec.”), ¶¶25–28.¹

Conventionally, bicycle steerer tubes (which critically connect the handlebars to the bicycle front fork to operate as a single steering mechanism unit) were circularly cylindrical with uniform wall thickness. However, this structure – used for over a century without change – had substantial disadvantages relating to strength, stability, comfort, and overall steering performance. *Id.*, ¶¶29–33. The inventors of U.S. Patent No. 10,328,993 B2 (“the ‘993 Patent”) recognized these

¹ Patent Owner submits herewith expert testimony from Dr. Kim Parnell. A mechanical engineer with a Ph.D. from Stanford University and more than thirty (30) years’ experience prior to the filing of the ‘993 Patent, Dr. Parnell also had extensive experience in the design of vehicle components and/or like technology since the early 2010’s. Ex. 2021, ¶¶4-13.

challenges with a conventional bicycle steerer tube structure and the unique mechanical forces that impact a steerer tube when twisted from side to side to steer the bicycle. They conceived of a novel structure with wall thicknesses that would *vary* through the length of the steerer tube to address those unique forces and disadvantages of conventional steerer tubes. This unique structure reduces the overall weight of the bicycle steerer tube while simultaneously increasing its strength and stiffness in the direction of the bicycle's plane of travel, a key advantage over the prior art.

By only making obviousness challenges to the '993 Patent, Petitioner FOX Factory, Inc. ("Petitioner") and their tendered expert² expressly acknowledge that

² To evaluate potential bias of a tendered expert, the Board must understand how much that expert has been paid for his opinions for Petitioner over time - how much of the expert's livelihood is dependent on such payments. Here, Petitioner tendered an expert who would not provide that information, claiming he did not know the total. *See* Ex. 2019, p. 70, line 23-p. 72, line 19. Petitioner's expert has provided near continual work for Petitioner for years on many different products. To properly evaluate bias, the Board should require Petitioner to identify those specific amounts.

such a structural arrangement never existed before the advent of the inventions of the ‘993 Patent and is not found in the prior art. Ex. 2019 (Slocum Depo.), p. 22, line 18 – p. 23, line 4. Faced with such unambiguous novelty, Petitioner misrepresents the nature and scope of the ‘993 Patent and relevant prior art, all in an attempt to obfuscate the basic facts about the novel, nonobvious invention of a structurally unprecedented steerer tube.³

The Board should reject Petitioner’s faulty premises and recognize the clear advantages over the art that the inventions of the ‘993 Patent provide, with elements

³ Petitioner’s penchant for misrepresentation is nothing new. In parallel litigation involving the ‘993 Patent in the United States District Court for the Northern District of Georgia – *SRAM, LLC v. FOX Factory, Inc.*, No. 1:23-cv-00492-SCJ – Petitioner was recently sanctioned by the federal court *sua sponte* for misrepresenting basic facts about its own principal place of business. Exhibit 2018, 3 (“The Court *sua sponte* required FOX to show cause why sanctions should not issue over its misrepresentations regarding the location of its principal place of business.”); (*id.* at 16) (“Based on these facts, the Court is constrained to find that FOX and its litigation counsel made ‘knowingly false statement[s] or exhibit[ed] a deliberate indifference to obvious facts’ and, thus, acted in a manner akin to contempt that supports a Rule 11 sanction.”) (footnote omitted).

not disclosed anywhere in the art, going against everything that came before it, addressing the unique forces impacting steerer tubes.

II. THE ‘993 PATENT INVENTION

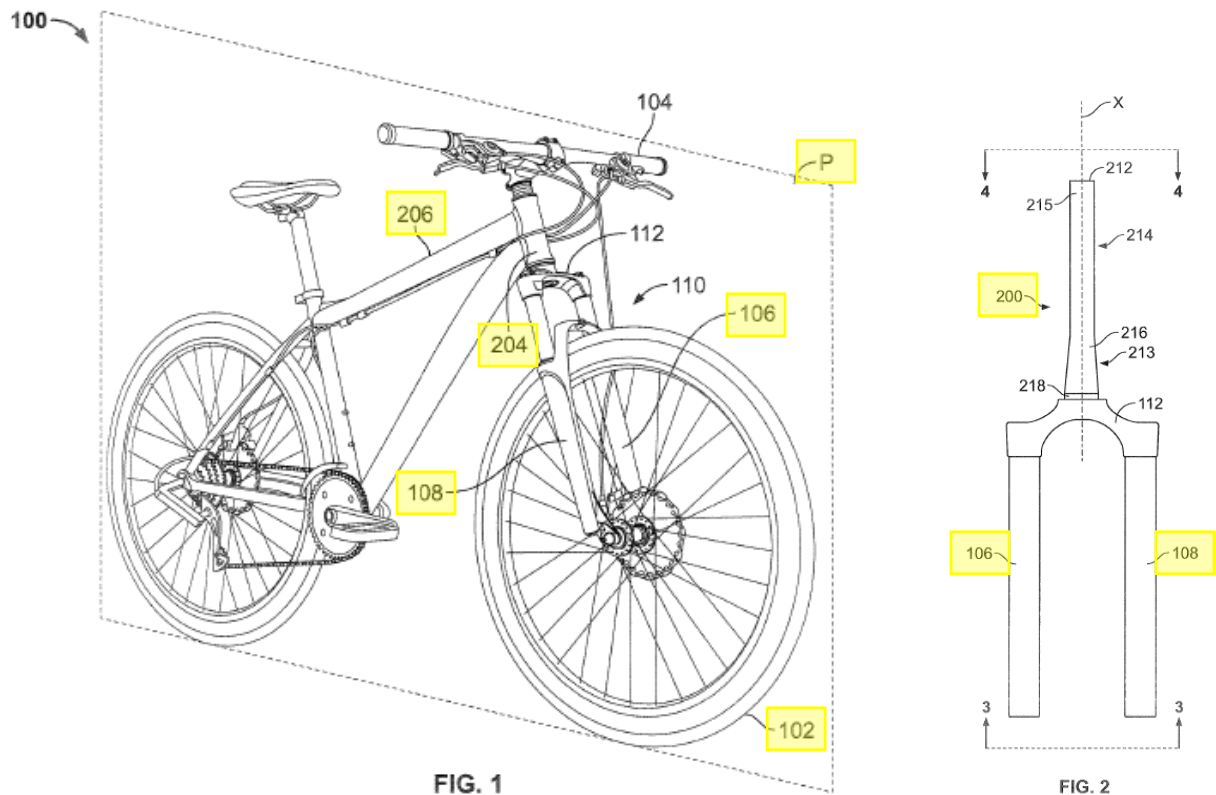
A. The Novel Steerer Tube of the ‘993 Patent

The invention of the ‘993 Patent is focused on a critical part of the bicycle: steering and, in particular, the steerer tube – which connects and allows the handlebar to control the direction of the front wheel, and, hence, the bicycle’s direction. The steerer tube has functions and characteristics uniquely distinguished from other parts of the bicycle.

Conventional bicycles are steered with a rider-operated handlebar linked to the front wheels through the steerer tube, such that turning the handlebar controls the turning of the front wheel, and hence, the bicycle’s direction. That critical and essential link between the handlebar and wheel is achieved through a component not rigidly connected to the frame, namely, the steerer tube, which connects the bicycle fork and front wheel to the bicycle frame and thereby permits the rider to steer the bicycle to the right or left, as desired. Ex. 1001 (‘993 Patent), 1:6–32.

Notably, the steerer tube experiences significantly different torsional and fore-and-aft forces compared to the primarily vertical forces impacting the bicycle frame caused by the rider’s weight, as the steerer tube has to rotate relative to the bicycle frame to cause a direction change, as discussed further below. As shown in Figures 1

and 2 of the '993 Patent, reproduced below, a bicycle frame **206** includes a head tube **204** that is configured to accept the addition of a separate steerer tube **200** therein, which in turn connects to the fork crown **112**, fork legs **106** and **108**, and front wheel **102**, with the steerer tube **200** and front wheel **102** located in the bicycle's plane of travel **P** (as highlighted below):



Prior to the invention of the '993 Patent, conventional steerer tubes were circularly cylindrical with uniform wall thickness. That makes perfect sense since a strong steerer tube is needed. But those uniform thickness steerer tubes had significant performance drawbacks in strength, stability, comfort, and steering:

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; Ex. 2021 (Parnell), ¶32; *see also id.*, ¶¶29–33.

To overcome these problems, the ‘993 Patent discloses steerer tubes that vary the thickness of the steerer tube walls to address the different impacting forces while turning and riding. The ‘993 Patent steerer tubes have greater wall thickness in a very specific direction – the fore-and-aft direction aligned with the bicycle’s plane of travel – while having a lesser wall thickness in the lateral or side-to-side direction, *i.e.*, perpendicular to the bicycle’s plane of travel. 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.

Id., 2:4–9. In other words, the ‘993 Patent orients the steerer tube so that the greater wall thickness is aligned with the direction of the bicycle’s travel, where the ‘993 Patent teaches that greater strength is needed. The resulting steerer tubes have an increased stiffness in the fore-and-aft direction, aligned with the direction of the bicycle’s travel. Ex. 2021 (Parnell), ¶¶41–42. Notably, ***the ‘993 Patent’s invention stands directly counter to the prior art’s teaching of increasing the stiffness and strength of the side walls while decreasing the stiffness and strength of the fore-aft walls***, as discussed further below.

One embodiment of the ‘993 Patent creates these benefits by forming a portion of the interior cross-sectional shape of the steerer tube with an elliptical shape. As shown in Figure 3 of the ‘993 Patent (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** below), while at a minimum in the perpendicular direction (side-to-side). Ex. 1001 (‘993 Patent), 7:57–65.

