UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BROOKS SPORTS, INC.,

Petitioner,

v.

HERBERT E. TOWNSEND,

Patent Owner.

Case IPR2018-00577
U.S. Patent 7,490,416

HERBERT E. TOWNSEND'S NOTICE OF APPEAL TO THE U.S. COURT OF APPEALS FOR THE FEDERAL CIRCUIT

Via PTAB E2E
Patent Trial and Appeal Board

Via Hand Delivery
Director of the U.S. Patent and Trademark Office
c/o Office of the General Counsel, 10B20
Madison Building East
600 Dulany Street
Alexandria, VA 22314

Via CM/ECF
United States Court of Appeals for the Federal Circuit

Under 35 U.S.C. §§ 141, 142, and 319, 37 C.F.R. §§ 90.2, 90.3, and 104.2, and Rule 15 of the Federal Circuit Rules, Patent Owner Herbert E. Townsend hereby appeals to the United States Court of Appeals for the Federal Circuit from the Final Written Decision (Paper 32) entered by the Patent Trial and Appeal Board on August 7, 2019, and the Decision on Patent Owner's Request for Rehearing of Final Written Decision of *Inter Partes* Review Pursuant to 37 C.F.R. § 42.71(d) (Paper 39) entered by the Patent Trial and Appeal Board on May 17, 2021. Copies of the Decisions are attached to this Notice.

In accordance with 37 C.F.R § 90.2(a)(3)(ii), Patent Owner identifies at least the following issues for appeal:

- Did the Board err in its judgment that claim 1 of U.S. Patent No. 7,490,416 is unpatentable under 35 U.S.C. § 103 and any finding or determination supporting or related to that judgment?
- Did the Board err in its judgment that claim 6 of U.S. Patent No. 7,490,416 is unpatentable under 35 U.S.C. § 103 and any finding or determination supporting or related to that judgment?
- Did the Board err in its claim constructions, including constructions of the claim terms "dilatant compound," "material consisting essentially of a dilatant compound," "cavity formed in said top surface" of a shoe midsole, and "below the bottom of the foot"?

- Did the Board err in its identification of relevant art for U.S. Patent No. 7,490,416?
- Did the Board err in its refusal to consider objective evidence of nonobviousness?
- Did the Board err in any finding, determination, judgment, or order relied on or related to the Final Written Decision and/or the Decision on Patent Owner's Request for Rehearing of Final Written Decision of Inter Partes Review Pursuant to 37 C.F.R. § 42.71(d) and decided adversely to Patent Owner?

Patent Owner is concurrently filing true and correct copies of this Notice of Appeal, along with the required fees, with the United States Court of Appeals for the Federal Circuit and with the USPTO Patent Trial and Appeal Board.

Respectfully submitted,

Dated: July 14, 2021

/*Steven J. Hampton* /
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CERTIFICATE OF FILING

The undersigned certifies that, in addition to being electronically filed through PTAB E2E, a true and correct copy of the above-captioned **HERBERT E. TOWNSEND'S NOTICE OF APPEAL** is being served by hand delivery to the Director of the United States Patent and Trademark Office, on July 14, 2021, at the following address:

Director of the U.S. Patent and Trademark Office
c/o Office of the General Counsel, 10B20
Madison Building East
600 Dulany Street
Alexandria, VA 22314

The undersigned also certifies that a copy of the above-captioned **HERBERT E. TOWNSEND'S NOTICE OF APPEAL** and the filing fee is being filed via CM/ECF with the Clerk's Office of the United States Court of Appeals for the Federal Circuit on July 14, 2021.

Dated: July 14, 2021

Respectfully submitted,

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Herbert E. Townsend

CERTIFICATE OF SERVICE

The undersigned hereby certify that the foregoing **HERBERT E. TOWNSEND'S NOTICE OF APPEAL** was filed through the PTAB's E2E Processing System as well as served electronically via e-mail on July 14, 2021 in its entirety on the following:

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Paper 32
Entered: August 7, 2019

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BROOKS SPORTS, INC.,
Petitioner,

v.

HERBERT E. TOWNSEND,
Patent Owner.

Case IPR2018-00577
Patent 7,490,416 B2

Before MEREDITH C. PETRAVICK, HYUN J. JUNG, and SCOTT A. DANIELS, *Administrative Patent Judges.*

JUNG, *Administrative Patent Judge.*

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence that claims 1 and 6 of U.S. Patent No. 7,490,416 B2 are unpatentable. We also *dismiss as moot* Patent Owner's motion to exclude Exhibits 1011, 1052, and 1064.

A. Procedural History

Brooks Sports, Inc. ("Petitioner") filed a Petition (Paper 1, "Pet.") requesting institution of an *inter partes* review of claims 1 and 6 of U.S. Patent No. 7,490,416 B2 (Ex. 1001, "the '416 patent"). Herbert E. Townsend ("Patent Owner") filed a Preliminary Response. Paper 5. Pursuant to 35 U.S.C. § 314, we instituted an *inter partes* review. Paper 6 ("Dec. on Inst."). In particular, we instituted review of all challenged claims of the '416 patent on all presented challenges. *Id.* at 2, 17, 20, 22, 23.

After institution, Patent Owner filed a Response (Paper 16, "PO Resp."), to which Petitioner filed a Reply (Paper 18), and thereafter, Patent Owner filed a Sur-Reply (Paper 20). With our authorization, the parties filed a corrected reply (Paper 28, "Pet. Reply") and corrected sur-reply (Paper 27, "PO Sur-Reply") to rectify erroneous citations.

Additionally, Patent Owner filed a Motion Pursuant to 37 C.F.R. § 42.64 to Exclude Exhibits 1011, 1052, and 1064 (Paper 23, "Mot."). *See also* Paper 10 (objecting to Exs. 1002, 1003, 1011, 1052, and 1064). Petitioner filed an Opposition to Patent Owner's Motion to Exclude (Paper 25), to which Patent Owner filed a Reply in Support of Motion (Paper 26).

An oral hearing in this proceeding was held on May 9, 2019; a transcript of the hearing is included in the record (Paper 31, "Tr.").

B. Related Proceedings

The parties indicate that the '416 patent is the subject of *Townsend v. Brooks Sports, Inc.*, Case No. 2:17-cv-01322-RSM (W.D. Wash.). Pet. 1; Paper 4, 2.

C. Evidence Relied Upon

Petitioner identifies the following references as prior art in the asserted grounds of unpatentability:

(1) U.S. Patent No. 4,768,295, issued September 6, 1988 (Ex. 1007, "Ito");

(2) U.S. Patent No. 4,918,838, issued April 24, 1990 (Ex. 1004, "Chang");

(3) JP H7-9105, published February 10, 1995 (Ex. 1003, "Izumi");

(4) GB 2 349 798 A, published November 15, 2000 (Ex. 1006, "Plant");

(5) U.S. Patent No. 6,158,149 B1, issued December 12, 2000 (Ex. 1005, "Rudy"); and

(6) U.S. Patent Application Publication No. US 2003/0120353 A1, filed February 5, 2003, published June 26, 2003 (Ex. 1008, "Christensen").

Petitioner states that "[a]ll of the grounds presented herein are based on prior art dated prior to January 26, 2004."

Citations to Izumi in this Decision are to the certified English translation (Ex. 1002). *See* PO Resp. 31 (stating that "Patent Owner does not, by this response, concede that Exhibit 1003 is what Petitioner represents

it to be nor that Exhibit 1002 is an accurate translation of Exhibit 1003"); Tr. 49:5–24 (Patent Owner's counsel agreeing that it had an opportunity to file its own translation, that it was served with satisfactory supplemental evidence, and that it is not raising incorrect translation as an issue).

Petitioner also specifies certain portions of the '416 patent as being allegedly applicant admitted prior art. Pet. 13–14 (citing Ex. 1001, 2:19–27, 2:33–38, 4:21–22, 4:65–66; Shorten Decl. ¶¶ 137–140), 65–67 (further citing Ex. 1001, 1:25–26, 2:30–33, 3:1–6, 6:50–54); *see also* Tr. 49:25–50:5 (Patent Owner's counsel indicating that it is not disputing that the portions of the '416 patent identified by Petitioner are admitted prior art).

In support of its challenges, Petitioner relies on a Declaration of Dr. Martyn Shorten (Ex. 1047, "Shorten Decl.") and a Reply Declaration of Dr. Martyn Shorten (Ex. 1071, "Shorten Reply Decl."). Patent Owner proffers a Declaration of Gareth McKinley, Ph.D. (Ex. 2011, "McKinley Decl."). Deposition transcripts for Dr. Shorten (Exs. 2009, 2012), and Prof. McKinley (Ex. 1068) were filed.

D. Grounds of Unpatentability at Issue

We instituted *inter partes* review on the grounds that:

(1) under 35 U.S.C. § 102, claim 1 is anticipated by Izumi;

(2) under 35 U.S.C. § 103, claim 1 would have been obvious in view of Izumi;

(3) under 35 U.S.C. § 103, claim 6 would have been obvious in view of Izumi and Chang;

(4) under 35 U.S.C. § 103, claim 1 would have been obvious in view of Rudy and Plant;

(5) under 35 U.S.C. § 103, claim 6 would have been obvious in view of Rudy, Plant, and Chang;

(6) under 35 U.S.C. § 103, claim 1 would have been obvious in view of Christensen and Ito;

(7) under 35 U.S.C. § 103, claim 6 would have been obvious in view of Christensen, Ito, and Chang;

(8) under 35 U.S.C. § 103, claim 1 would have been obvious in view of applicant admitted prior art and Izumi; and

(9) under 35 U.S.C. § 103, claim 6 would have been obvious in view of applicant admitted prior art, Izumi, and Chang.

Dec. on Inst. 2, 17, 20, 21, 23.

E. The '416 Patent (Ex. 1001)

The '416 patent issued February 17, 2009, from an application filed November 23, 2004, and claims priority to provisional applications filed January 26, 2004, and February 26, 2004. Ex. 1001, [22], [45], [60], 1:9–11; *see also* Pet. 12 (stating that "[a]ll of the grounds presented herein are based on prior art dated prior to January 26, 2004").

The '416 patent "is directed to an athletic shoe . . . having improved cushioning and energy returning properties that vary depending upon the speed of the runner due to incorporation of at least one insert containing dilatant compound." Ex. 1001, 1:16–20. According to the '416 patent, "the present invention describes a device that can be incorporated into the midsoles of existing running shoes to achieve higher energy storing and returning properties at higher running speeds" and "describes a method for incorporating said device into the midsoles of existing running shoes so as to

achieve higher energy storing and returning properties at higher running speeds." *Id.* at 3:13–20. Figure 3 of the '416 patent is reproduced below.

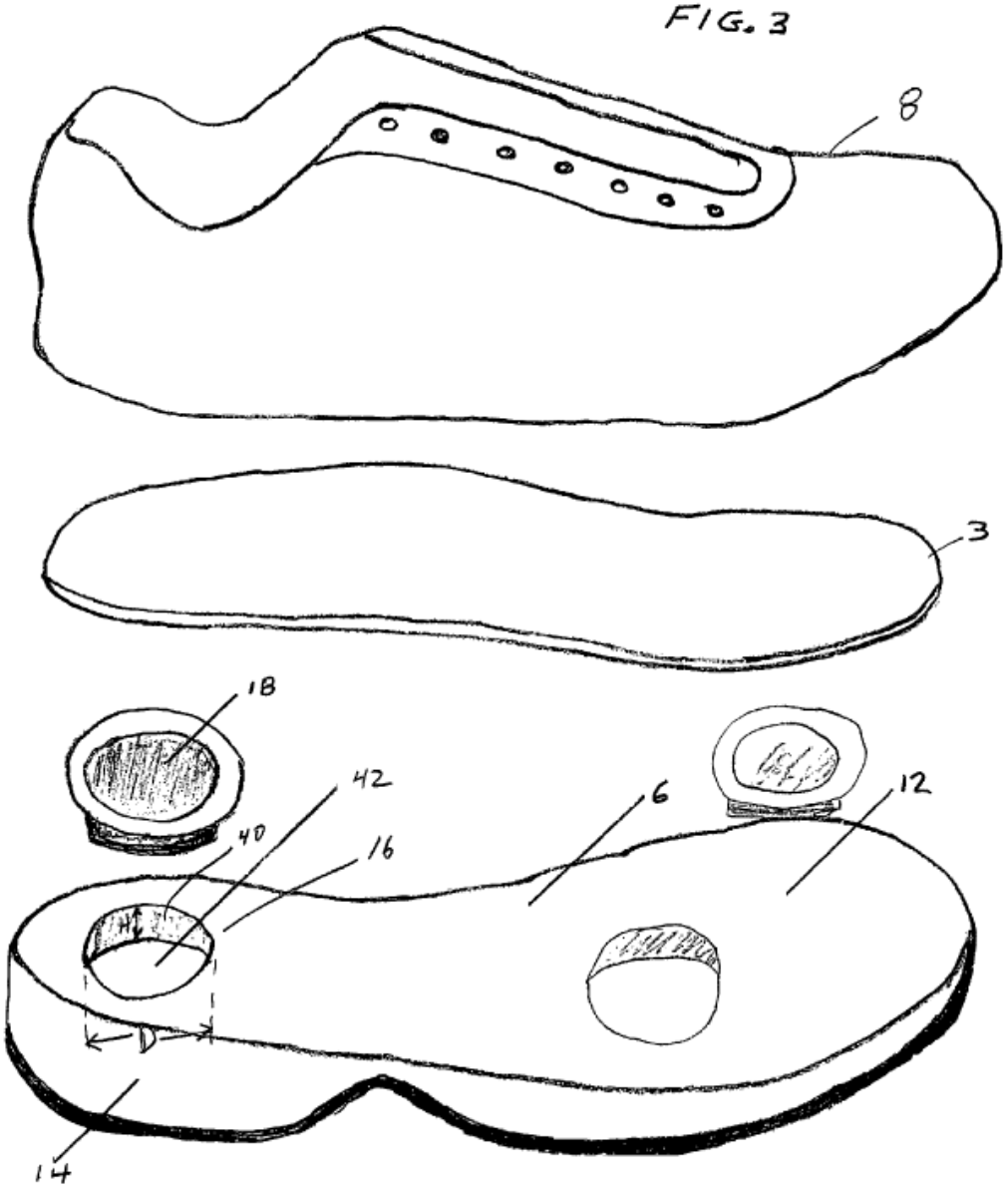


Figure 3 is an "assembly drawing of a shoe." *Id.* at 3:28–29. The shoe includes midsole 6 with at least one cavity 16. *Id.* at 3:45–47, 3:65–66. Cavity 16 receives insert 18, which is filled with a dilatant compound. *Id.* at 4:4–6. The '416 patent indicates that cavity 16 can be in certain parts of the midsole (*id.* at 3:63–4:2), that the dilatant compound fits snugly in the cavity

(*id.* at 4:25–29), that the insert is set into the cavity to have maximum contact (*id.* at 5:5–31), and that, in one embodiment, the dilatant compound is enclosed completely in a chamber (*id.* at 6:27–34). The '416 patent also states that cavity 16 is "preferably in the heel region 14" (*id.* at 3:63–66) and that the insert should not extend beyond a certain perimeter (*id.* at 5:50–64).