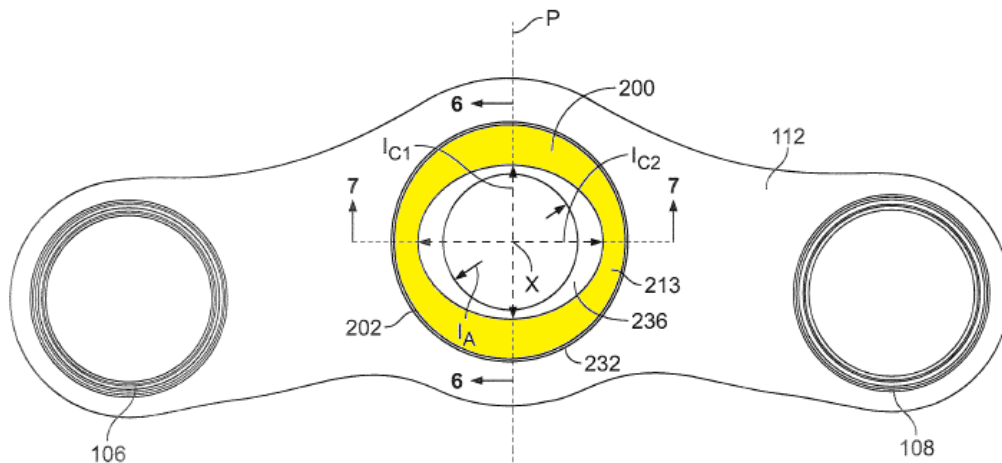


FIG. 3

According to the teachings of the '993 Patent, this puts required strength in the steerer tube where it experiences more stress. This critical distinguishing element is found in each of the Independent Claims 1, 61, and 64, recited as:

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.**

Id., 8:15–19 (claim 1) (emphasis added), 12:9–13 (claim 61), 12:39–43 (claim 64).

Increased stiffness in the fore-and-aft walls of the steerer tube is not the only benefit. By orienting the steerer tube so that the maximum wall thickness is aligned with the fore-and-aft direction of travel for the bicycle, the weight of the overall steerer tube can also be reduced for a given fore-and-aft strength, which is a

significant benefit in the bicycle space where riders are always looking for weight reduction advantages. *Id.*, 2:4–9.

Additionally, 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 simultaneously increasing strength and stiffness of the steerer tube in the direction of the bicycle’s plane of travel. Moreover, the circular outer cross-sectional shape assists with the fork’s integration into a bicycle frame by allowing the use of typical, circular bearings at the attachment points to the bicycle frame. *Id.*, 1:22–26, FIGs. 1, 3–4. To be certain, Fox cannot deny that such a structural arrangement never existed before the advent of the inventions of the ‘993 Patent and is not found in the prior art. Ex. 2021 (Parnell), ¶59. Indeed, their expert has admitted as much. Ex. 2019 (Slocum Depo.), p. 22, line 18 – p. 23 line 4.

B. The Stresses Experienced by, and Design Considerations for, a Bicycle Steerer Tube Are Entirely Different From Those on a Bicycle Frame and Its Tubular Components.

The ‘993 Patent distinguishes the bicycle frame **206** from the steerer tube **200** because these portions of the bicycle have completely different design considerations. Ex. 2021 (Parnell), ¶50. Specifically, as noted in the prior art, the bicycle frame **206** must manage the rider’s weight as a primary consideration. Ex. 1006 (English Translation of German Patent Application No. DE19629740A1

to Denk (“Denk”)), Col. 2.⁴ *See also* Ex. 2019 (Slocum Depo.), p. 93, lines 11–22 (Petitioner’s tendered expert admitting that the discussion in Denk’s column 2 related to bicycle frames). On the other hand, 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, above. Thus, weight concerns differ due to the forces incident on the bicycle frame compared to the very different forces that act on the bicycle steerer tube fixed to the front fork, which has differing forces affecting it because of the twisting actions to steer compared with a static frame. *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.”)

Further, the bicycle steering mechanism (handlebar, steerer tube, front fork) are fixed together and have to rotate as a single unit. The connected bicycle fork

⁴ The German version of Denk is Exhibit 1005.

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 bicycle steering mechanism 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**. The steerer tube fixes together and connects the front fork/front wheel with the handlebar. Twisting the handlebar **104** affixed to steerer tube **200** around the steering axis **X** causes the fork **110** to rotate around the same steering axis **X**, in turn rotating the wheel **102** out of the plane of travel **P**. When the wheel is turned out of the plane of travel **P**, the travel direction is altered, the plane **P** shifts, and the frame **206** is brought into a new direction of travel. Ex. 1001 ('993 Patent), 1:8–31; Ex. 2021 (Parnell), ¶51.

As a result of these known differences, bicycle frames and bicycle steerer tubes/forks are designed separately, and nearly always by 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).

It is known in the art that the steering mechanism of a bicycle, in particular, a bicycle steerer tube and fork, have different considerations compared to the bicycle frame as a whole because they are subjected to significantly different forces than bicycle frames during use. For example, bicycle frames are primarily concerned with loads and related forces that occur in the vertical (up and down) direction to the ground, while bicycle steerer tubes and forks are primarily concerned with loads and related forces in the fore-and-aft direction of the bicycle's travel (and to some extent, the side-to-side direction). 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. Ex. 2021 (Parnell), ¶52.

Prior to the advent of the inventions of the '993 Patent, bicycle fork designers concerned their designs with two overarching considerations believed to be: (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 (Ex. 1008 (Moechnig), ¶¶[0009], [0049], [0050]); Ex. 2021 (Parnell), ¶53.

The ‘993 Patent, however, uniquely improves bicycle steerer tube technology by bucking that prior convention, and increasing the stiffness and strength of the steerer tube and fork in the fore-and-aft direction, while also simultaneously accomplishing another goal, namely, the reduction of weight. Ex. 1001 (‘993 Patent), 2:4–9; 7:57–65; *see also id.*, FIGS. 2, 12, 13, 19, 25, 31.

The Petition ignores these considerations, and instead, generalizes the ‘993 Patent’s disclosure to support its unreasonable prior art combinations. The Petition muddies the technical waters, pulling unrelated statements from the prior art in an attempt to cobble together the elements of the claims of the ‘993 Patent. But the inventions of the ‘993 Patent provide clear advantages over the art, along with elements not disclosed anywhere in the art, and the ‘993 Patent’s unconventional construction goes directly against the teachings of prior art, especially Petitioner’s base modifying reference, Moechnig. Ex. 2021 (Parnell), ¶55.

C. No Claim Construction Is Needed for the ‘993 Patent Claims.

Patent Owner agrees that the ‘993 Patent’s claim terms require no special claim construction for purposes of denying this Petition.⁵

⁵ Despite its representations to the Board that no claim terms from the ‘993 Patent require construction, Petitioner has nevertheless sought construction of two claim phrases in the parallel District Court litigation. Ex. 2022, Ex. A thereto,

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

Patent Owner believes a person of ordinary skill in the art (“POSITA”) here 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. Ex. 2021 (Parnell), ¶57.

Petitioner’s generalist expert does not appear to meet these requirements. In contrast, Patent Owner’s technical expert (Dr. Kim Parnell) held a Ph.D. in Mechanical Engineering and had extensive experience in the design of vehicle components and/or like technology as of the ‘993 Patent’s 2014 filing date. *Id.*, ¶¶4–13.

1-2. Patent Owner continues to maintain that these claim terms carry their ordinary meaning. *See id.*

III. THE ‘993 PATENT CLAIMS ARE NOT ANTICIPATED BY ANY OF THE ASSERTED PRIOR ART.

Although the Petition does not assert anticipation under 35 U.S.C. § 102 for any single prior art reference, this fact bears repeating in view of the overbroad and generalized manner in which Petitioner wrongfully describes the prior art, improperly suggesting that the ‘993 Patent brings nothing new to the table.

The undisputed fact is that no single reference discloses all of the elements of any of independent claims 1, 61, or 63 of the ‘993 Patent, or any of the 45 other challenged dependent claims. Petitioner’s proffered technical expert expressly admitted the lack of anticipation of the ‘993 Patent claims by any single reference. Ex. 2019 (Slocum Depo.), p. 22, line 18 – page 23, line 4 (“Q. None of the prior art references in this matter anticipate any claim of the ‘993 patent, correct? A. Correct. I did not find each and everything exactly fully clearly in one of the references. Q. No single reference includes every element of any claim of the ‘993 patent, correct? A. That’s correct. It’s not explicitly present.”). This includes Unexamined Patent Application DE 19629740 A1 to Denk (“Denk”), which Petitioner broadly asserts is suitable for “all tubular components of a bicycle frame”, Petition at 10, even though Petitioner’s tendered expert acknowledges 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. In other words, it is uncontroverted that neither Denk nor any other single prior art reference discloses a bicycle steerer tube with all of the required elements of the challenged claims.

IV. DENK IN VIEW OF MOECHNIG AND/OR SCHROEDER DOES NOT RENDER THE CHALLENGED CLAIMS OBVIOUS.

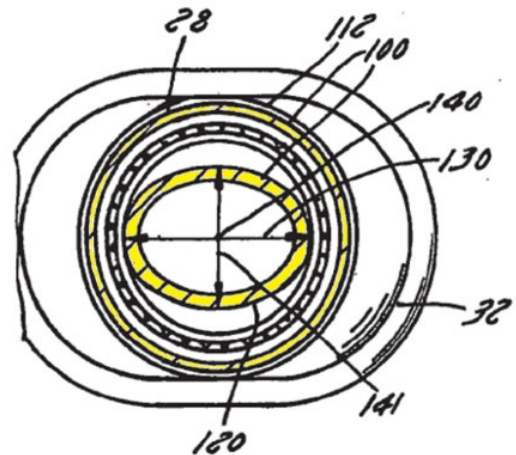
Independent claims 1, 61, and 64 all require that the bicycle steerer tube should have a varying wall thickness at its maximum in the bicycle's plane of travel. Petitioner admits that no single prior art reference has this requirement and therefore imagines that a POSITA would combine the Denk tubular frame component and the Moechnig prior art reference to somehow arrive at the claimed inventions of the '993 Patent. But the Moechnig prior art reference directly teaches the opposite – that the maximum wall thickness should be in the lateral, not the fore-aft, direction of the bicycle's travel. For at least this reason, the Board should deny Grounds I and II of the Petition and confirm the patentability of the challenged '993 Patent claims.