According to the '416 patent, "[f]or purposes of this invention, a dilatant compound is a polymeric material that changes from soft and pliable under slow application of a load to elastic and bouncy under rapid application of a load." *Id.* at 2:39–42. "In other words, it is a liquid with inverse thixotropy, that is, a viscous liquid suspension that temporarily solidifies under applied pressure." *Id.* at 2:45–47. "In the preferred embodiment, the dilatant compound is derived from a mixture of dimethyl siloxane, hydroxy-terminated polymers with boric acid, Thixotrol ST® brand organic rheological additive . . . , polydimethysiloxane, decamethyl cyclopentasiloxane, glycerine, and titanium dioxide." *Id.* at 4:16–21. The '416 patent states that the "compound is sold by Dow Corning as Dilatant Compound No. 3179," and "[o]ther dilatant compounds that could be used are available on the market and described in the prior art." *Id.* at 4:21–24.

The '416 patent also states that "it has been taught to interpose devices having variable elastic moduli between a runner's foot and the midsoles of running shoes so as to provide variable shock absorbing and cushioning properties," and that "[d]ilatant compounds are also well known." *Id.* at 2:39, 3:1–4.

> Under fast application of force, as in when the foot begins to impact against the insert during fast running, the dilatant compound will exhibit its inverse thixotropic properties and

> achieve a higher modulus of elasticity . . . then, the insert . . . will return more of the energy directly to the foot . . . .

Id. at 5:41–48. Also, the "insert constructed of the size and shape described above and constructed of the materials described above . . . maximize shock absorption . . . while maximizing the elastic return of energy during fast running." *Id.* at 6:21–26.

F. Challenged Claims

The '416 patent has 11 claims, of which Petitioner challenges claims 1 and 6. Both claims are reproduced below with indentations added to claim 1 for readability.

> 1. A shoe to be worn on a foot, said shoe comprising
>
> a midsole having a top surface, said shoe midsole fabricated from material having a fixed elastic modulus and
>
> having at least one cavity formed in said top surface below the bottom of the foot, said at least one cavity filled with material consisting essentially of a dilatant compound, all of which material consisting essentially of a dilatant compound is retained below the bottom of the foot.
>
> 6. The shoe of claim 1 wherein said at least one cavity is cylindrically shaped and has a diameter between 1 3/8" and 1 5/8" and has a side wall height between 3/8" and 5/8".

Ex. 1001, 8:28–35, 9:6–8.

II. ANALYSIS

To prevail in its challenges, Petitioner must prove unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d).

A. Relevant Art and Level of Ordinary Skill

Patent Owner contends that Petitioner "fails to identify the 'art' that is relevant for the '416 Patent," "argues for a level of ordinary skill in the 'art' that does not require a reasonable understanding of the recited materials," and thus, "fail[s] to meet its burden to show that the challenged claims are unpatentable by failing to identify the relevant art." PO Resp. 2; *see also id.* at 29 (arguing that "Petitioner failed to identify a relevant art and failed to establish an appropriate level of ordinary skill in the art"). Patent Owner states that "[t]here is a dispute as to the relevant art, and on that basis there is a dispute as to the level of ordinary skill in the art." *Id.* at 12. Patent Owner also contends that "[n]either the Petition nor Petitioner's expert's declaration, Shorten Decl., defines the relevant art nor explains why the recited education or work experience is relevant to the '416 Patent." *Id.* at 24.

According to Patent Owner, the "art that is relevant for the '416 Patent is Polymer Viscoelasticity and Polymer Rheology." *Id.* at 29. Patent Owner also asserts that "all challenges should be rejected based on Petitioner's failure to provide evidence based on the relevant art." *Id.* at 29–30.

Petitioner replies that Patent Owner misidentifies the relevant art. Pet. Reply 2. Petitioner points to the '416 patent's classification and prosecution history. *Id.* at 2–3 (citing Ex. 1001, [52], [58]; Ex. 1013, 24, 36; Ex. 1016, 11–66; Ex. 1041; Ex. 1045; Shorten Reply Decl. ¶¶ 19–20; Ex. 1072, 3). Petitioner also argues that its declarant provides testimony regarding the background art and technology of the '416 patent. Pet. Reply 13 (citing

Ex. 1001, 4:21–24, 6:53–55; Shorten Decl. ¶¶ 20–83, 136–185; Shorten Reply Decl. ¶¶ 5–16).

The "claims in suit provide a convenient starting point for determining the relevant art." *Orthopedic Equip. Co. v. U.S.*, 702 F.2d 1005, 1008 (Fed. Cir. 1983). All of the claims of the '416 patent recite a "shoe to be worn on a foot." *See* Ex. 1001, 8:28–10:31.

Also, to determine the relevant art for assessing Petitioner's validity challenges, we look to the nature of the problem confronting the inventor of the '416 patent. *See Bancorp. Servs., LLC v. Hartford Life Ins. Co.*, 359 F.3d 1367, 1375 (Fed. Cir. 2004) ("In determining the relevant art for purposes of addressing issues of patent validity, the court must look to the nature of the problem confronting the inventor."). In the section titled "Background of the Invention," the '416 patent states that "a great variety of running shoes and related devices" are "described in prior art," "[m]any running shoe components and materials are known which provide cushioning that attenuates and dissipates ground reaction forces," "[p]rior art shoes have long incorporated a midsole composed of closed cell viscoelastic foams," "[a]lternate shoe structures for cushioning the impact of heel strike by incorporating gas or liquid or cushioning devices combinations thereof in chambers in the midsole are also well known," and "[d]ilatant compounds are also well known." Ex. 1001, 2:19–24, 2:30–33, 2:39. The '416 patent also states:

> While it has been taught to interpose devices having variable elastic moduli between a runner's foot and the midsoles of running shoes so as to provide variable shock absorbing and cushioning properties, it has not been taught to provide midsoles that achieve higher energy storing and returning properties at higher running speeds.

Id. at 3:1–6; *see also id.* at 2:43–45 (describing that "a dilatant compound is a polymeric material whose . . . elastic modulus increase[s] with increasing strain rate").

In view of the claims and disclosures of the '416 patent, we determine that the problem facing the inventor was to devise a midsole for a running shoe that achieved higher energy storing and returning properties at higher running speeds. Therefore, the relevant art includes shoes, midsoles, and devices or materials that, at least, cushion, store energy, or return energy. The relevant art could include polymer viscoelasticity and polymer rheology, as asserted by Patent Owner, but based on the claims and above-quoted portions of the '416 patent, we determine that the relevant art is not limited to only polymer viscoelasticity and polymer rheology, as asserted by Patent Owner. Instead, we determine that the relevant art also includes shoes, midsoles, and devices or other materials that, at least, cushion, store energy, or return energy.

Turning to the level of ordinary skill, Petitioner states that:

> A person of ordinary skill in the art . . . was a person with an undergraduate degree in a field relevant to product design or manufacturing or the equivalent work experience, with 3–5 years of work experience and/or post-graduate study, including coursework or work experience related to materials science, engineering or biomechanics of footwear manufacturing methods.

Pet. 27 (citing Shorten Decl. ¶¶ 182–185).

Patent Owner contends that a "person having ordinary skill in that art [(field of polymer viscoelasticity and polymer rheology)] would have a degree in the field of materials science and engineering or closely-related discipline, as well as 1–5 years of experience within the area during which

time they may be synthesizing, characterizing or testing the physical and mechanical properties of polymeric material systems." PO Resp. 14 (citing McKinley Decl. ¶¶ 27–29).

Patent Owner asserts that Petitioner's proposed level of ordinary skill "is to recognize the nature of a problem and be able to seek someone who is actually skilled" and "is no skill at all in a relevant art." *Id.* at 24 (citing Ex. 2009, 87:5–89:6, 125:6–10); *see also id.* at 29 (asserting that Petitioner's proposed person of ordinary skill in the art "is not based on an appropriate level of skill in the relevant art"). Patent Owner contends that "all challenges should be rejected based on Petitioner's failure to provide evidence based on the relevant art . . . or a level of ordinary skill in the art, or evidence based on the perspective of one of ordinary skill in the art." *Id.* at 29–30 (citing Ex. 2009, 16:6–7, 18:14–20:5; McKinley Decl. ¶ 31).

The prior art asserted in this proceeding reflects an appropriate level of ordinary skill. *Okajima v. Bourdeau* 261 F.3d 1350, 1355 (Fed. Cir. 2001) (citing *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163 (Fed. Cir. 1985)). As discussed above for the relevant art and discussed in more detail below for each reference, the asserted prior art relates to at least one of shoes, midsoles, and devices or materials that, at least, cushion, store energy, or return energy. We note that any differences between the level of ordinary skill in the art reflected in the cited references and the parties' asserted levels of ordinary skill in the art would not impact our analysis. *See also* Tr. 52:18–21 (Petitioner's counsel agreeing that "the references here are sufficient to show what the level of ordinary skill in the art is").

Patent Owner also argues that Petitioner's declarant has limited background in the relevant art and his testimony should be given no weight. PO Resp. 30 (citing Ex. 2009, 16:6–7, 18:14–20:5; McKinley Decl. ¶ 31). Petitioner replies that its declarant would still be an ordinarily skilled artisan in view of Patent Owner's arguments. Pet. Reply 2. Petitioner argues that its declarant has experience in "analyzing a 'complex modulus,'" which Patent Owner's declarant identified as lacking. *Id.* at 3 (citing Ex. 1068, 57:5–58:1; Shorten Reply Decl. ¶¶ 49–52). Petitioner also argues that Patent Owner's declarant "is not a footwear expert." *Id.* (citing Ex. 1068, 53:17–54:22). Petitioner further asserts that its declarant more closely aligns with the '416 patent than does Patent Owner's declarant. *Id.* at 13 (citing Shorten Reply Decl. ¶¶ 5–52).

These arguments do not help us in determining what art is relevant to the '416 patent or what level of ordinary skill should be applied to the challenges discussed below. These arguments, instead, address what weight we should give to the testimony of the parties' declarants. For the reasons addressed below, the parties' declarants both provide relevant testimony on issues being assessed dependent on the declarant's particular background and expertise.

B. Claim Interpretation

In an *inter partes* review, claim terms in an unexpired patent are interpreted according to their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b)

(2018); *Cuozzo Speed Techs. LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard).[1]

1. "dilatant compound"

Petitioner proposes to interpret "dilatant compound" to encompass the '416 patent's characterizations that a dilatant compound is "a polymeric material that changes from soft and pliable under slow application of a load to elastic and bouncy under rapid application of a load," "a polymeric material whose yield point and elastic modulus increase with increasing strain rate," "a liquid with inverse thixotropy, that is, a viscous liquid suspension that temporarily solidifies under applied pressure," and "a liquid suspension in which the resistance to flow increases faster than the rate of flow." Pet. 28–29 (quoting 2:39–50) (citing Shorten Decl. ¶ 202). Petitioner contends that one of ordinary skill in the art would have understood "shear thickening" or "shear stiffening" to be "used to describe properties associated with 'dilatant compounds.'" *Id.* at 28 (citing Shorten Decl. ¶¶ 38, 135, 304).

According to Patent Owner, the broadest reasonable interpretation of "dilatant compound" in view of the specification and prosecution history is:

> a polymeric material that is soft, pliable, and has a low elastic modulus and low yield point under slow application of a load and slow strain rate, but becomes elastic and bouncy and has a

[1] On October 11, 2018, the Office revised its rules to harmonize the Board's claim construction standard with that used in federal district court. Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51340 (Oct. 11, 2018) (codified at 37 C.F.R. pt. 42 (2019)). This rule change, however, applies to petitions filed on or after November 13, 2018, so the revised claim construction standard does not apply to this proceeding. *Id.*; *see* Paper 3, 1 (according filing date of February 4, 2018 to the Petition).

> substantially higher elastic modulus under rapid application of a load or at high applied strain rate.

PO Resp. 15; *see also id.* at 16 (citing McKinley Decl. ¶ 36). Patent Owner argues that its proposed interpretation includes "essential features" as indicated by the specification and prosecution history, specifically "load rate and strain rate dependence of the modulus and deformation of the material, and the energy returning high elasticity of the material at high load rate and high strain rate." *Id.* at 15–16.