A. 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.

Petitioner's primary modifying prior art reference for all of its proposed combinations (Grounds 1–4) is Moechnig, offered for its teachings of a bicycle steerer tube having a steering axis located in a vertical plane of the bicycle's travel. Yet what Moechnig teaches about the proper construction of such a bicycle steerer

tube is directly in contradiction to the claimed motivations for, and obviousness of, Petitioner's proposed hindsight combinations.

To start, although it generally discloses a bicycle steerer tube, Moechnig is directed 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



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. *Id.*, FIG. 4.

Further, Moechnig is built with the exact opposite goal in mind compared to the '993 Patent's claimed structure, in that *Moechnig aims to decrease fore-aft rigidity, stiffness, and strength* as opposed to increasing each of those aspects as shown in the '993 Patent. *Id.*, Abstract, ¶¶[0006]–[0010], [0049]–[0050]; Ex. 2021 (Parnell), ¶¶34–36. Not surprisingly, Moechnig was already considered and overcome during the '993 Patent's prosecution for these very reasons. Ex. 1002, 180 (accepting arguments directed at Moechnig), 185–187 (arguments directed at Moechnig).

Moechnig first orients the POSITA to the importance of directionality relating to the bicycle steerer tube:

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].

Moechnig then explains 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.*

Therefore, *Moechnig seeks to have a less rigid fore-aft construction for the steerer tube* (i.e., in the direction of the bicycle's travel) and a more rigid lateral 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

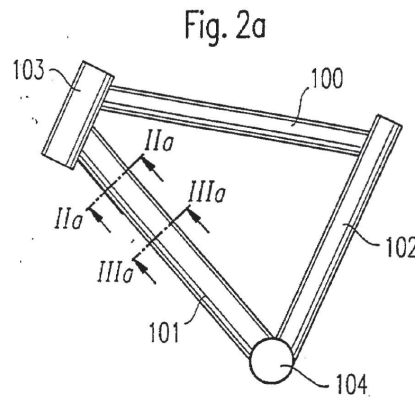
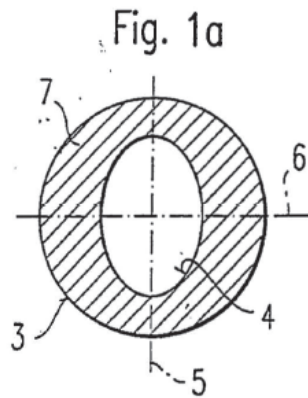
when subjected to a steering instruction input, most riders prefer a more rigid lateral interaction with the steerer assembly.

Id., ¶¶[0049]–[0050] (bold and italics emphasis added); Ex. 2021 (Parnell), ¶39.

A POSITA reviewing Moechnig for its teachings regarding proper steerer tube assembly would readily understand that it teaches that the focus should be on decreasing fore-aft rigidity, stiffness, and strength, and increasing the same aspects in the lateral direction. *See* Ex. 2021 (Parnell), ¶40. The ‘993 Patent does the opposite.

B. Denk Does Not Disclose a Bicycle Steerer Tube Having a Maximum Wall Thickness in the Bicycle’s Plane of Travel.

Petitioner’s tendered expert admits that Denk does not disclose or suggest the claimed “steerer tube for a bicycle” with a varying wall thickness at its maximum in the bicycle’s plane of travel. *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. A bicycle frame is illustrated in Denk’s Figure 2a, shown below, with one example of Denk’s tubular frame component shown in Figure 1a:



Id., Fig. 2a. Although Denk makes the overly broad statement that its lightweight tubing is suitable for “***practically all*** tubular components” of a bicycle, the items listed thereafter (“top tube, down tube, seat tube, head tube, fork tubes, rear wheel stay, seat posts, handlebars, handlebar stem, and the like”) do not specifically identify or disclose that Denk’s tubular frame component would be used as a substitute for the *bicycle’s steerer tube, which has unique and completely different set of torsional and fore-aft forces acting on it compared to the listed bicycle frame components*.⁶ Ex. 1006 (Denk), col. 4 (emphasis added); Ex. 2021 (Parnell), ¶¶60–68.

⁶ The non-frame “fork tubes” refer only 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. 2021 (Parnell), ¶¶68; Ex. 2019 (Slocum Depo.), p. 66, line 21 – p. 68, line 12; *id.*, p. 122, line 17 – p. 123, line 5.

Because of these very different torsional and fore-aft forces, bicycle frames and steerer tubes have differing considerations that tend to make tubing for frames different from tubing for steerer tubes. Specifically, a steerer tube is (1) subjected to more twisting torques, along with side-to-side torques, than frame tubes, (2) stressed during use at both ends and at the junction with the frame; and (3) oriented differently in space than frame tubes. Ex. 2021 (Parnell), ¶61.

The steerer tube is subjected to 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. *See, e.g.*, Ex. 2020 (US Patent Pub. No. 2014/0145413 A1 to Baltaxe), Abstract, [0001]– [0009] (explaining that fork twisting, which twists the steerer tube, is a significant consideration); Ex. 2021 (Parnell), ¶62. Further, steerer tubes experience stresses not just at the end of the tubing, but also at the points where the steerer tube interacts with the head tube of the relevant bicycle frame. Ex. 2021 (Parnell), ¶62. For example, French Patent No. 287,452 to Valat (“Valat”) confirms that bicycle steerer tubes are subjected to significant shear forces in this area. Ex. 1007 (Valat), 1:15–18, 1:44–51; Ex. 2019 (Slocum Depo.), p. 119, line 2 – p. 120, line 16.

Denk highlights differences compared to the steerer tube in discussing how the bicycle frame experiences vertical forces from the rider, rather than in the longitudinal direction of the bicycle during operation:

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). Denk's discussion of bicycle frames provides no disclosure or suggestions about how to design a bicycle steerer tube taking into account the forces acting both laterally (side-to-side), longitudinally (fore-aft), and torsionally (twisting), as opposed to the construction of bicycle frame components primarily experiencing vertical forces as contemplated by Denk. *See* Ex. 2021 (Parnell), ¶¶63–64.

Specifically for a bicycle frame, Denk is concerned with rider weight because the rider, who sits on top of the bicycle frame, is identified as the greatest stress to that bicycle frame. *See* Ex. 1006 (Denk), Col. 2. 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.* Denk's tubular frame component 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.

Denk simply says nothing about how its tubular frame component should be oriented other than for purposes of addressing these gravity-related vertical forces and does not suggest its use as a bicycle steerer tube with very different stresses, which would be recognized by a POSITA as experiencing a unique and special set of forces compared to bicycle frame tubular components and that is already oriented vertically such that the vertical forces contemplated by Denk have little impact on the steerer tube's design compared to the other forces acting on it. *See* Ex. 2021 (Parnell), ¶¶64–65.

C. A POSITA Would Not Be Motivated to Combine Denk With Moechnig for Weight and Strength Advantages When Moechnig Is Already Lightweight and Teaches Strength in the Lateral, Not Fore-Aft Direction, the Opposite of the '993 Patent.

Separate and apart from improperly conflating Denk's frame-based tubular components with a bicycle steerer tube experiencing uniquely different lateral and longitudinal forces or loads, Petitioner's sole proffered motivation to combine Denk with Moechnig is for the purported "advantages of improved mechanical strength

and reduced weight”. Petition, 13–14, 16; Ex. 1003 (Slocum), ¶57. Yet Petitioner says nothing more than this bare conclusion with respect to its proposed combination.

To be sure, weight and strength have long been factors for consideration in the construction of bicycles and bicycle components. Petitioner accordingly cites all four of its prior art references – Denk, Moechnig, Valat, and Schroeder – for this uncontroversial proposition. *See* Petition at 13–14, 16. But what Petitioner fails to provide is any actual evidence or information about how, specifically, Denk’s tubular frame component would do this when combined with Moechnig’s steerer tube.

At one point, Petitioner and its tendered expert broadly assert that the Denk tubular frame component would have “reduced weight” as a bicycle steerer tube, but then later suggest that Denk’s Figure 11 embodiment would require “additional reinforcement, such as a thicker wall” in order to connect to the fork crown if used as a steerer tube. *Compare* Petition at 13 with *id.* at 15. Denk provides no indication that it 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. *See* Ex. 2021 (Parnell), ¶69. Petitioner and its tendered expert’s guesswork and speculation as to the purported “reduced weight” of the Denk tubular frame component substituted in for Moechnig’s steerer tube are “mere conclusory

statements” without “some articulated reasoning with some rational underpinning” to support an obviousness finding. *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007) (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)); *see also TQ Delta, LLC v. CISCO Systems, Inc.*, 942 F.3d 1352, 1359 (Fed. Cir. 2019) (“This court’s opinions have repeatedly recognized that conclusory expert testimony is inadequate to support an obviousness determination[.]”).

Likewise, Petitioner provides nothing other than its expert’s conclusory statement and speculation that Denk’s tubular frame component would add strength to a standard steerer tube, which is insufficient on its own to warrant an obviousness conclusion. Moreover, as detailed herein, if a POSITA were looking to combine Denk’s tubular frame component with Moechnig’s steerer tube for purposes of somehow adding strength (even though Moechnig teaches the opposite of having thicker walls fore-and-aft, and already discloses a lightweight steerer tube with enhanced rigidity and strength), a POSITA would only potentially do so to increase strength in the lateral direction of the steerer tube, as taught by Moechnig, which is the opposite of the fore-aft maximum wall positioning claimed in the ‘993 Patent. *See* Ex. 2021 (Parnell), ¶69. In other words, Petitioner ignores the express teaching of its primary modifying prior art reference and instead engages in classic hindsight to traverse the ‘993 Patent inventors’ route to finding a solution to the forces impacting the novel ‘993 Patent claimed steerer tube. *See Ortho-McNeil Pharm.*,

Inc. v. Mylan Lab 'ys, Inc., 520 F.3d 1358, 1364 (Fed. Cir. 2008) (criticizing expert as having “simply retraced the path of the inventor with hindsight, discounted the number and complexity of the alternatives, and concluded that the invention ... was obvious”); *Virtek Vision Int’l ULC v. Assembly Guidance Sys., Inc.*, 97 F.4th 882, 887 (Fed. Cir. 2024) (“The mere fact that these possible arrangements existed in the prior art does not provide a reason that a skilled artisan would have” made the arrangements, rendering them obvious).

In sum, Petitioner’s mere conclusory statements about the potential for reduced weight and increased strength – without actual, verifiable evidence of improvement compared to the standard steerer tube – are simply insufficient to support the asserted motivation to combine Denk with Moechnig.

D. A POSITA Would Not Find It Obvious to Orient Denk in View of Moechnig to Have a Maximum Wall Thickness of the Bicycle Steerer Tube in the Fore-and-Aft Direction of the Bicycle’s Plane of Travel.

Notwithstanding all of the other flaws with the Petition’s proposed obviousness combination of Denk in view of Moechnig, the Petition rests its obviousness combination in all Grounds on Denk purportedly supplying the rationale to combine and amend Denk’s own disclosure, along with mere conclusory remarks made by its tendered expert. *See* 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. As discussed above, vertical loads are very relevant to a bicycle frame but irrelevant to the forces impacting a bicycle steerer tube because the steerer tube is oriented in space in a way that already maximizes vertical strength but has significant side-to-side and fore-aft forces. *See* Section II.B, *supra*; Ex. 2021 (Parnell), ¶76. Further, the art of record specifically contradicts Petitioner’s conclusory argument that the highest or most concerning loads occur in the fore-aft direction of travel. *See* Ex. 2021 (Parnell), ¶76.

Rather, the record evidence in this matter explains that steerer tube designers were most concerned with lateral forces or loading before the advent of the ‘993 Patent. *Id.*, ¶77. Relied upon by Petitioner in every Ground, Moechnig includes an elliptical-shaped steerer tube with the maximum wall thickness oriented perpendicular to the direction of travel, also referred to as the side-to-side or lateral direction. *Id.* 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; Ex. 2021 (Parnell), ¶77. Moechnig teaches the opposite of the ‘993 Patent, and explains that ***increasing strength in the fore-aft direction is undesirable*** because there would be an increase in fore-aft stiffness, which is undesirable because the stiffness communicates forces from the fork to the rider’s hands. Ex. 1008, ¶¶[0004], [0008]. Moechnig proclaims

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]. That is the opposite of the ‘993 Patent’s teaching and claims. Petitioner’s proffered prior art unmistakably held that a steerer tube with a ***minimum 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.*; Ex. 2021 (Parnell), ¶77.

In other words, Moechnig – the base modifying reference for all of Petitioner’s Grounds and the only prior art reference of record discussing all of the forces acting on a steerer tube – expressly teaches stronger wall rigidity and stiffness in the lateral direction, directly opposite of the claimed ‘993 Patent invention. In view of the Moechnig prior art proposed to modify Denk, a POSITA would not orient Denk’s tubular frame component to gain strength in the fore-aft direction when the very same modifying prior art says to do the opposite. Petitioner’s and its expert’s mere conclusory statements to orient Denk in such a manner directly contradict the evidence of record. *See* Petition, 15, 25; Ex. 1003 (Slocum), ¶¶46, 59, 89–92; Ex. 2021 (Parnell), ¶78.

Accordingly, for all of the reasons discussed above, it would not be obvious to combine Denk with Moechnig to orient the steerer tube's maximum wall thickness oriented in the direction of the bicycle's travel, as required by the challenged claims.⁷ Indeed, the prior art relied upon by Petitioner to modify Denk teaches to do the exact opposite.

V. VALAT IN VIEW OF MOECHNIG, DENK AND/OR SCHROEDER DOES NOT RENDER THE CHALLENGED CLAIMS OBVIOUS.

Petitioner's alternative combination of Valat with Moechnig, Denk and/or Schroeder does not improve its meritless case on purported obviousness of the challenged '993 Patent claims. This is because Petitioner's proposed hindsight combination is similarly based on the false premise that Denk in view of Moechnig would lead a POSITA to orient the Denk tubular frame component with a maximum wall thickness in direction of the bicycle's travel even though the base modifying reference (Moechnig) teaches the exact opposite. For these reasons, Petitioner's proposed combinations cannot render obvious any of independent claims 1, 61, or 64, or any of the challenged dependent claims.

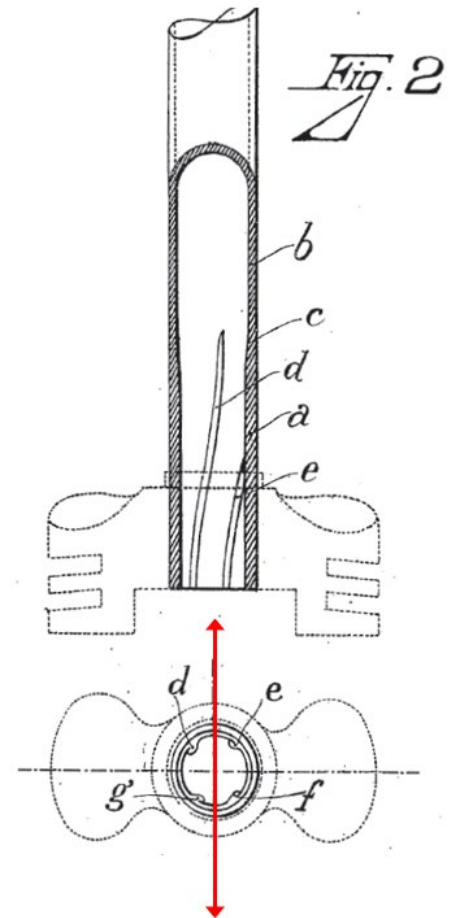
⁷ The Schroeder reference adds nothing in this regard either, itself only being offered for Independent Claim 64's additional limitation that the steerer tube and fork crown are made of different materials. *See* Petition, 45–49.

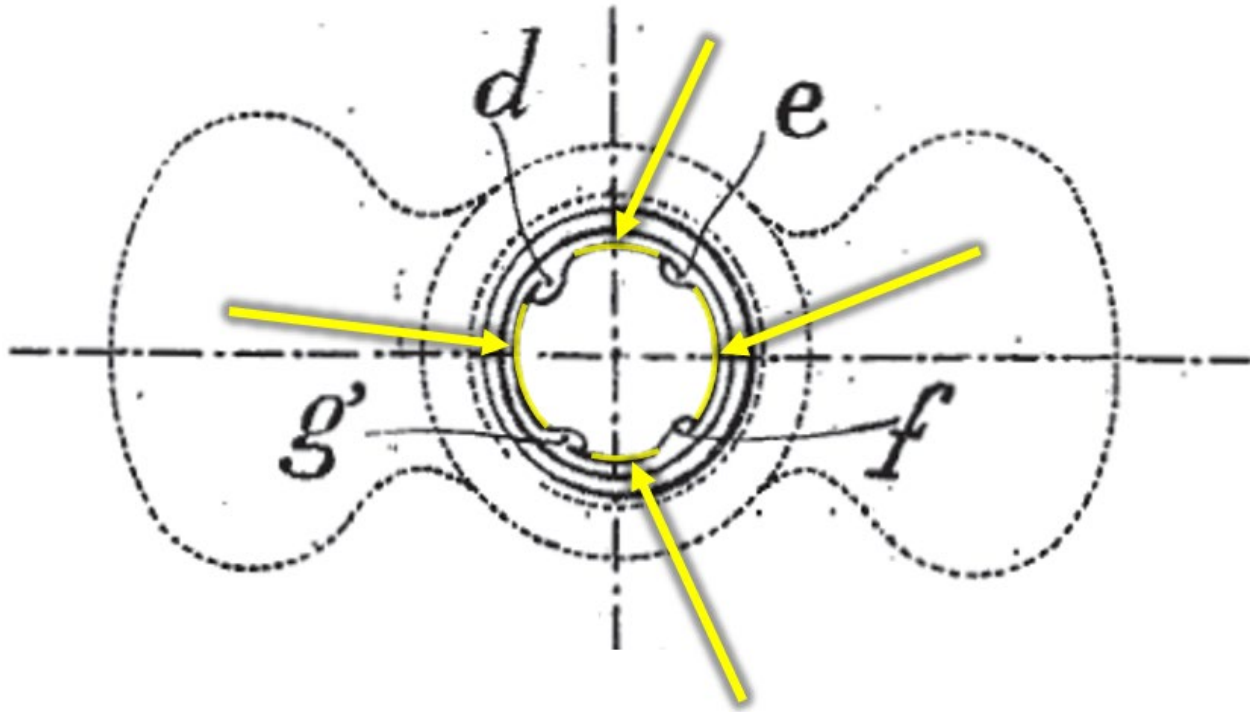
A. Valat Does Not Disclose a Bicycle Steerer Tube Having a Maximum Wall Thickness in the Bicycle's Plane of Travel.

It is undisputed that Valat does not disclose or suggest a steerer tube having a “body formed by a wall ... the wall thickness being at a maximum in the plane of travel of the bicycle” as claimed in the independent claims. Instead, Valat simply discloses 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 in this annotated figure, 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, Valat fails to disclose or suggest a maximum wall thickness in the plane of the bicycle's travel.