Patent Owner responds that Petitioner's proposed interpretation is based on statements that illustrate aspects of a dilatant compound but are not sufficient to define such a compound. *Id.* at 25 (citing Pet. 28–29). Patent Owner also argues that Petitioner's proposed interpretation encompasses materials that lack essential features of a dilatant compound, is not based on how one of ordinary skill in the art would interpret the term, is not supported by testimony of one ordinarily skilled in the art, and is not an interpretation at all. *Id.* at 25–26 (citing Pet. 28, 52, 62; Shorten Decl. ¶¶ 31, 202).

Petitioner replies that Patent Owner's proposed interpretation is unsupported, "cherry picks features," "selectively makes alternatives into additive requirements," "selectively broadens the inventor's construction," "writes out definitions favored by the inventor," and "lacks § 112 support." Pet. Reply 4–5 (citing Ex. 1001, 2:39–50, 5:43–44, 5:53–55, 5:57–58, 5:61–64, 6:1–3; Ex. 1068, 64:11–19, 66:5–10). Petitioner also replies that, under the broadest reasonable interpretation standard, one of ordinary skill would not have understood the definition in the manner proposed by Patent Owner and that statements at column 2, line 39–50 of the '416 patent cannot be dismissed. *Id.* at 5 (citing Pet. 27–28; Shorten Decl. ¶ 202). Petitioner

further replies that Patent Owner's declarant did not use the broadest reasonable interpretation standard, but that Petitioner's declarant used the understanding of the ordinary skilled artisan. *Id.* (citing PO Resp. 25; Shorten Decl. ¶ 201; Ex. 1068, 61:22–62:1).

Starting first with the claims, claim 1 recites "said at least one cavity filled with material consisting essentially of a dilatant compound." Ex. 1001, 8:32–33. They also recite that the material consisting essentially of a dilatant compound is contained or encapsulated (claims 2–4), and that the material consisting essentially of a dilatant compound "is derived from a mixture of dimethyl siloxane, hydroxy-terminated polymers with boric acid, Thixotrol ST®, polydimethysiloxane, decamethyl cyclopentasiloxane, glycerine, and titanium dioxide" (claims 5 and 9–11). The claims of the '416 patent provide some support to both parties' proposed interpretations of "dialatant compound." *See* Pet. 28–29; PO Resp. 15.

Turning to the specification, the '416 patent states that "[f]or purposes of this invention, a dilatant compound is a polymeric material that changes from soft and pliable under slow application of a load to elastic and bouncy under rapid application of a load." Ex. 1001, 2:39–42. The parties' proposed interpretations of "dilatant compound" agree that the term includes such a polymeric material. *Compare* Pet. 28–29 *with* PO Resp. 15. The parties also agree that "dilatant material" includes "[t]echnically, . . . a polymeric material whose yield point and elastic modulus increase with increasing strain rate." *See* Pet. 28–29; PO Resp. 15; McKinley Decl. ¶¶ 17, 21, 23, 36.

The '416 patent also states that "[i]n other words, it is a liquid with inverse thixotropy, that is, a viscous liquid suspension that temporarily

solidifies under applied pressure." Ex. 1001, 2:45–47. Petitioner includes this characterization as part of its proposed interpretation of "dilatant compound," and Patent Owner presents arguments clarifying its use in the '416 patent. Pet. 28–29; *see also* Pet. Reply 5 (presenting arguments regarding "inverse thixotropy"); PO Sur-Reply 11 (replying to Petitioner's arguments regarding "inverse thixotropy"). To resolve the parties' disputes regarding patentability, we need not determine whether "dilatant compound" also includes "a liquid with inverse thixotropy." *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (construing explicitly only those claim terms in controversy and only to the extent necessary to resolve the controversy); *see also Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (applying *Vivid Techs.* in the context of an *inter partes* review).

Thus, in view of the record before us, we interpret "dilatant compound" to mean "a polymeric material that changes from soft and pliable under slow application of a load to elastic and bouncy under rapid application of a load." Ex. 1001, 2:39–42; *see also* Pet. 28–29; PO Resp. 15. Also, in view of the specification and claims 5 and 9–11 in particular, our interpretation of "dilatant compound" would encompass "Silly Putty," "Dilatant Compound No. 3179," and a mixture of dimethyl siloxane, hydroxyl-terminated polymers with boric acid, Thixotrol ST® brand organic rheological additive, polydimethylsiloxane, decamethyl cyclopentasiloxane, glycerine, and titanium dioxide. Ex. 1001, 2:51–52 ("A well-known example of a dilatant compound is the toy Silly Putty® as described in U.S. Pat. No. 2,541,851."), 4:16–22 ("In the preferred embodiment, the dilatant compound is derived from a mixture of dimethyl siloxane, hydroxyl-

terminated polymers with boric acid, Thixotrol ST® brand organic rheological additive . . . , polydimethylsiloxane, decamethyl cyclopentasiloxane, glycerine, and titanium dioxide. This compound is sold by Dow Corning as Dilatant Compound No. 3179."), 5:1–5 (claim 5), 9:25–10:31 (claims 9–11).

2. "material consisting essentially of a dilatant compound"

Petitioner proposes to interpret "material consisting essentially of a dilatant compound" to include materials whose "formulation contains substances that are not dilatant so long as those other substances do not render the material non-dilatant as a whole." Pet. 29. Petitioner argues that the '416 patent "recognizes that dilatant compounds were well known," discloses well-known dilatant compounds such as Silly Putty and Dilatant Compound No. 3179, and "does not disclose any new material for its 'dilatant compound' or any modification of Silly Putty and Dow Dilatant Compound No. 3179." *Id.* (citing Ex. 1001, 2:39, 2:50–67, 3:10–12, 4:16–24; Shorten Decl. ¶ 203). Petitioner also argues that Silly Putty and Dilatant Compound No. 3179 contain lubricant and fibrous filler, and "therefore does not exclude Silly Putty, Dow Dilatant Compound No. 3179, and other materials containing additives so long as those materials have dilatant properties." *Id.* at 30 (citing Shorten Decl. ¶¶ 204–205).

According to Patent Owner, the broadest reasonable interpretation of "material consisting essentially of a dilatant compound" in view of the specification and prosecution history is:

> a dilatant compound and other material compounds and additives that do not significantly diminish the energy storage and return of the dilatant compound at high rates of loading and/or high strain rates.

PO Resp. 16; *see also id.* at 17 (citing McKinley Decl. ¶ 39). Patent Owner contends that its proposed interpretation conforms to the specification and prosecution history, specifically arguments made during prosecution to distinguish from U.S. Patent No. 6,701,529 B1 to Rhoades et al., issued March 9, 2004 (Ex. 1045, "Rhoades"). *Id.* at 16. Patent Owner states that its proposed interpretation "exclud[es] materials that significantly diminish a dilatant compound's energy storage and return" and "aligns with the essential requirement of a dilatant compound that it is energy storing and energy returning property under fast loading and fast strain rate." *Id.*

Patent Owner argues that Petitioner's proposed interpretation is (1) essentially the same as Petitioner's proposed interpretation for "dilatant compound," (2) unreasonable because it renders meaningless the phrase "consisting essentially of," and (3) unreasonable in view of prosecution history that distinguished the claims from Rhoades, which discloses an energy absorbing dilatant material. PO Resp. 26–27 (citing Pet. 29; Ex. 1045, 3:10–24, 3:44–48, 7:39–42, 8:6–50; McKinley Decl. ¶ 22).

Petitioner replies that Patent Owner's proposed interpretation "includes features that are not material properties for the invention and is not supported by the file history as argued." Pet. Reply 6. Petitioner argues that a "material 'consisting essentially of' a compound is the compound and other materials that do not change the compound's basic and novel properties" and that the '416 patent's dilatant compound has no novel properties and its basic properties are related to dilatancy. *Id.* (citing Pet. 29; Ex. 1001, 2:39–50; Shorten Decl. ¶¶ 203–205; Shorten Reply Decl. ¶¶ 21, 22, 77). Petitioner also argues that energy storage and return at high rates of loading are not material properties, but the result of incorporating the '416

patent's dilatant compound into a shoe. *Id.* at 6–7 (citing Ex. 1001, 2:10–17, 3:13–16, 6:21–26; Ex. 1068, 50:23–51:10; Ex. 1070, 2; Shorten Reply Decl. ¶¶ 27–40, 57, 78–82, 88).

Petitioner also replies that Patent Owner does not explain, or provide the source of, the inclusion of "material compounds" in Patent Owner's proposed interpretation. *Id.* at 7. Petitioner argues that Patent Owner "offers no objective metric for 'significantly diminish.'" *Id.* Petitioner also argues that Patent Owner ignores aspects of, or changes, the description of "dilatant compound" in the '416 patent. *Id.* at 7–8 (citing PO Resp. 5–6; Ex. 1001, 1:40–46, 2:39–42, 3:1–6, 5:41–47, Fig. 7). According to Petitioner, the claims were not allowed based on "energy return" and were not limited to exclude Rhoades in the manner asserted by Patent Owner. *Id.* at 8 (citing PO Resp. 6–7; Ex. 1016, 2, 10–11), 9–10 (citing PO Resp. 6–7, 42; Ex. 1018, 10–12; Shorten Reply Decl. ¶ 93). Petitioner contends that Rhoades conflicts with Patent Owner's arguments. *Id.* at 9 (citing Ex. 1006, Abstract, 8:26–29; Ex. 1011, 5; Ex. 1045, 8:25–37, 10:52–59; Ex. 1065, 1; Shorten Reply Decl. ¶¶ 84–93). Petitioner also contends that its proposed interpretation does not render terms meaningless and that "Dow 3179 is a 'dilatant compound,' of the claim which contains silica filler and other additives." *Id.* at 10 (citing PO Resp. 26, 27; Ex. 1041, Abstract).

Patent Owner replies that its declarant testified that energy storage and return are material properties that can be determined. PO Sur-Reply 11–12 (citing Pet. Reply 6–8; Ex. 1068, 94:17–96:9, 97:15–25; McKinley Decl. ¶¶ 38, 39). Patent Owner also argues that Petitioner cannot argue that Patent Owner's declarant is not qualified and that Petitioner ignores the testimony of Patent Owner's declarant. *Id.* at 12 (citing Pet. Reply 8; Ex. 1068, 29:1–

16; McKinley Decl., Ex. A). Patent Owner additionally argues that prosecution history shows that the dilatant material of the '416 patent is distinct from Rhoades and that Petitioner misinterprets Rhoades because Rhoades discloses an energy absorbing material. *Id.* at 12–13 (citing Pet. Reply 8, 9; Ex. 1017, 6; Ex. 1045, 3:11–28, 3:50–4:20, 7:39–46). Patent Owner also points to Plant for disclosing the use of Dilatant Compound No. 3179 as an energy absorbing material but not using the compound in the midsole. *Id.* at 13. Patent Owner further argues that Rhoades teaches formulations that minimize energy return. *Id.* at 14 (citing Pet. Reply 9; Ex. 1045, 10:24–27).

The claims of the '416 patent require "at least one cavity filled with material consisting essentially of a dilatant compound . . . retained below the bottom of the foot" (claim 1), where the material consisting essentially of a dilatant compound is contained or encapsulated (claims 2–4), and the material consisting essentially of a dilatant compound "is derived from a mixture of dimethyl siloxane, hydroxy-terminated polymers with boric acid, Thixotrol ST®, polydimethysiloxane, decamethyl cyclopentasiloxane, glycerine, and titanium dioxide" (claims 5 and 9–11). The claims of the '416 patent do not require explicitly or implicitly that the "material consisting essentially of a dilatant compound" is a dilatant compound with other compounds and additives that "do not significantly diminish the energy storage and return of the dilatant compound at high rates of loading and/or high strain rates," as proposed by Patent Owner in its interpretation.

The specification does not use the phrase "material consisting essentially of a dilatant compound," but does describe dilatant compounds. *See*, *e.g.*, Ex. 1001, 2:39–42, 2:45–47, 2:51–52, 4:16–22. Regarding

"energy storage and return of the dilatant compound at high rates of loading and/or high strain rates," the specification states that "the present invention describes a device that can be incorporated into the midsoles of existing running shoes to achieve higher energy storing and returning properties at higher running speeds" (*id.* at 3:13–16), "the present invention describes a method for incorporating said device into the midsoles of existing running shoes so as to achieve higher energy storing and returning properties at higher running speeds" (*id.* at 3:17–20), "[u]nder fast application of force, as in when the foot begins to impact against the insert during fast running, the dilatant compound will exhibit is inverse thixotropic properties and achieve a higher modulus of elasticity . . . then, the insert . . . will return more of the energy directly to the foot . . . " (*id.* at 5:41–48), and the "insert constructed of the size and shape described above and constructed of the materials described above . . . maximize shock absorption . . . while maximizing the elastic return of energy during fast running" (*id.* at 6:21–26).

Based on our review of the specification, we agree with Petitioner that the '416 patent indicates that energy storage and return at high rates of loading are not due to the claimed "material consisting essentially of a dilatant compound" but instead due to incorporating the "material consisting essentially of a dilatant compound" in an insert placed in the cavity of a midsole. Pet. Reply 6–7. The specification of the '416 patent, thus, does not support Patent Owner's proposed interpretation of "material consisting essentially of a dilatant compound" to mean a dilatant compound with other compounds and additives that "do not significantly diminish the energy storage and return of the dilatant compound at high rates of loading and/or high strain rates."

Turning to the prosecution history of the ’416 patent, the then-pending claims were distinguished based on where the dilatant compound was placed and fixed. *See* Ex. 1018, 8 (arguing that “the placement of the dilatant compound in Kita . . . is intentionally different from the placement of the dilatant compound in the subject application”), 9 (arguing that “this complete difference between Kita and the subject application -- i.e., between potential movement of the dilatant compound from under the foot and the fixture of the dilatant compound under the foot -- demonstrates that Applicant’s teachings and claims regarding the size of the claimed insert are not obvious”).