In fact, Valat itself discloses a body having portions of the wall that are *unvarying in thickness* as a function of the cross-sectional angle of the point relative to the plane of travel. Ex. 2021 (Parnell), ¶92. These unvarying sections are shown in the annotated Figure 2 of Valat, below:





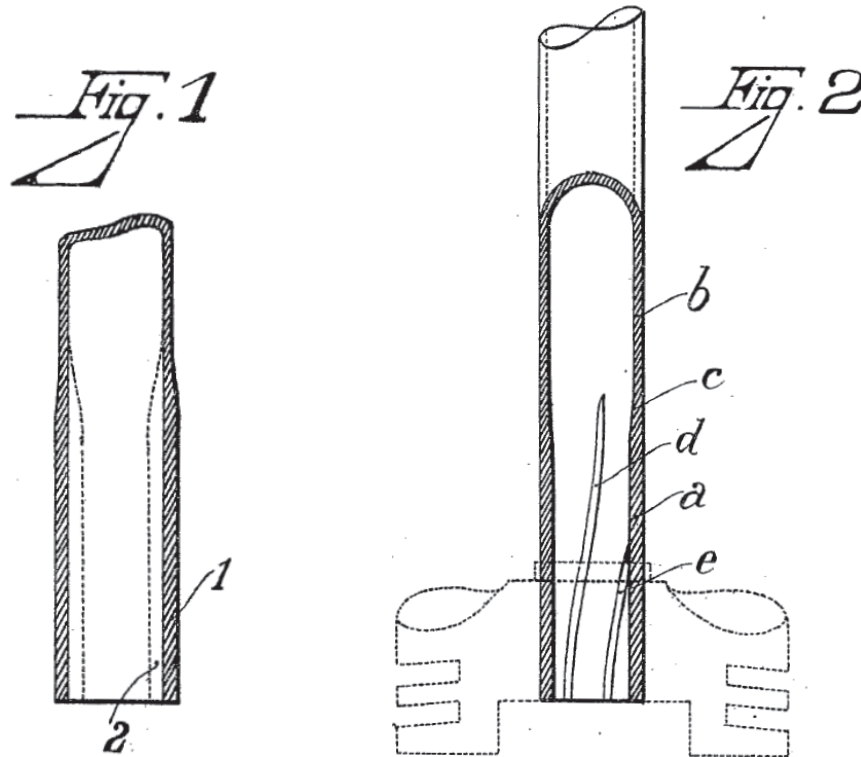
Id. Further, each of the other embodiments shown in Figures 3, 4, and 5 of Valat show interiors with portions unvarying in thickness, *i.e.*, sections that do not vary in wall thickness relative to the cross-sectional angle of the point relative to the plane of travel because ***adjacent points have the same wall thickness.*** *Id.*

Petitioner argues 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 not in accordance with reality and entirely too broad, as it would capture any shape, even a circle. Ex. 2021 (Parnell), ¶93.

The ‘993 Patent makes clear that the term “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” includes 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; Ex. 2021 (Parnell), ¶¶94. The ‘993 Patent’s independent claims exclude circular interior shapes, but Petitioner’s proffered construction would capture such a shape because a circular interior shape would have a wall thickness that depends on cross-sectional angle, although the function describing the dependency would be a constant for wall thickness. Ex. 2021 (Parnell), ¶¶94. Accordingly, Valat fails to disclose this required claim element for all Challenged Claims.

In an unsuccessful attempt to rewrite Valat and bring it closer in structure to the challenged ‘993 Patent claims, Petitioner and its tendered expert (who has never designed any vehicle components whatsoever) misidentify Valat as disclosing multiple “configurations” or embodiments in Figures 1 and 2, which is demonstrably false and contrary to the express language of Valat. *See, e.g.*, Petition, 49; Ex. 1003 (Slocum), ¶¶49; Ex. 2021 (Parnell), ¶¶85. Instead, Valat is clear that Figure 1 is an example of a tube before a swaging process is performed, whereas Figure 2 shows

the resultant tube after swaging.⁸ Ex. 1007 (Valat), 1:58–63, 1:96–2:4; Ex. 2021 (Parnell), ¶85. 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)):



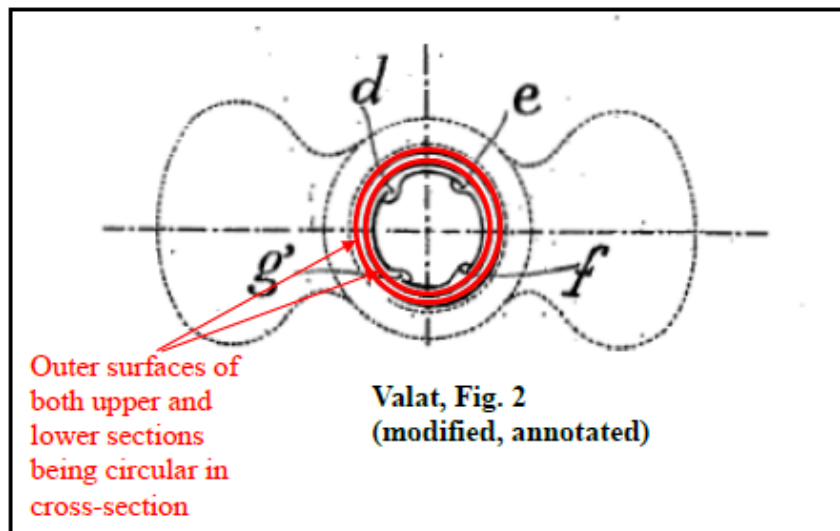
⁸ Swaging is a forging process in which the dimensions of an item are altered using dies into which the item is forced. Swaging processes have been well-known in the art for centuries. More than one die may be used, and the process may be automated. Mandrels may also be used to provide shaping for the interior of objects being swaged. Ex. 2021 (Parnell), ¶99.

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. 2021 (Parnell), ¶86; Ex. 2019 (Slocum Depo.), p. 128, line 18 – p. 131, line 15.

Valat continues to explain that Valat’s steerer tube has a constant external diameter along its length. Ex. 1007 (Valat), 1:70–77. The internal diameter, however, does vary because of its internal ribbing created through a swaging process, not because of considerations in the ‘993 Patent. *Id.*, FIG. 2, 1:70–77, 1:86–90; Ex. 2021 (Parnell), ¶87. 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. Ex. 1007 (Valat), 1:97–2:4; Ex. 2021 (Parnell), ¶87. 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. *Id.* As the tube is pressed inwards, the material forms into the exterior shape of the mandrel, leaving behind a tube having a constant exterior diameter and an interior with shaped ribs. Ex. 2021 (Parnell), ¶87. Swaging is a common, well-known metal working process that

finishes the exterior surface of the tubing. *Id.*; Ex. 2019 (Slocum Depo.), p. 126, lines 8 – 24.

Accordingly, both Petitioner and Petitioner's tendered expert misrepresent or do not understand the disclosure of Valat, and instead pick and choose from Valat's figures without appreciating and being straightforward about what Valat actually discloses. *See* Petition, 49–50, 61–63; Ex. 1003 (Slocum), ¶¶49, 181. Petitioner goes as far as improperly annotating several figures in Valat, such as the one shown below, which improperly imposes differently sized circular cross-sections on the Valat finished product even though Valat expressly states that its finished product has a constant external shape.



See Petition, 63; Ex. 2021 (Parnell), ¶88. 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). There is no accurate support for the representations made in Petitioner’s annotations, given Valat’s express statements that the tube has a constant external shape and is formed by swaging. Ex. 2021 (Parnell), ¶88.

Petitioner’s arguments regarding Valat should therefore be wholly rejected.

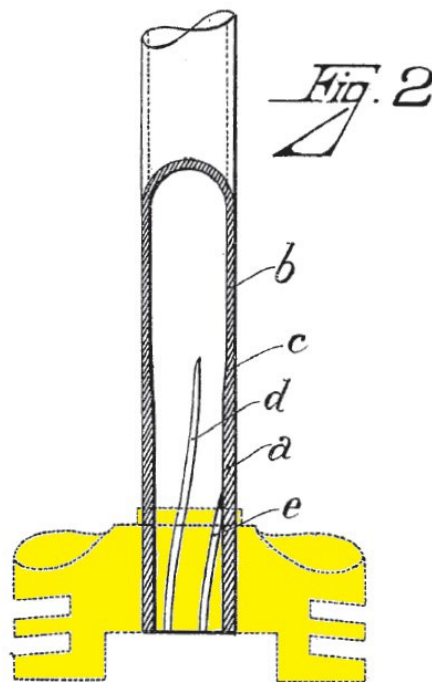
B. A POSITA Would Not Be Motivated to Combine Valat in View of Moechnig and Denk for Strength and Weight Advantages.

Petitioner’s proposed motivation to combine Valat with Moechnig and Denk is for the purported benefits of “improving the strength and rigidity (or loadbearing) properties of Valat’s steerer tube in the vertical plane of the bicycle frame where higher loads or stresses occur” and “reducing the weight of the steerer tube to provide a ‘lighter weight machine.’” Petition, 52; Ex. 1003 (Slocum), ¶155.

Again, Patent Owner does not dispute that strength and weight are routinely considered as part of the design of bicycles and bicycle components. However, as with its proposed motivation to combine Denk with Moechnig, Petitioner’s citation to these factors relies on supposition and guesswork rather than bona fide evidence for its proposed combinations and really amounts to working back in hindsight to arrive at the ‘993 Patent’s novel and nonobvious inventions.

1. Changing Valat to Include Denk's Alternating Thin and Thick Wall Features Would Defeat Valat's Primary Purpose of Providing Strength Along the Entire Lower Portion of the Steerer Tube.

One primary difference between Valat (Ex. 1007) and Denk (Ex. 1006) is that while Denk is merely concerned with bolstering a tubular frame component in a single vertical direction, Valat is intended to reinforce the steerer tube in all directions in the region where the steerer tube meets the fork bridge or crown (highlighted in yellow below) that in turn connects to the fork legs. Ex. 2021 (Parnell), ¶96.