The pending claims were also distinguished from Rhoades based on the composition of Rhoades including a dilatant compound, polymer, lubricant, and fibrous filler. *Id.* at 10 (arguing that “Rhoades teaches an energy and shock absorption and vibration dissipation medium . . . comprising a dilatant compound including a polymer and a lubricant and a fibrous filler . . . ,” that the pending claims were “limited to ‘consisting essentially of dilatant compound,’ i.e., no combination of said additives,” and that “the Rhoades medium should contain 20% Paraffinic Grease . . . ”), 11 (arguing that “Rhoades teaches that the Rhoades medium must contain a fibrous filler to stabilize the composition” and that “it can be seen that the medium or composition described and claimed by Rhoades is sufficiently different than the dilatant compound that is a claim element in the subject application . . . ”). Thus, according to Applicant’s understanding of Rhoades, the composition of Rhoades was not a “material consisting essentially of a dilatant compound” because the composition included a

dilatant compound with polymer, lubricant, and fibrous filler. *See id.* at 10, 11.

Although Applicant further argued that these additives made the composition of Rhoades energy absorbing, the prosecution history of the '416 patent does not make clear whether the pending claims were distinguished from Rhoades based on only the claimed "material consisting essentially of a dilatant compound" being energy returning instead of energy absorbing or whether the pending claims were distinguished based on "material consisting essentially of a dilatant compound" lacking the additives listed by Rhoades. Thus, the prosecution history of the '416 patent does not support conclusively Patent Owner's proposed interpretation of "material consisting essentially of a dilatant compound." The arguments made during prosecution quoted above also do not present a clear and unambiguous disclaimer of claim scope. *Arendi S.A.R.L. v. Google LLC*, 882 F.3d 1132, 1135 (Fed. Cir. 2018) ("[I]n order to disavow claim scope, a patent applicant must clearly and unambiguously express surrender of subject matter during prosecution." (citation omitted)).

Based on a preponderance of the evidence and, in particular, our findings above that the '416 patent indicates that energy storage and return at high rates of loading are due to incorporating the "material consisting essentially of a dilatant compound" in an insert placed in the cavity of a midsole (*see* Ex. 1001, 3:13–20, 5:41–48, 6:21–26), we interpret "material consisting essentially of a dilatant compound" to mean materials whose "formulation contains substances that are not dilatant so long as those other substances do not render the material non-dilatant as a whole," as proposed by Petitioner. *See* Pet. 29.

3. "cavity formed in said top surface"

Patent Owner proposes to interpret "cavity formed in said top surface" to mean "a space within the midsole that opens only to the top surface of the midsole." PO Resp. 17; PO Sur-Reply 14. Patent Owner argues that its proposed interpretation conforms to the plain and ordinary meaning of "cavity" and the specification. PO Resp. 17–18 (citing Ex. 1001, 3:63–4:7, 4:25–29, 5:8–9, 6:27–34, Figs. 1–3, 6; Ex. 1018, 2; Ex. 2001, 5). Patent Owner also argues that "[i]t is essential that the dilatant material is confined in the cavity" under slowly applied pressure. *Id.* at 18 (citing Ex. 1001, 5:5–31, 5:35–41).

Petitioner replies that Patent Owner's dictionary definition (Ex. 2001, 5) "provides a broader, contextually-appropriate meaning that [Patent Owner] omits" and "does not support 'opens only to the top surface' and permits other openings." Pet. Reply 11. Petitioner also argues that Patent Owner's proposed interpretation reads in limitations from embodiments and that Patent Owner does not argue there is lexicography or disclaimer to read in those limitations. *Id.* Petitioner additionally argues that the "compound may be 'confined' for purposes of the invention in [] multiple other ways." *Id.* Patent Owner replies that "Petitioner does not offer a construction that gives any effect to the requirement that the cavity is 'formed in said top surface.'" PO Sur-Reply 14 (citing Pet. Reply 11).

Claim 1 recites "a midsole . . . having at least one cavity formed in said top surface below the bottom of the foot, said at least one cavity filled with material consisting essentially of a dilatant compound." Ex. 1001, 8:28–35. It does not require expressly that the cavity be open only to the top surface in the manner of Patent Owner's proposed interpretation. *See id.*

Patent Owner directs us to certain portions of the specification that Patent Owner contends supports its proposed interpretation. PO Resp. 17–18 (citing Ex. 1001, 3:63–4:7, 4:25–29, 5:8–9, 6:27–34, Figs. 1–3, 6; Ex. 1018, 2; Ex. 2001, 5). Those portions of the specification, however, do not indicate that cavity 16 opens only to the top surface of the midsole. The specification, instead, indicates that cavity 16 can be in certain parts of the midsole (Ex. 1001, 3:63–4:2), that cavity 16 receives insert 18 (*id.* at 4:3–7), that the dilatant compound fits snugly in the cavity (*id.* at 4:25–29), that the insert is set into the cavity to have maximum contact (*id.* at 5:5–31), and that, in one embodiment, the dilatant compound is enclosed completely in a chamber (*id.* at 6:27–34). The specification does not discuss the cavity beyond the portions of the specification referred to by Patent Owner. Because the specification does not require the claimed cavity to be open only to the top surface of the midsole, we determine that the specification does not support Patent Owner's proposed interpretation.

Neither party directs us to prosecution history. Turning to the proffered dictionary definition, we agree with Petitioner that the other definitions of "cavity" indicate that the recited "cavity" can be interpreted so that it is not limited to "a space within the midsole that opens only to the top surface of the midsole," as proposed by Patent Owner. *See* Ex. 2001, 5 (defining "cavity" to mean "a three-dimensional discontinuity in the substance of a mass or body" in addition to "a space within a mass").

In view of the record before us, we interpret "cavity formed in said top surface" to mean "a space within the midsole that may or may not open to the top surface of the midsole." *See* Ex. 1001, 3:63–4:7; Ex. 2001, 5.

4. "below the bottom of the foot"

Patent Owner proposes to interpret "a midsole . . . having at least one cavity . . . below the bottom of the foot" to mean "the entire cavity, including the top surface, is directly under the foot." PO Resp. 18–19; PO Sur-Reply 15. Patent Owner argues that its proposed interpretation conforms to the plain and ordinary meaning of "below," and is consistent with the specification and prosecution history. PO Resp. 19–20 (citing Ex. 1001, 3:63–66, 5:50–64, Figs. 1–3; Ex. 1018, 8, 9; Ex. 2001, 4).

Petitioner replies that "below the bottom of the foot" "distinguishes areas up the sides of the foot or the addition of 'bottom of' would be sur[]plusage." Pet. Reply 11. Petitioner also contends that Patent Owner's dictionary definition of "directly under" does not provide support because other definitions, such as "at a lower level" and "downward from" are within the broadest reasonable interpretation standard. *Id.* at 11–12. Petitioner additionally contends that the specification is consistent with Petitioner's contentions and does not provide lexicography or disclaimer. *Id.* at 12 (citing Ex. 1001, 2:10–11). According to Petitioner, prosecution history does not support Patent Owner's proposed interpretation because it does not indicate a clear and unambiguous disclaimer of claim scope. *Id.* at 12–13 (citing Ex. 1018, 7–8). Patent Owner replies that "Petitioner does not show how [other] definitions are consistent with the specification and prosecution history of the '416 patent." PO Sur-Reply 15.

Claim 1 recites "a midsole . . . having at least one cavity formed in said top surface below the bottom of the foot." Ex. 1001, 8:28–32. It does not require expressly that "the entire cavity, including the top surface, is directly under the foot," as proposed by Patent Owner. *See id.* The portions

of the specification relied upon by Patent Owner describe that "midsole 6 includes at least one cavity 16, preferably in the heel region 14" (*id.* at 3:63–66) and that the insert should not extend beyond a certain perimeter (*id.* at 5:50–64). By using the word "preferably," the specification does not exclude cavity 16 from being somewhere other than heel region 14 or "directly under the foot," as proposed by Patent Owner. *See id.* at 3:63–66.

The portions of the prosecution history relied upon by Patent Owner include arguments that the claims have been amended so that the dilatant compound must be retained below the foot. *See* Ex. 1018, 8, 9. These arguments, however, do not make clear that the entire cavity must be directly under the foot, as Patent Owner proposes in its interpretation. The arguments are directed to the dilatant compound being below the foot and the insert not being too large or small. *See id.* The arguments do not address whether the entire cavity must also be directly under the foot. *See id.* We, thus, agree with Petitioner that the prosecution history does not provide a clear and unambiguous disclaimer of claim scope. We also determine that the prosecution history does not support clearly Patent Owner's proposed interpretation.

As for the dictionary definition, we agree with Petitioner that other definitions indicate that "below" can be interpreted so that "below the bottom of the foot" is not limited to "directly under the foot," as proposed by Patent Owner. *See* Ex. 2001, 4 (defining "below" to also mean "at a lower level" in addition to "directly under").

For the reasons above and in view of the record before us, we interpret "a midsole . . . having at least one cavity . . . below the bottom of the foot" to

mean "the cavity is at a lower level than or directly under the foot." *See* Ex. 1001, 3:63–66; Ex. 2001, 4.

5. "material having a fixed elastic modulus"

Petitioner proposes an interpretation for "material having a fixed elastic modulus." Pet. 30–31 (citing Ex. 1001, 2:33–38, 2:43–45, 3:45–50, 7:37–39; Shorten Decl. ¶ 206). Patent Owner does not accept that Petitioner's proposed interpretation is correct. PO Resp. 27–28 (citing Pet. 30–31). Patent Owner, however, states that "[b]ecause no issue presented to this point requires construction of this term, Patent Owner does not propose a different construction." *Id.* at 28.

We determine that express interpretation of "material having a fixed elastic modulus" or any other term beyond those addressed above is not required to resolve the parties' disputes. *Vivid Techs.*, 200 F.3d at 803.

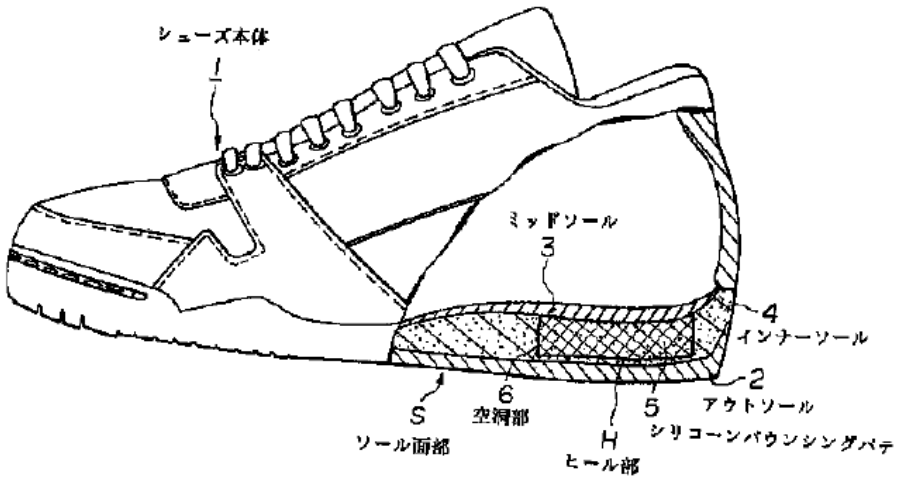
C. Challenge Under 35 U.S.C. § 102

To anticipate a claim under 35 U.S.C. § 102, "a single prior art reference must expressly or inherently disclose each claim limitation." *Finisar Corp. v. DirecTV Group, Inc.*, 523 F.3d 1323, 1334 (Fed. Cir. 2008). That "single reference must describe the claimed invention with sufficient precision and detail to establish that the subject matter existed in the prior art." *Verve, LLC v. Crane Cams, Inc.*, 311 F.3d 1116, 1120 (Fed. Cir. 2002).

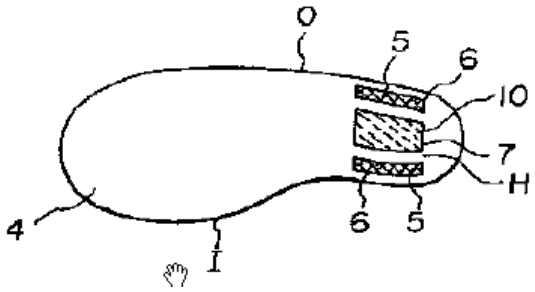
1. Izumi (Ex. 1002)

Izumi relates to a sports shoe with improved stability and shock mitigation characteristics. Ex. 1002 ¶ 1. Figures 1–3 of Izumi are reproduced below.

【図１】



【図２】



【図３】

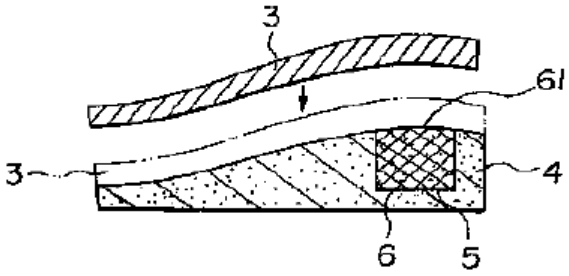


Figure 1 shows a partial cutaway of a shoe; Figure 2 shows a midsole; and Figure 3 shows a cutaway of an inner sole and mid sole. *See id.* ¶ 30. Shoe 1 includes inner sole 3 and mid sole 4 that has hollow portions 6 that are filled with silicone bouncing putty 5. *See id.* ¶ 17. One property of silicone bouncing putty 5 is that it acts like a liquid when a small force is applied to it and acts like a rigid body when a large force is applied to it. *See id.* ¶¶ 13, 18, 24, 29.

Mid sole 4 is "made from, for example, an ethylene-vinyl acetate copolymer (EVA), a compressed molded EVA, a foam urethane, foam rubber, or the like." *Id.* ¶ 17. "When filling the hollow portions 6 of the mid sole 4 with silicone bouncing putty 5 . . . the mid sole 4 may be layered . . .

so as to have opening portions 61 on the top face of the mid sole 4 . . . ." *Id.* ¶ 19.

Patent Owner states that it "does not, by this response, concede that Exhibit 1003 is what Petitioner represents it to be nor that Exhibit 1002 is an accurate translation of Exhibit 1003." PO Resp. 31. At the hearing, Patent Owner's counsel indicated that Patent Owner had an opportunity to file its own translation, was served with satisfactory supplemental evidence, and is no longer raising incorrect translation as an issue. Tr. 49:5–24.

2. Claim 1

Petitioner contends that claim 1 is anticipated by Izumi. Pet. 2, 31–40. Patent Owner responds that Izumi fails to disclose "a material consisting essentially of a dilatant compound in a cavity formed in the top surface of a shoe midsole as recited by claim 1." PO Resp. 22, 40–45. For the reasons discussed below, Petitioner does not persuade us by a preponderance of the evidence that Izumi anticipates claim 1.

a. " . . . said at least one cavity filled with material consisting essentially of a dilatant compound . . . "

Claim 1 requires "said at least one cavity filled with material consisting essentially of a dilatant compound." Ex. 1001, 8:31–32. Petitioner points to disclosures related to "silicone bouncing putty 5" to argue that one of ordinary skill in the art would have understood "silicone bouncing putty" refers to a dilatant compound. Pet. 36–37 (citing Ex. 1002 ¶¶ 17, 26, 27, Figs. 2, 5, 6; Shorten Decl. ¶¶ 219–220).

Petitioner argues that Izumi's description of "silicone bouncing putty" as "a mixture of silica, as a filler, in a reaction product of dimethyl polysiloxane and a boric acid compound" is equivalent to, and would be

understood by one of ordinary skill in the art to be the same as, the "Dilatant Compound No. 3179" of the '416 patent, which is described as "a mixture of dimethyl siloxane, hydroxyl-terminated polymers with boric acid." *Id.* at 37 (citing Ex. 1001, 4:16–23; Ex. 1002 ¶ 13) (emphasis omitted). According to Petitioner, an ordinary skilled artisan would have understood both Izumi's silicone bouncing putty and Dilatant Compound No. 3179 contain silica. *Id.* (citing Ex. 1011, 5–6; Shorten Decl. ¶ 220; Ex. 1064, 2). Petitioner contends that Silly Putty is also a dilatant compound and referred to as "bouncing putty," as described in U.S. Patent No. 2,541,851 to Wright, issued February 13, 1951 (Ex. 1009, "Wright"). *Id.* (citing Ex. 1001, 2:51–52; 6:50–54, 6:66–7:2; Ex. 1009, 1:5–29, 4:22–25; Shorten Decl. ¶¶ 220, 222). Petitioner asserts that Izumi describes its silicone bouncing putty as having the properties of a dilatant compound and that one of ordinary skill in the art would have understood Izumi discloses the benefits described in the '416 patent. *Id.* at 38 (citing Ex. 1001, 3:4–6; Ex. 1002 ¶¶ 13, 18; Shorten Decl. ¶¶ 221–223).

Patent Owner responds that Petitioner fails to show that Izumi discloses "material consisting essentially of a dilatant compound." PO Resp. 40. According to Patent Owner's understanding, Petitioner is arguing that Izumi's silicone bouncing putty is a "dilatant compound" and "consist[s] essentially of a dilatant compound" because Izumi's silicone bouncing putty, Wright's Silly Putty, and Dow Compound No. 3179 are the same. *Id.* (citing Pet. 36–38). Patent Owner also argues that "Petitioner relies extensively on Petitioner's expert who is not skilled in the art." *Id.*

Patent Owner contends that Izumi's silicone bouncing putty, the material disclosed in Wright, and Dow Compound No. 3179 have not been

shown to be the same because Izumi and Wright do not disclose "the form or amount of silica that is used as a filler." *Id.* at 40–41. Patent Owner also argues that the form and amount of silica "can affect the behavior of the mixture" and "diminish its energy storing and returning properties at high loading rate and high strain rate." *Id.* at 41 (citing McKinley Decl. ¶¶ 45–46). Patent Owner further argues that "[h]aving a form of silica filler does not make these the same materials." *Id.* (citing McKinley Decl. ¶¶ 23–25).

Petitioner replies that "material consisting essentially of a dilatant compound" encompasses Dow Compound 3179, which includes the reaction product and additives like silica. Pet. Reply 20. Petitioner also argues that Izumi's silicone bouncing putty is a dilatant compound "irrespective of supposed lessened energy return" and "'consists of' a dilatant compound." *Id.* at 20–21.

Patent Owner replies that Izumi's silicone bouncing putty is not the recited "material consisting essentially of a dilatant compound," "performs a different function in the sole of the shoe disclosed by Izumi" than the claimed material, and behaves differently than the claimed material. PO Sur-Reply 15–16. Patent Owner argues that, contrary to Petitioner's assertion that Izumi's silicone bouncing putty and the recited "material consisting essentially of a dilatant compound" are the same, properties of dilatant compounds based on polyborodimethylsiloxane (PBDMS) "depend on the materials with which it is mixed." *Id.* at 16 (citing Ex. 1045, 8:50–60, Fig. 1; McKinley Decl. ¶¶ 23, 58).

As indicated by Petitioner's arguments, Izumi does not disclose expressly that its silicone bouncing putty is a "dilatant compound" or a "material consisting essentially of a dilatant compound." *See* Pet. 36 ("A

POSA would have understood that Izumi's 'silicone bouncing putty' refers to dilatant compounds, including Silly Putty, which is often called bouncing putty."). We also find that Izumi does not disclose expressly that its "silicone bouncing putty" is, or must be necessarily, a "dilatant compound."

Petitioner also points to Izumi's disclosure that its "silicone bouncing putty . . . is a mixture of silica, as a filler, in a reaction product of dimethyl polysiloxane and a boric acid compound." *See id.* at 37 (citing Ex. 1002 ¶ 13) (emphasis omitted). As discussed above for our interpretation of "dilatant compound" and as described by the '416 patent, a preferred embodiment of the "dilatant compound" is "a mixture of dimethyl siloxane, hydroxyl-terminated polymers with boric acid, Thixotrol ST® brand organic rheological additive . . . , polydimethylsiloxane, decamethyl cyclopentasiloxane, glycerine, and titanium dioxide . . . sold . . . as Dilatant Compound No. 3179." Ex. 1001, 4:16–22. The '416 patent does not indicate that its preferred embodiment of dilatant compound includes silica. *See id.* Petitioner also points to no disclosure in Izumi that expressly indicates its silicone bouncing putty is, or must be necessarily, Dilatant Compound No. 3179. *See* Pet. 36–38. Similarly, Petitioner points to no disclosure in Izumi that expressly indicates its silicone bouncing putty is, or must be necessarily, Wright's material or Silly Putty. *See id.*

Thus, even if we agreed that one of ordinary skill in the art would have understood Izumi's "silicone bouncing putty" to have similar composition and to exhibit similar properties as the claimed "material consisting essentially of a dilatant compound," we are not persuaded by a preponderance of the evidence that Izumi discloses that its putty is the claimed material. For the reasons above, Petitioner does not show by a

preponderance of the evidence that Izumi discloses all the elements of claim 1, and therefore, does not show by a preponderance of the evidence that Izumi anticipates claim 1.

D. Challenges Under 35 U.S.C. § 103

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

As discussed above in Section II.A, the parties dispute the level of ordinary skill in the art, and we determine that the prior art asserted in this proceeding reflects an appropriate level of ordinary skill. *See* Tr. 52:18–21 (Petitioner's counsel agreeing that "the references here are sufficient to show what the level of ordinary skill in the art is"). As described below, the parties' disputes are also related to the scope and content of the prior art, differences between claim 1 and the prior art, and objective evidence of nonobviousness. *See also* Pet. Reply 27 (stating that Patent Owner "raises no separate substantive arguments about the unpatentability of claim 6"); Tr. 50:6–9 (Patent Owner's counsel agreeing that no specific arguments for claim 6 were presented).

After reviewing the complete record, we conclude that Petitioner has shown by a preponderance of the evidence that Izumi alone as well as Rudy and Plant teach or suggest each limitation of claim 1, and that Izumi and Chang as well as Rudy, Plant, and Chang teach or suggest each limitation of claims 1 and 6; that a person of ordinary skill in the art would have had a reason to modify Izumi and to combine Izumi and Chang, Rudy and Plant, and Rudy, Plant, and Chang; that a person of ordinary skill in the art would have had a reasonable expectation of success in modifying Izumi and combining Izumi and Chang, Rudy and Plant, and Rudy, Plant, and Chang in the manner asserted by Petitioner; and that the asserted objective evidence of nonobviousness does not show persuasively that others tried and failed to develop the claimed shoe.

1. Scope and Content of the Prior Art

Izumi is discussed above in Section II.C.1.

a. Rudy (Ex. 1005)

Rudy "relates to articles of footwear that include cushioning devices." Ex. 1005, 1:11–12. Figure 2 of Rudy is reproduced below.

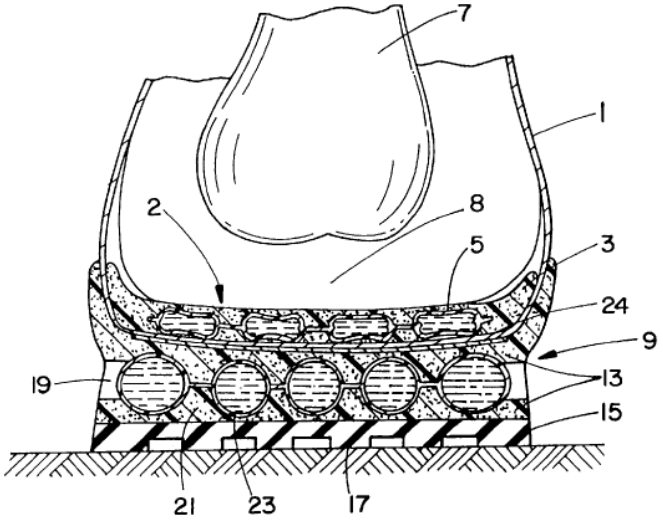


FIG. 2

Figure 2 is a diagram partly in section of a shoe under a standing load condition. *Id.* at 3:28–30. The shoe includes sockliner 2 encapsulating cushioning device 5. *Id.* at 4:9–12. The shoe also includes sole 9 with midsole 13 comprising cushioning device 23. *Id.* at 4:22–23, 4:26–28.

b. Plant (Ex. 1006)

Plant "relates to a new energy absorbing member . . . suitable for incorporation into garments or apparel worn by people who need their body parts protected against impact." Ex. 1006, 1:3–6; *see also id.* at 2:13–15 ("According to the invention there is provided a protective member comprising an energy absorbing material in an envelope which contains said material in a controlled space."), 4:23–25 ("Figures 1 and 2 show a protective member 1 of the invention which comprises a quantity of energy absorbing material 2 encapsulated in an envelope.").

The protective member comprises an energy absorbing material in an envelope, which contains the material. *Id.* at 2:13–17, 4:23–27. The energy absorbing material can be a "dilatant compound which is normally malleable under low strain rates and behaves in a manner similar to a putty like substance." *Id.* at 5:1–5. The "preferred material is a Dimethyl siloxane hydroterminated polymer such as the material sold by DOW CORNING under their Catalogue or Trade number 3179." *Id.* at 2:26–28; *see also id.* at 5:1–5 ("The energy absorbing material 2 can be a strain rate sensitive polymer, a non-Newtonian fluid or a dialatent compound which is normally malleable under low strain rates and behaves in a manner similar to a putty like substance."), 5:7–10 ("The preferred material is a dimethyl siloxane hydroterminated polymer such as the material manufactured by DOW CORNING and sold under their catalogue or trade No. 3179.").

c. Ito (Ex. 1007)

Ito "relates to a sole for sports shoes." Ex. 1007, 1:6–7. Figure 1 of Ito is reproduced below.

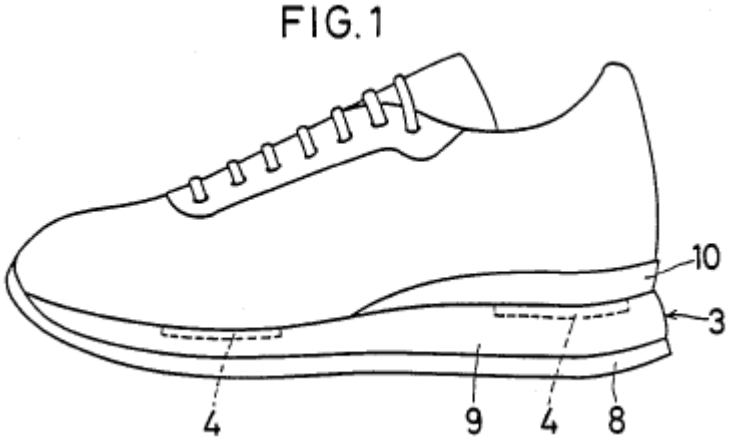


Figure 1 is a side view with the sole of Ito. *Id.* at 2:11–12. Sole plate 3 is formed with recesses 4 that receive cushioning members 1. *Id.* at 2:22–24. Sole plate 3 comprises outer sole 8, middle sole 9, and upper sole 10. *Id.* at 2:50–52. Recesses 4 are formed in the top surface of middle sole 9. *Id.* at 2:52–54.

d. Christensen (Ex. 1008)

Christensen relates to a variable resistance cell. Ex. 1008 ¶ 3. Christensen states that "it is often desirable to provide greater resistance to greater applied conditions, and lesser resistance to lesser applied conditions." *Id.* ¶ 5. Figure 10 of Christensen is reproduced below.