In particular, Valat explains:

Among the parts of a bicycle, motor assisted cycle, or motorcycle 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 form 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. Ex. 2021 (Parnell), ¶96. Further, each ribbing pattern shown in Valat’s Figures 2–5 shows reinforcement around the entirety of the steerer tube. *Id.* Thus, Valat is concerned with *all shear stresses around the junction between the steerer tube and the fork crown*. *Id.*; see also Ex. 1007 (Valat), 1:15–21, 44–51.

Petitioner, on the other hand, suggests weakening Valat at points around the junction between Valat’s steerer tube and fork crown/bridge by eliminating Valat’s ribs and providing reinforcement in *only one direction at that particular junction*. See, e.g., Petition, 52; Ex. 2021 (Parnell), ¶97. A POSITA would not make such an alteration in view of Valat’s primary purpose of providing consistent support around the junction between the steerer tube and the fork crown/bridge. Ex. 2021 (Parnell), ¶97; see also, e.g., *In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984) (one of ordinary skill in the art would not be motivated to modify a reference by making it “inoperable for its intended purpose”). In fact, as indirectly admitted by Petitioner, a change from Valat’s ribs to Denk’s alternating thin and thick bicycle frame walls

would intentionally lessen the strength of the lateral sides of the steerer tube (assuming *arguendo* orientation of Denk's bicycle frame thick walls in the direction of the bicycle's travel). *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, thereby resulting in a thinner wall in the side-to-side direction); Ex. 2021 (Parnell), ¶97. A POSITA would not make such a strange change to Valat. *Id.*

Further, Petitioner argues for a modification to Valat that would change the principle of operation of Valat, namely, the reinforcement of Valat's steerer tube along the entire extent of the particular place of the junction between the steerer tube and the crown/bridge using simple-to-form internal ribs. Ex. 2021 (Parnell), ¶98. 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 motorcycle 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 (Valat), Claim 1. In other words, Valat is pinpoint-focused on a swaged tube having internal ribs at a particular place of attachment to the crown. Ex. 2021 (Parnell), ¶98. Replacing these ribs is simply nonsensical, at least because these ribs are the entire distinguishing purpose of Valat. *Id.* It strains credulity to believe that a POSITA would have removed Valat’s ribs to replace them with something wholly different in construction, a classic, conjectured hindsight combination. *Id.*

2. There Would Be No Actual Benefit to Replacing Valat’s Ribs with Denk’s Alternating Thick and Thin Walls.

Petitioner’s Grounds III and IV are further 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, that is not the purpose of Valat, as Valat seeks to strengthen its steerer tube in all directions around the junction between the steerer tube and the fork bridge/crown. Ex. 2021 (Parnell), ¶100.

Moreover, the purported advantages of Denk’s tubular frame component are wholly redundant in view of the same advantages already present in Valat, such that there is no valid reason to combine these references. *Id.*, ¶101. *See, e.g., Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1369 (Fed. Cir. 2012) (no

reason to combine where “both of these references independently accomplish similar functions” and “each device independently operates effectively...[thus a POSITA] would have no reason to combine the features[.]”).

First, Valat is already a reinforced steerer tube having lightweight properties. Ex. 2021 (Parnell), ¶102. 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), 1:8–4. The addition of internal ribs in a portion of Valat’s steerer tube would significantly increase the strength of these already very lightweight tubes while adding little weight. Ex. 2021 (Parnell), ¶102. As a result, Valat discloses a weight- and strength-efficient steerer tube that supplies increased resistance to shear forces at the junction between the fork crown and the steerer tube while remaining lightweight. *Id.*

Further, Petitioner provides no analysis regarding why the Denk frame’s internal shape would be superior to Valat’s internal ribbing. *Id.*, ¶103. Instead of supplying a rationale or explanation, Petitioner and its tendered expert rely solely on a statement in Denk that Denk’s tubular frame component itself is lightweight. *See* Petition, 51–55, 67; Ex. 1003 (Slocum), ¶¶189, 155. However, although Denk touts its frame component as being lightweight, ***Denk does not explain that its tubular frame component would be lighter in weight than the rib-reinforced tube in Valat*** (or a similar tube). Ex. 2021 (Parnell), ¶103. Petitioner’s tendered expert 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.

Petitioner and its tendered expert similarly rely on broad statements in Denk that a POSITA would have found the purportedly smooth interior of Denk's frame component to reduce stress concentration and to be easier to manufacture. Petition, 52 (citing Ex. 1006 (Denk), Col. 3). However, 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; Ex. 2021 (Parnell), ¶104. Said another way, there is no evidence on record that Valat would suffer from increased stress concentrations, especially where Valat reduces stress by having a continuous outer surface. Ex. 1007 (Valat), 1:22–42; Ex. 2021 (Parnell), ¶104. Further, neither Valat nor Denk's reinforcement solutions are inherently superior. Ex. 2021 (Parnell), ¶104. Thus, the statements of Petitioner's expert are conclusory and must be afforded no weight.

Similarly, Petitioner's statement that Denk's frame component process would be "easier to manufacture" is conclusory. Petition, 52; Ex. 2021 (Parnell), ¶105. The Petition turns to its tendered expert for support, but he 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 the misunderstandings about Valat by Petitioner's expert. Ex. 2021 (Parnell), ¶105. Valat is produced using a swaging process. Ex. 1007 (Valat), 1:35–40, 1:96–2:4; Ex. 2021 (Parnell), ¶105. Swaging is an inexpensive and beneficial process, known to even increase the hardness of the tubing being swaged. Ex. 2021 (Parnell), ¶105. Contrary to the opinion of Petitioner's expert, a POSITA would understand that both Valat and Denk's frame component could be manufactured using relatively easy and low-cost processes. This fact, however, does not suggest any benefit of the Denk frame component's internal shape when considering Valat's continuous outer shape and internal ribbing. Ex. 2021 (Parnell), ¶¶103–105. Petitioner's tendered expert admitted in his deposition that Denk also discloses swaging as an acceptable manufacturing method. Ex. 2019 (Slocum Depo.), p. 98, lines 17–24. Further, Petitioner's expert admitted that he did not quantify any additional costs or difficulties associated with swaging in his declaration. *Id.*, p. 139, lines 4–23.

A POSITA would understand that Denk's tubular frame component could be made to be heavier and/or weaker than Valat's steerer tube. Ex. 2021 (Parnell), ¶106. Petitioner's expert speculatively argues, without support, that removing Valat's ribs and creating an asymmetric cross-sectional shape would reduce weight. Ex. 1003 (Slocum), ¶155. But the relative strengths and weights of steerer tubes and

forks depend on many factors, such that, even when accounting for materials used, there is no clear advantage of Denk's frame component or Valat's steerer tube structures when considering weight or strength alone. Ex. 2021 (Parnell), ¶106. Petitioner's reliance on purported benefits and puffery stated in Denk is unavailing when considering the actual strengths or weights of a finished product. *Id.* Without more analysis, the bald, conclusory statements of Petitioner's tendered expert must be afforded no weight, such that the Board should wholly reject Petitioner's arguments in this regard.

C. A POSITA Would Not Find It Obvious to Orient Valat in View of Moechnig and Denk to Have a Maximum Wall Thickness of the Bicycle Steerer Tube in the Fore-and-Aft Direction of the Bicycle's Plane of Travel.

Petitioner relies upon the same conjecture to make-up orienting the Denk frame component's maximum thickness in the plane of travel of the bicycle for all of Petitioner's grounds. *See, e.g.,* Petition, 52–53. Accordingly, for the same reasons discussed in Section IV above, a POSITA would not consider orienting Denk's tubular frame component's maximum thickness in the bicycle's plane of travel, especially not as a steerer tube.

For example, Petitioner relies on conclusory statements from its tendered expert 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, 52–53 (citing Ex. 1003 (Slocum), ¶157). Again, discounting of lateral loads and emphasis on vertical loads may be relevant to a bicycle frame but are inapplicable to a bicycle steerer tube, which is oriented in space in a way that maximizes vertical strength. See Sections II & IV, *supra*; Ex. 2021 (Parnell), ¶108. Additionally, as stated above, the very same modifying art of record (Valat and Moechnig) specifically contradicts Petitioner’s conclusory argument that the highest or most concerning loads occur in the fore-aft direction of travel. Ex. 2021 (Parnell), ¶108.

It cannot be ignored that, prior to the ‘993 Patent, the evidence of record indisputably demonstrated that bicycle steerer tube designers were most concerned with lateral loading. *Id.*, ¶109. Moechnig teaches that ***increasing strength in the fore-aft direction is undesirable***, concluding that there would be an undesirable increase in fore-aft stiffness, which uncomfortably communicates forces from the fork to the rider’s hands. Ex. 1008 (Moechnig), ¶¶[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.”); Ex. 2021 (Parnell), ¶109.

Accordingly, the Petition fails to show a sufficient motivation to combine Valat, Moechnig, Denk, and Schroeder (which again adds nothing for this purpose) and to orient a steerer tube, as recited in the '993 Patent's independent claims. The prior art actually teaches the opposite of what Petitioner contends. The Board should likewise reject Grounds III and IV.

VI. DEPENDENT CLAIMS 56 AND 59 DIRECTED TO TAPERING THE MAJOR OR MINOR DIAMETERS OF THE INNER SHAPE AS A FUNCTION OF PROXIMITY TO THE UPPER SECTION ARE NOVEL AND NOT RENDERED OBVIOUS BY ANY GROUNDS.

Claim 56 includes a requirement that “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 of record, and fails to show that it would have been obvious to form a steerer tube having the recited arrangement

with all the other claimed elements.

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; *see also id.*, 42 (Petitioner incorrectly claiming that “[i]t 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 tubular 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; Ex. 2021 (Parnell), ¶133. 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. Ex. 2021 (Parnell), ¶133.