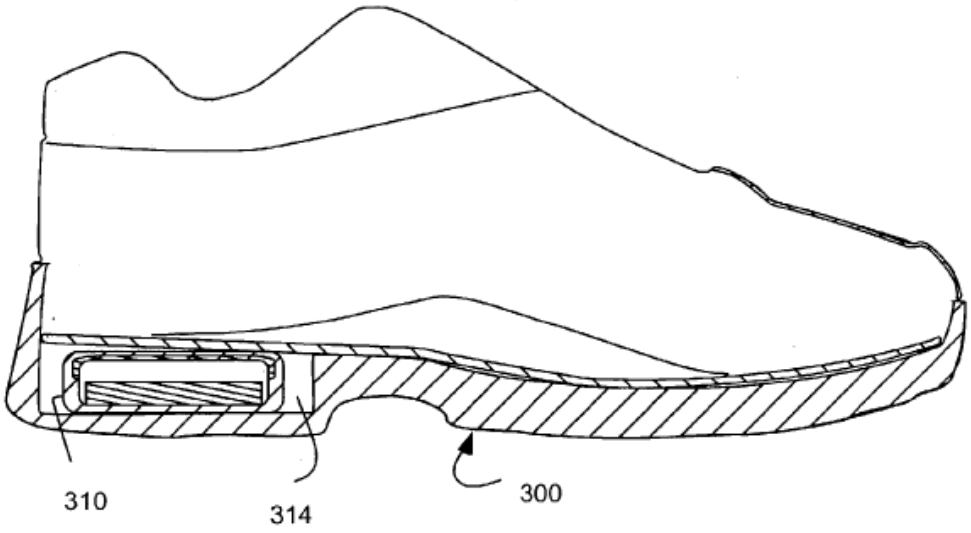


FIG. 10

Figure 10 is a cross-sectional view of a shoe with a variable resistance cell. *Id.* ¶ 27. Shoe 300 includes variable resistance cell 310 positioned at the heel in cavity 314. *Id.* ¶ 59. Variable resistance cell 310 can act as a cushion. *Id.*

The variable resistance cells provide a variable resistance response to a load because, according to Christensen, it is advantageous to have such a cell that compresses less in response to a greater load but compresses more in response to a lesser load. *Id.* ¶¶ 6, 7. The variable resistance cells include a variable viscosity fluid or material that increases in viscosity with an increase in the load applied to it. *See id.* ¶¶ 32, 36, 38. Christensen states that "variable viscosity fluid 12 can include a shear stiffening material that increases in viscosity with an increase in the load factor applied to the shear stiffening material," and "[a]n example of such shear stiffening material is a composition of cornstarch and water." *Id.* ¶ 42.

e. Chang (Ex. 1004)

Chang "relates to a sole with compressible shock absorbers." Ex. 1004, 1:5–6. Figure 1 of Chang is reproduced below.

Fig. 1.

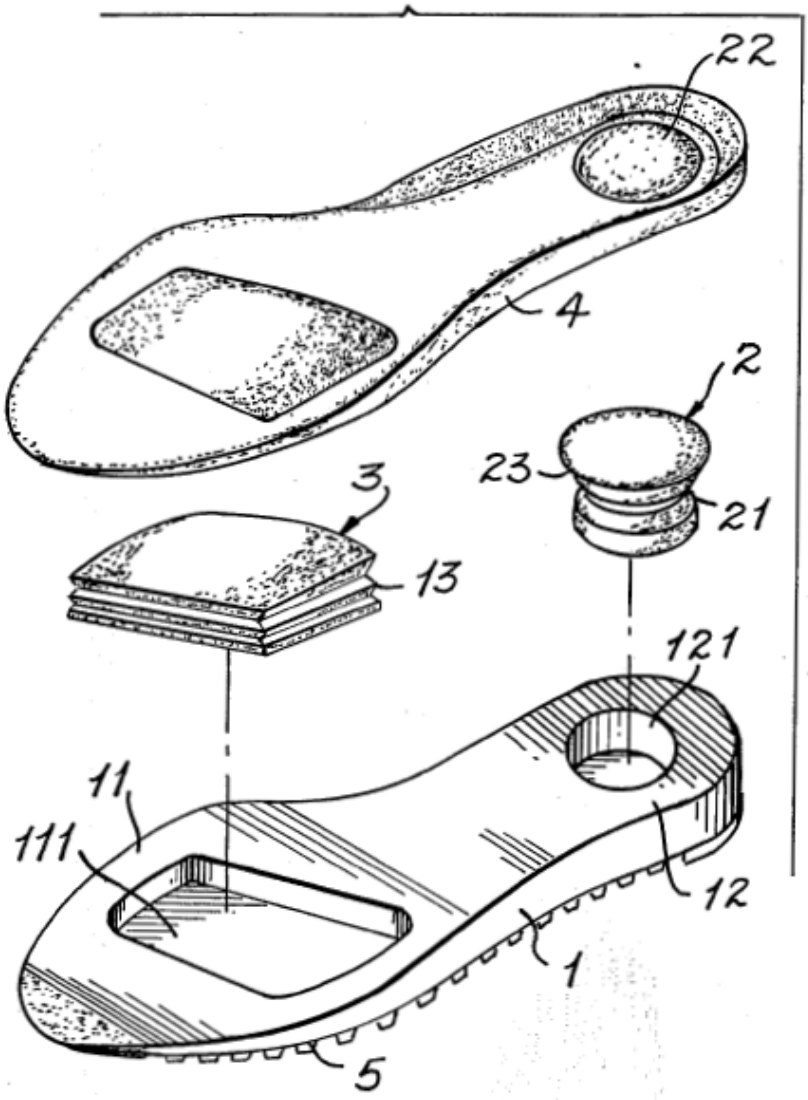


Figure 1 is a perspective view of Chang's sole. *Id.* at 2:36–37. A replaceable air cylinder has cylindrical body 21 that is placed in circular recess 121 in a heel portion of a sole unit 1. *Id.* at 2:64–67.

2. Differences Between the Claimed Subject Matter and the Prior Art

a. Challenges Based on Izumi

Petitioner contends that claim 1 is rendered obvious by Izumi. Pet. 40–41. Petitioner relies on its arguments that Izumi discloses claim 1 and argues that, even if "the 'at least one cavity filled with material consisting essentially of a dilatant compound' limitation somehow constrains the amount of fillers," Izumi would have rendered obvious claim 1. *Id.* at 40 (referencing *id.* at 31–40). Patent Owner argues that Izumi does not teach or suggest "material consisting essentially of a dilatant compound" and a cavity formed in the top surface of a midsole "below the bottom of the foot." PO Resp. 45–47.

For the reasons below, Petitioner persuades us by a preponderance of the evidence that Izumi would have rendered obvious claims 1 and 6.

i. "A shoe to be worn on a foot, said shoe comprising a midsole having a top surface, said shoe midsole fabricated from material having a fixed elastic modulus . . . "

Petitioner contends that Izumi discloses every element of claim 1. Pet. 31–40 (citing Ex. 1002 ¶¶ 1, 13, 17–21, 24, 26, 27, Figs. 1–3, 5, 6; Shorten Decl. ¶¶ 209–220, 222–226); *see also id.* at 14–17 (asserting what Izumi discloses), 40 (referencing arguments that Izumi anticipates claim 1 for the challenge that Izumi would have rendered obvious claim 1).

Specifically, Petitioner contends that Izumi discloses a "shoe to be worn on a foot." Pet. 31 (citing Ex. 1002 ¶ 1, Fig. 1; Shorten Decl. ¶ 209). We find that Izumi states that it "relates to a sport shoe . . . ." Ex. 1002 ¶ 1. We also find that Figure 1 of Izumi depicts "1: Shoe Main Unit." *Id.* Fig. 1;

see also id. ¶ 16 (stating "FIG. 1 through FIG. 4 are a first embodiment of a sport shoe according to the present invention"), [Brief Descriptions of the Drawings], [Explanations of Reference Symbols]. We further credit Petitioner's declarant testimony regarding "shoe to be worn on a foot" because Izumi supports it. Shorten Decl. ¶ 209. We, thus, find that Izumi discloses a "shoe to be worn on a foot," as recited by claim 1.

Petitioner also contends that Izumi discloses "said shoe comprising a midsole having a top surface." Pet. 32 (citing Ex. 1002 ¶ 17, 19, Figs. 1, 3; Shorten Decl. ¶ 210). We find that Izumi states that the "sole surface portion S that forms the base of the shoe bottom of the main shoe unit 1, as depicted in FIG. 1, is structured from an outer sole 2, an inner sole 3, and, layered between the outer sole 2 and the inner sole 3, a foam *mid sole 4* . . . ." Ex. 1002 ¶ 17 (emphasis added). We also find that Izumi states that "[w]hen filling the hollow portions 6 of the mid sole 4 with silicone bouncing putty 5 . . . the mid sole 4 may be layered . . . so as to have opening portions 61 on the top face of the mid sole 4 . . . ." *Id.* ¶ 19. We additionally find that Figure 1 of Izumi shows "4: Mid Sole." *Id.* Fig. 1; *see also id.* ¶ 16 (stating "FIG. 1 through FIG. 4 are a first embodiment of a sport shoe according to the present invention"), [Brief Descriptions of the Drawings], [Explanations of Reference Symbols]. We further credit Petitioner's declarant testimony regarding this limitation because Izumi supports it. Shorten Decl. ¶ 210. We, thus, find that Izumi discloses "said shoe comprising a midsole having a top surface," as recited by claim 1.

Petitioner further contends that Izumi discloses "said shoe midsole fabricated from material having a fixed elastic modulus." Pet. 32–33 (citing Ex. 1002 ¶ 17; Ex. 1003 ¶ 17; Shorten Decl. ¶¶ 206, 211–213). We find that

Izumi indicates that "foam mid sole 4" is "made from, for example, an ethylene-vinyl acetate copolymer (EVA), a compressed molded EVA, a foam urethane, foam rubber, or the like." Ex. 1002 ¶ 17; *see also* Ex. 1001, 2:21–38 (indicating that known running shoe components and materials include EVA and that running shoes "are generally constructed of materials and in such a manner as to interpose materials having fixed elastic moduli between a runner's foot and the walking and running surface . . . "). We also credit Petitioner's declarant testimony regarding this limitation because it is supported by record evidence. Shorten Decl. ¶ 213.

Patent Owner does not present any arguments for these limitations. PO Resp. *passim*; *see also* Tr. 50:10–19 (Patent Owner's counsel indicating arguments were not presented for these limitations).

For the reasons above, Petitioner persuades us by a preponderance of the evidence that Izumi teaches a "shoe to be worn on a foot, said shoe comprising a midsole having a top surface, said shoe midsole fabricated from material having a fixed elastic modulus," as recited by claim 1.

ii. " . . . having at least one cavity formed in said top surface below the bottom of the foot, . . . "

Petitioner contends that Izumi discloses a shoe midsole "having at least one cavity formed in said top surface below the bottom of the foot." Pet. 33–36 (citing Ex. 1002 ¶¶ 17, 19, 24, 26, 27, Figs. 2, 3, 5, 6; Shorten Decl. ¶¶ 214–218); *see also id.* at 40 (referencing arguments that Izumi anticipates claim 1 for the challenge that Izumi would have rendered obvious claim 1). Specifically, Petitioner argues that Izumi's midsole has hollow portions 6 and opening potions 61 on the midsole's top face and that one of ordinary skill in the art would have understood that hollow portions 6 are

cavities below inner sole 3 and, therefore, a foot. *Id.* at 33–34 (citing Ex. 1002 ¶ 19, Fig. 3; Shorten Decl. ¶ 214). Petitioner also points to embodiments where hollow portions 6 are in the heel portion (*id.* at 34–35 (citing Ex. 1002 ¶ 17, Fig. 2; Shorten Decl. ¶ 215)), hollow portions 6, 8 are in the heel and toe space portions (*id.* at 35 (citing Ex. 1002 ¶ 26, Fig. 5; Shorten Decl. ¶ 216)), and hollow portion 9 is in the toe space portion (*id.* at 35 (citing Ex. 1002 ¶ 27, Fig. 6; Shorten Decl. ¶ 217)).

Petitioner argues that one of ordinary skill in the art would have understood the placement of the hollow portions 6 as "below the bottom of the foot" based on their position. *Id.* at 36. Petitioner also argues that, because Izumi places hollow portions 6 to increase stability and enable strong pushoff, one of ordinary skill in the art would have understood that the cavities must be between the foot and ground. *Id.* (citing Ex. 1002 ¶ 24; Shorten Decl. ¶ 218).

Patent Owner responds that Petitioner fails to show that Izumi discloses a cavity formed in the top surface of a midsole "below the bottom of the foot," as recited by claim 1. PO Resp. 43. Relying on its proposed interpretation of "below the bottom of the foot," Patent Owner argues that Petitioner "does not specifically assert that any 'hollow portion' in the midsole disclosed by Izumi is entirely under the foot of the wearer." *Id.* (citing Pet. 14–17, 27–31, 33–36, 38–40). Patent Owner also argues that Petitioner "requires no more than being in the midsole of the shoe" to meet the limitation "below the bottom of the foot," which is not a reasonable interpretation of "below" in view of the specification and prosecution history. *Id.* at 44 (citing Pet. 38–40). Patent Owner further argues that none of Izumi's disclosed embodiments is "entirely 'directly under the foot'"

under Patent Owner's proposed interpretation. *Id.* at 44–45 (citing Ex. 1002 ¶¶ 27, 30); *see also id.* at 31–39 (asserting what Izumi discloses).