First, Petitioner presents its argument as if Denk specifically contemplates such a frame component. *Id.*, ¶134. However, Denk merely describes a laundry list of frame components and potential features thereof. For example, Denk shows no

preference in its internal shaping between Figures 1a–1h. Further, to the extent that Denk implies that the internal shape may transition, Denk does not disclose a specific combination of these features, or any reason to do so. Thus, without any specific embodiment that combines tapering, the specific form of tapering recited, and the specific shapes of each section, and any reason to taper, Denk fails to actually disclose this feature. *Id.* 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.

But Petitioner fails to disclose any rationale to do so. As discussed above, Petitioner’s motivations to alter Denk’s frame components as alleged by Petitioner are legally and technically deficient. Petitioner provides no additional or new motivation with regard to the claim elements of claims 56 and 59. Petition, 42–44, 78–79, 81.

Petitioner awkwardly contends that it would have been “obvious to combine” Denk’s tubular frame component with Moechnig’s steerer tube simply because Moechnig has a section with elliptical outer and inner shapes, which would inscrutably lead to claim 56’s diameter tapering. 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 by obviousness. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 418 (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)); *see also TQ Delta, LLC v. CISCO Systems, Inc.*, 942 F.3d 1352, 1359 (Fed. Cir. 2019). Said another way, Petitioner argues that Denk would have these features, but only uses buzz words associated with an obviousness argument in doing so. At no time does Petitioner provide a true *rationale* as to why a POSITA would use Denk in such a fashion. This is classic hindsight and conjecture. Ex. 2021 (Parnell), ¶136. Likewise, for claim 59, Petitioner provides 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. *Id.*

Because no legally cognizable obviousness rationale has been supplied for either claim 56 or claim 59, Petitioner has failed to show that these two dependent claims are unpatentable.

VII. DEPENDENT CLAIMS 6, 10, 20, 24, 40, AND 44 DIRECTED TO A CIRCULAR INNER SURFACE OF THE UPPER SECTION ARE NOT RENDERED OBVIOUS BY ANY GROUNDS.

Along with all the other requirement elements, each of dependent claims 6, 10, 20, 24, 40, and 44 include a requirement that the “inner surface of the upper section is circular in cross section,” even though the lower section does *not* have a circular inner cross section. Petitioner fails to show that this claim element exists in

the prior art of record, and fails to show that it would have been obvious to form a steerer tube having the recited arrangement.

For Valat, Petitioner fails in the first instance to show that Valat has a circular inner shape. Petitioner relies on an annotated image of Valat's Figure 2 in support, but Figure 2 neither shows the upper portion of Valat's steerer tube nor is clearly stated as being drawn to scale. Petition, 76.

As discussed above, Petitioner misunderstands or misrepresents Valat's disclosure. Additionally, 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. Ex. 2021 (Parnell), ¶123. 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 misguided assertions. Thus, Valat's Figure 2 does not even disclose the cross-sectional structure of Valat's entire steerer tube. *Id.* Further, Figure 2 is insufficiently clear and does not indicate that it is drawn to scale, to determine if the upper interior shape is circular or another shape. *Id.* The Federal Circuit has found 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. *See Hockerson-Halberstadt, Inc. v. Avia Group Int'l.*, 222 F.3d 951, 956 (Fed. Cir. 2000) (The disclosure gave no indication that the figures were drawn to scale. "[I]t is well

established that patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue.”).

Petitioner goes on boldly to conclusorily state 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 its expert. 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.⁹ Ex. 2021 (Parnell), ¶124.

Petitioner repeats these conclusory remarks to 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-

⁹ Petitioner also loosely relies on Valat’s use of the word “diameter” and its 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 of the upper section, which it does not. Ex. 2021 (Parnell), ¶125. Again, this is not an obviousness argument, and does not include any motivation or reason why a POSITA would modify Valat to have this internally circular feature.

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; Ex. 2021 (Parnell), ¶126. But here again, Petitioner fails to meet its burden to show obviousness. Petitioner must know that the standard for obviousness is not what a reference states *could* be done, but what a POSITA *would* have done. *See, e.g., Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) (“Obviousness concerns whether a skilled artisan not only could have made but would have been motivated to make the combinations or modifications of prior art to arrive at the claimed invention.”). This requires a real motivation or rationale to alter the prior art, not just a petitioner’s self-serving statements. The Petition supplies no such real motivation or rationale. Ex. 2021 (Parnell), ¶126.

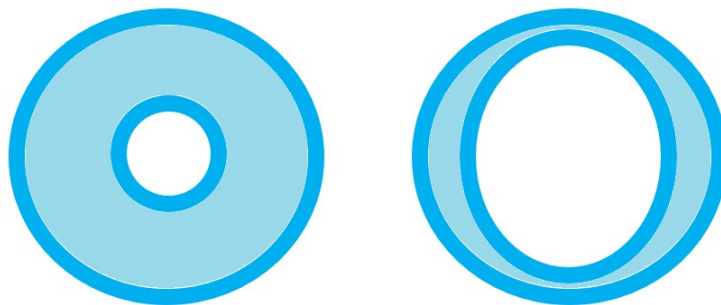
Contrary to Petitioner’s allegations, Denk’s general suggestion that another random frame component might have different interior shapes does not suggest that it would be obvious to form a bicycle steerer tube having a lower section with an elliptical interior shape and an upper section with a circular interior shape. *Id.*, ¶128. This mere possibility does not meet the bar of providing an obviousness rationale. *See, e.g., Belden*, 805 F.3d at 1073.

Likewise, Moechnig does not disclose a steerer tube having a section with circular interior and exterior shapes and a section with elliptical interior and exterior shapes. Petitioner incorrectly identifies in its annotated Figure on page 36 of the Petition that “28” represents the circular cross sections of radial portion 106 of the steerer tube, when in fact “28” refers to the head tube, which is not the steerer tube or any other portion of the fork. Ex. 1008 (Moechnig), ¶[0026]; Ex. 2021 (Parnell), ¶¶127–129. At best, 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). Ex. 2021 (Parnell), ¶129. Again, a mere possibility does not meet the bar of providing an obviousness rationale. *See, e.g., Belden*, 805 F.3d at 1073.

Petitioner’s grab-bag conjectures for purported reasons for rewriting and reconfiguring Moechnig to have “added reinforcement” in one section and reduced weight in another action (Petition, 36–37), are not accompanied by any evidence, explanation, or rationale to support the otherwise conclusory statements. Ex. 2021 (Parnell), ¶130. For example, the Petition does not explain the relevance of “added reinforcement” nor does it explain what the “reinforcement” might be other than having a “greater wall thickness.” Petition, 36–37. This is apparently Petitioner’s attempt at a catchall statement when there is no real reason for Petitioner’s proposed obviousness modifications. There is also 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 Petitioner's tendered expert – not the prior art – is the sole source of this contention. Ex. 2021 (Parnell), ¶130.

There is no real indication in the prior art that having a transition between elliptical and circular would affect the strengths of sections having differing interior shapes. *Id.* Further, Petitioner's argument that this arrangement allows for a thinner wall in the circular section is illogical. *Id.* The thickness of the sidewall in any given embodiment is unstated in Denk. *Id.* Interior shapes alone would not motivate a POSITA to use Petitioner's conjectured arrangement for benefits to weight or thinness. *Id.* Not only does the prior art fail to provide the required motivation, even the Petitioner's expert does not explain why circular inner and outer cross-sectional shapes would necessarily lead to a thinner wall overall. *Id.* For example, the images below show two different cross-sectional shapes, each having a circular exterior but differing in internal shape.



The shape on the left has a circular interior and exterior, but that does not mean it necessarily has a thinner wall. Indeed, its wall is thicker than the walls of the circular interior-elliptical interior shape on the right. In other words, Petitioner's argument is not only conclusory, but also demonstrably false. *Id.*

Petitioner's prior art of record does not show or suggest this claim element, and Petitioner supplies no legally or technically cognizable obviousness rationale. As a result, the Board should confirm that each of dependent claims 6, 10, 20, 24, 40, and 44 are patentable.

VIII. ALL GROUNDS FAIL TO DISCLOSE OR RENDER OBVIOUS DEPENDENT CLAIMS 2–4, 6–8, 16–20, 22, 27–29, 36–38, 40, 42, 47–49, AND 61–63 CLAIMING A STEERER TUBE ORIENTED WITH ITS MAXIMUM THICKNESS IN THE DIRECTION OF TRAVEL AND AN OUTER DIAMETER THAT IS GREATER IN THE LOWER SECTION THAN THE UPPER SECTION.

Each of Petitioner's Grounds are based primarily on Petitioner's tendered expert picking and choosing among aspects not disclosed in Denk's frame components but pulled from the ether, or so broadly referenced in Denk that a POSITA would have no reasons to choose any one aspect from the veritable cornucopia of possibilities. As a prime example, Denk does not even disclose a steerer tube, much less a steerer tube as claimed in the '993 Patent. Petitioner attempts to conflate catchall statements that a tubular frame component could be used elsewhere on a bicycle, such as a seat post, but a POSITA would never use such a frame component as a steerer tube. *See e.g.*, Petition, 10–11, 13–15, 32.

When the ‘993 Patent’s dependent claims are considered, Petitioner’s web of hindsight-based combinations becomes truly staggering. As an example, each of claims 2–4, 6–8, 16–20, 22, 27–29, 36–38, 40, 42, 47–49, and 61–63 includes a requirement (in addition to their other required elements) that the “outer diameter of the lower section of the body is greater than an outer diameter of the upper section of the body.” Petitioner fails to show that this claim element exists in the prior art, and fails to prove that it would have been obvious to form a steerer tube having the recited arrangement of the outer diameters of the upper and lower sections of the body.

For each of the foregoing reasons, all of the above listed claims are novel and patentable.