For the limitation "below the bottom of the foot," Petitioner replies that Patent Owner relies on its proposed interpretation, which was not adopted at institution and that the "record has not materially changed" since then. Pet. Reply 21 (citing Dec. on Inst. 7; Ex. 1068, 188:2–189:17). Petitioner points to its Petition and declarant testimony to argue that it shows Izumi's cavities are below the bottom of the foot. *Id.* (citing Pet. 34–36; Shorten Decl. ¶¶ 214–218; Shorten Reply Decl. ¶¶ 148–163).

We find that Izumi teaches "[w]hen filling the hollow portions 6 of the mid sole 4 with silicone bouncing putty 5 . . . the mid sole 4 may be layered . . . so as to have opening portions 61 on the top face of the mid sole 4 . . . ." Ex. 1002 ¶ 19. We also find that Figure 3 of Izumi shows hollow portion 6 with opening portion 61 that open to the top surface of mid sole 4. *Id.* Fig. 3. Because Izumi teaches mid sole 4 with opening portions 61 on the top face of mid sole 4, we determine that Izumi teaches a shoe midsole (mid sole 4) and a cavity (hollow portions 6 with opening portions 61) in the top surface of the midsole, and thus, Izumi teaches a "shoe midsole . . . having at least one cavity formed in said top surface," as recited by claim 1.

We further find that Figure 2 of Izumi shows hollow portion 6 "formed, independent from each other, adjacent to an inside line I and to an outside line O, respectively, in the heel portion H of the mid sole 4." *Id.* ¶ 17, Fig. 2. Based on our review of Izumi, we credit Petitioner's declarant testimony that "Figure 2 depicts hollow portions 6 entirely beneath the

portion of the midsole 3 where the bottom of the foot is expected to rest when in use." Shorten Decl. ¶ 215.

As discussed above, we interpret "a midsole . . . having at least one cavity . . . below the bottom of the foot" to mean "the cavity is at a lower level than or directly under the foot." Because we credit Petitioner's declarant testimony that hollow portion 6 is beneath inner sole 3 in the area where the foot is expected to rest, we determine that hollow portion 6 would be a cavity that is at a lower level than the foot.

We, thus, determine that Izumi teaches a "shoe midsole . . . having at least one cavity formed in said top surface below the bottom of the foot," as recited by claim 1.

iii. " . . . said at least one cavity filled with material consisting essentially of a dilatant compound . . . "

As discussed above, we determine that Izumi teaches at least one cavity. Petitioner argues that Izumi discloses hollow portions 6, 8, 9 with silicone bouncing putty. Pet. 36 (citing Ex. 1002 ¶¶ 17, 26, 27, Figs. 2, 5, 6); *see also id.* at 40 (referencing arguments that Izumi anticipates claim 1 for the challenge that Izumi would have rendered obvious claim 1).

We find that Izumi teaches "filling the hollow portions 6 of the mid sole 4 with silicone bouncing putty 5." Ex. 1002 ¶ 19. We also find that Figures 2–6 of Izumi show hollow portion 6 filled with silicone bouncing putty 5. *Id.* Figs. 2–6. We further credit the testimony of Petitioner's declarant regarding "at least one cavity filled with material" because it is supported by Izumi. Shorten Decl. ¶ 219.

Turning to Izumi's silicone bouncing putty and "material consisting essentially of a dilatant compound," Petitioner states that its obviousness

challenge based on Izumi "focuses on what formulation techniques would have been obvious for a [person of ordinary skill in the art] to employ in conjunction with Izumi's disclosures." Pet. 41. Petitioner argues that one of ordinary skill in the art "would have known that Izumi's goal was for its silicone bouncing putty to exhibit the properties of a dilatant compound," "would also have known it was common for fillers such as silica to be added to polymeric materials to achieve desired dilatant and/or other properties," and "would have also understood how much filler to add (if any) so that the material had the desired dilatant properties." *Id.* (citing Ex. 1021, 2:30–34, 2:44–54). Petitioner also argues that Izumi's "explicit teaching that resiliency and spring in a footwear cushioning system component may be achieved without the addition ('may not be added') of filler to silicone bouncing putties would have made it obvious . . . to arrive at a 'material consisting essentially of a dilatant compound.'" *Id.* (citing Shorten Decl. ¶¶ 227–228).

Patent Owner responds that Petitioner does not identify or determine the limit on the amount of filler for a "material consisting essentially of a dilatant compound." PO Resp. 46. Patent Owner argues that Petitioner provides "no way to identify that limit in the prior art" and "does not disclose what properties a 'material consisting essentially of a dilatant compound' should have that would limit the amount of filler." *Id.* Patent Owner contends that Petitioner is arguing one of ordinary skill in the art *could* have, but not *would* have, arrived at a "material consisting essentially of a dilatant compound," which is insufficient. *Id.* at 46–47.

Petitioner replies that the challenged claims do not specify a range or a limit on fillers. Pet. Reply 22. Petitioner argues that the "prior art

discloses 0% filler and is below any limit." *Id.* (citing Ex. 1021, 2:30–34, 2:44–54). Petitioner also argues that Izumi teaches the known goals of good sports performance and energy return and teaches that bouncing putty is a way to achieve those goals. *Id.* (citing Ex. 1001, 1:24–28, 1:36–2:38; Ex. 1002 ¶¶ 4–14, 24, 29). Petitioner further relies on Exhibit 1021 for teaching that "inert fillers" "may or may not be" added. *Id.* (citing Pet. 41; Ex. 1021, 2:30–34; Shorten Decl. ¶ 64). Petitioner asserts that Exhibit 1021 "describes the same elastic 'bouncy' or 'energy returning' behavior which Townsend ascribes to Dow 3179" and would have motivated a filler-free bouncing putty for shoe inserts. *Id.* at 22–23 (citing Shorten Decl. ¶ 64). Petitioner also asserts that one of ordinary skill in the art "would have recognized the desirability of bouncing putty with large coefficient of restitution," and thus, arrive at "a material consisting essentially of a dilatant compound." *Id.* at 23 (citing Pet. 41).

Patent Owner replies that Izumi teaches a silicone bouncing putty with a high coefficient of restitution and thus does not provide a reason for changing Izumi's bouncing putty. PO Sur-Reply 21 (citing Ex. 1002 ¶ 13). Patent Owner also replies that Exhibit 1021 teaches an arch support above an outsole and Petitioner provides no teaching or motivation to use an arch support in Izumi's midsole. *Id.* (citing Ex. 1021, 3:38–44, Fig. 3). Patent Owner further replies that Petitioner relies on separate teachings from Exhibit 1021 that are not related to each other. *Id.* (citing Ex. 1021, 2:30–34, 2:50–51). Patent Owner additionally replies that Petitioner uses an incorrect level of ordinary skill. *Id.* Patent Owner further faults Petitioner for failing to explain what properties are to be achieved by Izumi's inserts and "how those properties would change the Izumi material." *Id.* Patent

Owner concludes that "Petitioner presents no reason a person of ordinary skill in the would have [replaced the Izumi inserts with inserts having no filler]." *Id.*

A preponderance of the evidence persuades us that Izumi's silicone bouncing putty suggests or would have provided a reason to arrive at a "material consisting essentially of a dilatant compound," as recited by claim 1. We find that Izumi's bouncing putty has similar properties as the claimed "material consisting essentially of a dilatant compound." *See* Pet. 38 (arguing that one of ordinary skill in the art "would have understood Izumi's 'silicone bouncing putty' to have the same or similar composition and to exhibit the same properties as Townsend's claimed 'dilatant' compound"). We credit Petitioner's declarant testimony that Izumi's silicone bouncing putty exhibits similar properties as the '416 patent's dilatant compound based on comparing descriptions found in Izumi and the '416 patent. Shorten Decl. ¶ 222 (comparing Ex. 1001, 5:35–49 with Ex. 1002 ¶¶ 23, 24).

Also, we agree with Petitioner that Izumi teaches a similar composition as the dilatant compounds of the '416 patent. Pet. 38. As discussed above, Izumi states that its "silicone bouncing putty . . . is a mixture of silica, as a filler, into a reaction product of dimethyl polysiloxane and a boric acid compound." Ex. 1002 ¶ 13. Patent Owner's declarant states that the "reaction product of dimethyl polysiloxane and boric acid compound is a physically-cross-linked high molecular weight polymeric material that is viscoelastic and *dilatant at high strain rates*." McKinley Decl. ¶ 43 (discussing the reaction product described in Ex. 1002 ¶¶ 13, 14 without an inert filler, such as silica).

As for whether the presence of fillers would render the material non-dilatant as a whole, we agree with Petitioner that the '416 patent states at column 2, lines 51–52, that a "well-known example of a dilatant compound is the toy, Silly Putty® as described in U.S. Pat. No. 2,541,851," which is Exhibit 1009. Pet. 37 (citing Ex. 1001, 2:51–52). As Petitioner argues, we determine that Wright teaches the use of fillers, such as silica. Ex. 1009, 4:22–25 ("Various inorganic fillers such as ferric oxide, silica, etc., may be employed in place of or in addition to the fillers mentioned above."); *see also* Pet. 37 (citing Ex. 1009, 1:5–29, 4:22–25). Because Wright teaches a known dilatant compound as indicated by the '416 patent, and Wright also teaches the addition of fillers, we determine that it was known in the art that dilatant compounds can include fillers. Thus, because Izumi teaches a reaction product of dimethyl polysiloxane and boric acid compound with a filler (Ex. 1002 ¶ 13) and because the reaction product is "dilatant at high strain rates" (McKinley Decl. ¶ 43), a preponderance of the evidence persuades us that Izumi suggests a "material consisting essentially of a dilatant compound." *See also* Tr. 49:25–50:5 (Patent Owner's counsel indicating that it is not disputing that the portions of the '416 patent identified by Petitioner are admitted prior art).

Also, because we agree with Petitioner that one of ordinary skill in the art "would have understood Izumi's 'silicone bouncing putty' . . . to exhibit the same properties as Townsend's claimed 'dilatant' compound," we determine that Izumi's silicone bouncing putty is within the scope of our interpretation of "material consisting essentially of a dilatant compound," which we interpret to mean materials whose "formulation contains

substances that are not dilatant so long as those other substances do not render the material non-dilatant as a whole."

Alternatively, because Izumi teaches a reaction product of dimethyl polysiloxane and boric acid compound with a filler (Ex. 1002 ¶ 13), the reaction product is "dilatant at high strain rates" (McKinley Decl. ¶ 43), and Wright provides evidence that adding fillers was within ordinary skill in the art (Ex. 1009, 4:22–25), we determine that one of ordinary skill in the art would have modified the amount of fillers in the bouncing putty of Izumi "so that the material had the desired dilatant properties" to arrive at a "material consisting essentially of a dilatant compound," i.e., a material whose "formulation contains substances that are not dilatant so long as those other substances do not render the material non-dilatant as a whole." *See* Pet. 29, 41. Wright additionally provides evidence that Petitioner's proposed modification would have had a reasonable expectation of success.

In arguing against Petitioner's assertion that Izumi discloses a "material consisting essentially of a dilatant compound" in the anticipation challenge, Patent Owner raises contentions based on its proposed interpretation of "material consisting essentially of a dilatant compound" as meaning a dilatant compound with other compounds and additives that "do not significantly diminish the energy storage and return of the dilatant compound at high rates of loading and/or high strain rates." PO Resp. 39–40, 42–43; PO Sur-Reply 15–20; *see also* PO Resp. 16 (proposing an interpretation for "material consisting essentially of a dilatant compound"), 31–35 (asserting what Izumi discloses). For the reasons discussed above, the record does not persuade us to adopt Patent Owner's proposed interpretation of "material consisting essentially of a dilatant compound,"

and thus, arguments based on that proposed interpretation do not persuade us of a deficiency in Petitioner's arguments that Izumi would have rendered obvious claim 1.

Patent Owner also responds that Petitioner "fails to identify the claim element in Izumi that is missing" and "fails to provide any articulated reasoning with rational underpinning." PO Resp. 46. Petitioner, however, explicitly argues that "even if the Board finds the 'at least one cavity filled with material consisting essentially of a dilatant compound' limitation somehow constrains the amount of fillers that may be a part of the dilatant compound, Izumi still renders the claim obvious." Pet. 40. Petitioner, thus, indicates that the limitation "at least one cavity filled with material consisting essentially of a dilatant compound" may be determined to be missing in Izumi.

For the reasons above, we determine that Izumi suggests "said at least one cavity filled with material consisting essentially of a dilatant compound," as recited by claim 1. We also determine that Petitioner provides a sufficient reason for modifying Izumi to arrive at the same limitation.

iv. " . . . all of which material consisting essentially of a dilatant compound is retained below the bottom of the foot"

Petitioner asserts that all the embodiments of Izumi have cavities with silicone bouncing putty below the foot. Pet. 38–40 (citing Ex. 1002 ¶¶ 19–21, Fig. 3); *see also id.* at 40 (referencing arguments that Izumi anticipates claim 1 for the challenge that Izumi would have rendered obvious claim 1). Petitioner contends that "[b]ecause the bottom of the wearer's foot rests on the top surface of the inner sole 3, the dilatant compound is in turn retained

below the bottom of the foot" in these embodiments. *Id.* at 39 (citing Shorten Decl. ¶¶ 224–226).

As discussed above, we determine that Izumi teaches "at least one cavity . . . below the bottom of the foot" and suggests or would have provided a reason to arrive at a "material consisting essentially of a dilatant compound." We find that Izumi teaches or suggests a wearer's foot rests on inner sole 3. Ex. 1002 ¶¶ 19, 20. We also credit Petitioner's declarant testimony regarding the "material consisting essentially of a dilatant compound" being "retained below the bottom of the foot" because it is supported by Izumi. Shorten Decl. ¶¶ 224, 225 (citing Ex. 1002 ¶¶ 8–11, 19, 20).