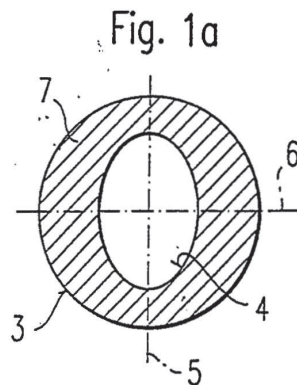
1. Valat Does Not Disclose or Suggest a Steerer Tube With an Outer Diameter That Is Greater in the Lower Section Than the Upper Section.

Valat does not have this feature included in claims 2–4, 6–8, 16–20, 22, 27–29, 36–38, 40, 42, 47–49, and 61–63. Petitioner and its expert misunderstand or misrepresent Valat’s disclosure, arguing that Valat’s Figure 1 discloses an embodiment of Valat when it does not, and that Valat discloses a constant outer diameter, and, therefore, shape. Ex. 2021 (Parnell), ¶110. These issues are discussed at length above. Valat explicitly states that Figure 1 is an intermediate product (Ex. 1007, 1:58–63) and that its steerer tube has a constant diameter (*id.*, 1:70–77).

Ex. 2021 (Parnell), ¶110. 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 nonexistent first configuration); Ex. 2021 (Parnell), ¶110. Accordingly, because Valat fails to disclose or render obvious this feature, Grounds III and IV necessarily fail on this basis. Ex. 2021 (Parnell), ¶110.

2. Denk Does Not Disclose or Suggest a Steerer Tube With an Outer Diameter That Is Greater in the Lower Section Than the Upper Section.

Petitioner relies solely upon Denk’s Figure 11, to argue it purportedly shows a section of a bicycle frame component with a taper. Petition, 32–33; *see also id.*, 20–21. However, Denk’s disclosure regarding Figure 11 states the opposite: it states that Denk’s tubing in Figure 11 is *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; Ex. 2021 (Parnell), ¶111. 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 (emphasis added); Ex. 2021 (Parnell), ¶111. 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. Ex. 2021 (Parnell), ¶111.

Similarly, a POSITA would understand that the methods disclosed in Denk’s Columns 9–11 would not be used to create a tapered tube design. *Id.*, ¶112. Specifically, Denk discloses (1) a pressing process that is followed by a material removal process (Cols. 9–10; Figures 4a–4c); (2) a rolling process that is followed by folding and welding processes (Col. 10; Figures 5a–5e); and (3) 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. *Id.*

Although Denk broadly references that there may be a number of different embodiments of Denk’s tubular frame component, Denk does not include a specific embodiment having all of the features of claims 2–4, 6–8, 16–20, 22, 27–29, 36–38, 40, 42, 47–49, and 61–63. *Id.*, ¶113. At best, the thrust of Petitioner’s argument is that a POSITA, with the clear understandings of 20/20 hindsight, ***could*** make the proposed combination, but this Board knows well that this is not the standard for

obviousness. *See Belden Inc.*, 805 F.3d at 1073; *Ortho-McNeil Pharm., Inc.*, 520 F.3d at 1365; *Abiomed, Inc. v. Maquet Cardiovascular, LLC*, Case No. IPR2017-01025, 2017 WL 4317629, *3–4 (PTAB Sept. 26, 2017). Petitioner simply cannot mix and match Denk’s conceivable embodiments without a rationale to motivate to do so.

3. Petitioner’s Rationales to Combine and/or Alter Denk and Valat Are Legally and Technically Deficient.

Petitioner provided no rationale or motivation to alter Denk and Valat to include the taper contained in the ‘993 Patent’s claims 2–4, 6–8, 16–20, 22, 27–29, 36–38, 40, 42, 47–49, and 61–63. Ex. 2021 (Parnell), ¶114. Their respective disclosures do not suggest a potential taper, as Denk and Valat are both silent regarding any changes in the outer diameter of their specific depicted embodiments. *Id.*, ¶¶114–115.

Valat does not disclose a tapered tube. Petitioner misrepresents, or mistakenly relies on its misunderstanding of, Valat to try to concoct this claim element for Grounds III and IV. *See, e.g.*, Petition, 61–63 (Petitioner relying on a nonexistent “embodiment” of Valat), 69–70, 74; Ex. 2021 (Parnell), ¶115. Petitioner’s improper representation of Valat cannot be a basis for an obviousness finding at least because it does not provide the required evidence of what a POSITA would know at the time of the invention. Ex. 2021 (Parnell), ¶115. Accordingly, the Petition fails to show

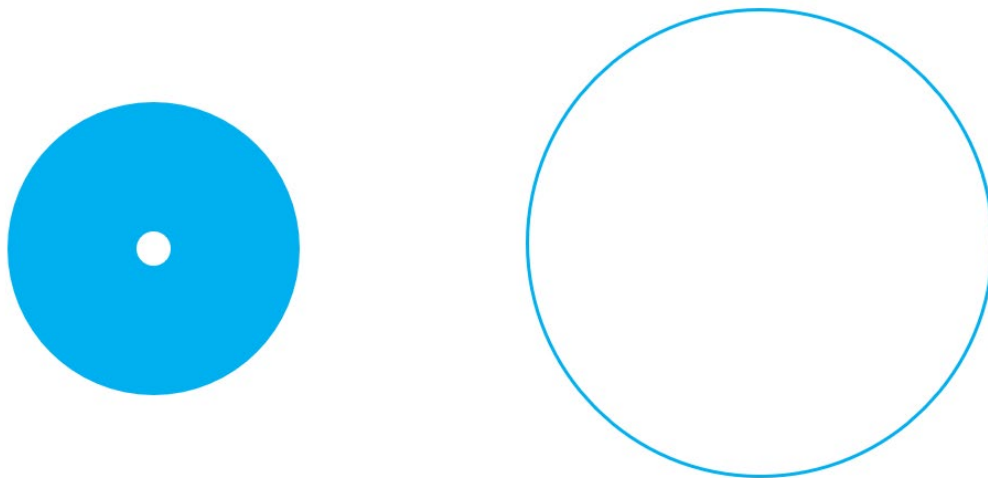
that Valat renders obvious the recited “outer diameter of the lower section of the body is greater than an outer diameter of the upper section of the body.” *Id.*

Denk does not disclose a tapered steerer tube, and Petitioner fails to show that Denk’s tubular frame component discloses or renders obvious orienting a tapered tubing in a steerer tube so that ***the larger diameter is in the lower section of the tubing.*** *Id.*, ¶116. The Petition, implicitly acknowledging that Denk lacks this claim element, states that the conjectured 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 wishful statement of what Petitioner would like Denk to disclose is both conclusory and inaccurate.

Petitioner’s purported rationale is conclusory because it is argued without any explanation or support. Petitioner’s “additional reinforcement” is vague and undefined at best because Petitioner fails to explain what this reinforcement might be other than having “a thicker wall.” Petition, 21, 28, 36–37. Further, there is no explanation as to ***why***, or even ***if***, a POSITA would create a thicker wall in a purported “larger” section of Denk’s frame component. *See id.* Denk makes no such disclosure, with Petitioner’s so-called expert simply speculating about a possibility. Without real support or 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 its frame component shown in Figure 11, nor does Figure 11 show its interior shape. Ex. 2021 (Parnell), ¶117. Without more, a POSITA could not determine which end would actually 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. *Id.*

Moreover, the asserted basis of Petitioner’s tendered expert 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. *Id.*, ¶118. For example, the smaller tube on the left has a much stronger sidewall than the very thin but larger diameter tubing on the right:



Id. 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 its expert’s brief and unsupported statements about the possible benefits of a tapered tube are technically incorrect.

Accordingly, Petitioner fails to state any reasonable rationale to modify Denk’s frame tube into the recited ‘993 Patent 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 novel and patentable.

IX. CONCLUSION

Petitioner FOX misrepresents the nature and scope of the underlying prior art references, proposing hindsight combinations of features despite directly contradictory teachings in the same prior art. The challenged claims of the ‘993 Patent are indisputably novel and are likewise clearly nonobvious when the prior art is correctly understood.

For at least these reasons, the Board should therefore uphold the patentability of all challenged ‘993 Patent claims.

Respectfully submitted,

Dated: October 31, 2024

/s/ Michael J. Hickey
Michael J. Hickey, Reg. No. 51,801
Attorneys for Patent Owner SRAM, LLC

CERTIFICATE OF SERVICE

The undersigned certifies that a copy of the foregoing Patent Owner's Response and Exhibits 2016 through 2023 were served by email at the following address of record for the Petitioner's Counsel on October 31, 2024:

Joshua L. Goldberg (Reg. No. 59,369)

joshua.goldberg@finnegan.com

Finnegan, Henderson, Farabow, Garrett & Dunner, LLP

901 New York Avenue, NW

Washington, DC 20001-4413

Arpita Bhattacharyya (Reg. No. 63,681)

arpita.bhattacharyya@finnegan.com

Robert F. McCauley (*pro hac vice* to be filed)

robert.mccauley@finnegan.com

Finnegan, Henderson, Farabow, Garrett & Dunner, LLP

Stanford Research Park

3300 Hillview Avenue

Palo Alto, CA 94304-1203

/s/ Michael J. Hickey

Michael J. Hickey (Reg. No. 51,801)

Attorneys for Patent Owner SRAM, LLC

CERTIFICATE OF COMPLIANCE

Under 37 C.F.R. § 42.24(d), the undersigned certifies that this Patent Owner Response complies with the type-volume limitation of § 42.24(b)(2) because Microsoft Word counts 13,998 words, excluding the parts of the Response exempted by § 42.24(a).

This paper also complies with the typeface requirements of 37 C.F.R. § 42.6(a)(2)(ii) and the type style requirements of 37 C.F.R. § 42.6(a)(2)(iii) and (iv).

/s/ Michael J. Hickey

Michael J. Hickey (Reg. No. 51,801)
Attorneys for Patent Owner SRAM, LLC