For the reasons above, we determine that Izumi teaches or suggests "all of which material consisting essentially of a dilatant compound is retained below the bottom of the foot," as recited by claim 1.

v. "wherein said at least one cavity is cylindrically shaped and has a diameter between 1 3/8" and 1 5/8" and has a side wall height between 3/8" and 5/8""

Claim 6 depends from claim 1 and recites "wherein said at least one cavity is cylindrically shaped and has a diameter between 1 3/8" and 1 5/8" and has a side wall height between 3/8" and 5/8"." Ex. 1001, 9:6–8.

Petitioner contends that Chang teaches a cylindrical cavity. Pet. 42–43 (citing Ex. 1004, 1:31–35, 2:64–67, Fig. 1). Petitioner also contends that cylindrically-shaped cavities "were simple and economical for manufacture of the midsole recess and corresponding recess" and "a known and obvious configuration." *Id.* at 43–44 (citing Ex. 1008 ¶ 33, Fig. 10; Ex. 1036, 5:49–

65:2, Fig. 6; Ex. 1037, 19:54–20:1, Fig. 11D; Shorten Decl. ¶¶ 229, 230, 233–238).

Petitioner also asserts that the recited dimensions would have been "constrained by the dimensions of the shoe itself" and further asserts that, based on standardized dimensions, the need for bonding space, comfort, and common thicknesses of EVA sheets, acceptable dimensions would have been a 0.98 to 1.98 inches diameter and 0.39 to 0.63 inches height. *Id.* at 44–45 (citing Ex. 1005, 11:2–6; Ex. 1025, 5:46–48; Shorten Decl. ¶¶ 231–232, 239–242, 244–253). Petitioner, thus, contends that the recited dimensions are "a matter of choosing from the limited available options." *Id.* at 45 (citing Shorten Decl. ¶¶ 239, 242, 252).

Petitioner also argues that there are no "special or unexpected performance benefits attributed to the claimed cavity dimensions." *Id.* at 45–46 (citing *Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1322 (Fed. Cir. 2014); Ex. 1001, 5:1–2, 6:7–20, 6:50–62; Shorten Decl. ¶¶ 255–256). Petitioner further argues that one of ordinary skill in the art would have been motivated to combine Izumi and Chang because Chang's cavity "is designed to provide 'the dual effects of energy return and shock absorption'" and one of ordinary skill in the art "would have recognized that the cylinder in Chang is designed to provide a similar effect to the silicone bouncing putty in Izumi—returning more energy with increased impact force." *Id.* at 48 (citing Ex. 1004, 3:36–37; Shorten Decl. ¶¶ 257–258, 260).

Patent Owner responds that Petitioner's challenges to claim 6 rely on its challenge of claim 1. PO Resp. 23 (citing Pet. 42, 56, 64). Patent Owner states that "[c]laim 6 is also not unpatentable on any of those grounds at least because claim 1 is not unpatentable on the ground relied on [for the

challenge of claim 6 based on, *inter alia*, Izumi and Chang]." *Id.*; *see also* Tr. 50:6–9 (Patent Owner's counsel agreeing that there are no specific arguments for claim 6). Patent Owner also argues that Petitioner's challenge of claim 6 based on Izumi and Chang "should be rejected for failing to set out a *prima facie* case of unpatentability" because the Petition provides no arguments that claim 1 would have been unpatentable over Izumi and Chang. PO Resp. 23. Petitioner replies that Patent Owner "raises no separate substantive arguments about the unpatentability of claim 6." Pet. Reply 27.

We find that Chang teaches cylindrical-shaped cavities that provide "energy return and shock absorption." Ex. 1001, 1:31–35, 2:64–67, 3:36–37, Fig. 1. We also find that the '416 patent does not indicate any unexpected results from the recited cavity dimensions. Ex. 1001, 5:1–2, 6:7–20, 6:50–62. We further credit the testimony of Petitioner's declarant regarding the recited dimensions and the motivation to combine Izumi and Chang because the references support the testimony. Ex. 1004, 3:36–37; Shorten Decl. ¶¶ 231–232, 239–242, 244–253, 257–258, 260. We additionally determine that the recited dimensions are "a matter of choosing from the limited available options." Pet. 45; Shorten Decl. ¶¶ 239, 242, 252. Chang also provides evidence that Petitioner's proposed modification was within ordinary skill and had a reasonable expectation of success.

For the reasons above, we determine that Izumi and Chang teach or suggest the limitations of claim 6 and provide a motivation for combining their teachings to arrive at the subject matter of claim 6.

b. Challenges Based on Rudy and Plant

Petitioner also contends that claim 1 is rendered obvious by Rudy and Plant. Pet. 49–54. Petitioner argues that one of ordinary skill in the art would have been motivated to combine Rudy and Plant. Pet. 54–56. Patent Owner responds that Rudy and Plant would not have rendered obvious all the limitations of claim 1 and that Petitioner does not provide articulated reasoning with rational underpinning. PO Resp. 49–50, 53–57.

For the reasons below, Petitioner persuades us by a preponderance of the evidence that Rudy and Plant teach or suggest the limitations of claim 1 and that Petitioner's proposed combination of Rudy and Plant represents an arrangement of old elements with predictable results, predictable variation, or an obvious substitution. Petitioner also persuades us by preponderance of the evidence that Rudy, Plant, and Chang teach or suggest the limitations of claim 6 and the asserted references provide a reason for Petitioner's proposed combination.

i. Claim 1

Claim 1 recites a "shoe to be worn on a foot, said shoe comprising a midsole having a top surface, said shoe midsole fabricated from material having a fixed elastic modulus . . . ." Ex. 1001, 8:28–30. Petitioner contends that Rudy teaches or suggests these limitations. Pet. 49–51 (citing Ex. 1005, 1:9–10, 4:22–23, 4:26–28, 6:36–67, 8:34–35, 8:52–54, 12:26–27, Figs. 1, 2, 4, 7, 8; Shorten Decl. ¶¶ 206, 262–268).

Patent Owner does not present any arguments for these limitations. PO Resp. *passim*; *see also* Tr. 50:10–19 (Patent Owner's counsel indicating arguments were not presented for these limitations).

We find that Rudy states that it "relates to articles of footwear" and Figure 1 shows a shoe. Ex. 1005, 1:9–10, Fig. 1. We also find that Rudy teaches cushioning device 153 within midsole 155 and its Figures 2, 4, 7, and 8 show embodiments with midsoles. *Id.* at 6:36–67, Figs. 2, 4, 7, 8. We further find that Rudy teaches that its midsole is made from elastomeric encapsulating foam 158. *Id.* at 4:26–28, 6:37–39; *see also* Ex. 1043, 12:58–60. We additionally credit Petitioner's declarant testimony regarding these limitations because Rudy supports the testimony. Shorten Decl. ¶¶ 206, 262–269.

Based on our findings above, Petitioner persuades us by a preponderance of the evidence that Rudy teaches a "shoe to be worn on a foot, said shoe comprising a midsole having a top surface, said shoe midsole fabricated from material having a fixed elastic modulus," as recited by claim 1.

Claim 1 also recites "said shoe midsole . . . having at least one cavity formed in said top surface below the bottom of the foot . . . ." Ex. 1001, 8:29–32. Petitioner argues that Rudy teaches or suggests these limitations. Pet. 51–52 (citing Ex. 1005, 2:61–63, 4:43–47, 12:6–10, Fig. 4; Shorten Decl. ¶¶ 270–274).

We find that Rudy teaches that "the second elastomeric member is located in the sole of the shoe, exterior and below the shoe upper envelope encasing the foot" and that "the cushioning inserts may be positioned as desired under the foot." Ex. 1005, 2:61–63, 4:43–45. We also find that Figure 4 shows cushioning device 153 below a foot. *Id.* Fig. 4. We further credit Petitioner's declarant testimony because it finds support in the record.

Shorten Decl. ¶¶ 270–274; Ex. 1005, 2:61–63, 4:43–47, 12:6–10, Fig. 4; Ex. 1044, 9:31–48.

Patent Owner argues that Rudy does not teach or suggest "having at least one cavity formed in said top surface below the bottom of the foot." PO Resp. 53 (citing Pet. 51–53). In particular, Patent Owner contends that Rudy "would not create a midsole having the recited cavity that opened **only** to the top surface as that claim element should be construed." *Id.* According to Patent Owner, Petitioner relies on an embodiment shown in Figure 4 of Rudy, which shows fluid cushioning device 153 in a cavity that opens through holes 19 at opposed sides of a midsole. *Id.* at 53–54 (citing Ex. 1005, 4:28); *see also id.* at 50–52 (asserting what Rudy teaches). Patent Owner, thus, contends that the asserted cavity would not be opened only to the top surface.

Petitioner replies that Patent Owner's interpretation is incorrect, and Patent Owner does not provide arguments based on other interpretations. Pet. Reply 24. Petitioner also replies that Patent Owner's contentions are not applicable to Petitioner's alternative position that relies on a cushioning device with no viewing window. *Id.* (citing Pet. 52; Ex. 1044, 9:31–48, 18:64–19:10). Petitioner contends that Patent Owner misinterprets Rudy's description of its cavity that can accept an "encapsulated" cushioning device or cushioning device when "foam encapsulation is not required." *Id.* at 25. According to Petitioner, the cushioning device without foam encapsulation would sit in the midsole, and the description about a viewing window describes its location, "not that the Ex. 1044 embodiment exposed perimeter sides." *Id.*

As discussed above, in view of the specification and the dictionary definition, we interpret "cavity formed in said top surface" to mean "a space within the midsole that may or may not open to the top surface of the midsole." Ex. 1001, 3:63–4:7; Ex. 2001, 5. We did not adopt Patent Owner's proposed interpretation that cavity must open to the top surface of the midsole. Patent Owner's arguments based on the proposed interpretation that we did not adopt do not show a deficiency in Petitioner's arguments that Rudy teaches "at least one cavity formed in said top surface."

Based on Petitioner's arguments and the full record before us, we determine that Petitioner shows by a preponderance of the evidence that Rudy teaches a "shoe midsole . . . having at least one cavity formed in said top surface below the bottom of the foot," as recited by claim 1.

Claim 1 further recites "said at least one cavity filled with material consisting essentially of a dilatant compound, all of which material consisting essentially of a dilatant compound is retained below the bottom of the foot." Ex. 1001, 8:32–35. Petitioner contends that Rudy teaches or suggests "at least one cavity filled with material consisting essentially of a dilatant compound." Pet. 52 (citing Ex. 1005, 5:17–27; Ex. 1025, 1:14–21; Shorten Decl. ¶¶ 275–277).

Petitioner relies on Plant for teaching the use of dilatant material in energy absorbing applications. *Id.* at 53 (citing Ex. 1006, Abstract, 2:13–18, 2:22–24, 5:1–10, 5:21–24, 8:24–9:2, Fig. 2; Shorten Decl. ¶¶ 278–280). Petitioner asserts that one of ordinary skill in the art would have been motivated to combine Rudy and Plant, that the proposed combination is an arrangement of old elements with predictable results or predictable variation, and that it would have been obvious to substitute the cushioning insert of

Rudy with the pad containing Dow Compound No. 3179 of Plant. Pet. 54–56 (citing Ex. 1005, 1:29–31, 5:17–28, 5:31–42; Ex. 1006, 1:3–6, 9:9–13; Ex. 1031, 1:3–5, 1:18–20, 4:13–16, 5:28–6:7; Ex. 1045, 5:29–31, 9:59; Shorten Decl. ¶¶ 282–286).

Patent Owner argues that Rudy does not teach or suggest "at least one cavity filled with material consisting essentially of a dilatant compound." PO Resp. 53 (citing Pet. 51–53). In particular, Patent Owner argues that Rudy does not teach or suggest "a material consisting essentially of a dilatant compound," as asserted by Petitioner, because Petitioner's contention that Rudy's "rheopexic fluids" is within the scope of "dilatant compound" is supported improperly by declarant testimony regarding the understanding of one of ordinary skill in the art, not a proposed interpretation. *Id.* at 54–55 (citing Pet. 28, 52). Patent Owner asserts that no reasonable interpretation of "dilatant compound" would encompass Rudy's rheopexic fluid because a "rheopexic fluid is not a dilatant compound either as a matter of technical fact or as a matter of the requirements for a dilatant compound as clearly stated by the '416 Patent." *Id.* at 55 (citing McKinley Decl. ¶¶ 66–69). Patent Owner also asserts that Petitioner does not argue that a rheopexic fluid would exhibit the essential features of a dilatant material. *Id.*

Patent Owner further argues that Rudy and Plant would not have rendered obvious claim 1. *Id.* at 53 (citing Pet. 51–53). Specifically, Patent Owner argues that Petitioner's rationale for its proposed combination of Rudy and Plant is based on the alleged, same, shared properties of the incompressible fluid of Rudy and the dilatant material of Plant. *Id.* at 55–56 (citing Pet. 55). Patent Owner contends that Petitioner does not identify

those properties and "does not offer any reason that one of [ordinary] skill in the art would have replaced Rudy's fluid containing shoe cushioning device with Plant's body padding." *Id.* at 56. Patent Owner also contends that Petitioner's supporting testimony concludes that the proposed combination could have been made, not would have been made. *Id.* (discussing Shorten Decl. ¶¶ 281–283).

Patent Owner also argues that Petitioner does not provide articulated reasoning with rational underpinning for replacing the incompressible fluid of Rudy with the dilatant material of Plant. *Id.* (citing Pet. 56). Patent Owner further argues that Petitioner's declarant testifies that "one of skill in the art would have understood that the dilatant material could achieve similar properties to the rheopexic fluid," not *would* achieve similar properties. *Id.* (citing Shorten Decl. ¶ 285).

Petitioner replies that Patent Owner does not address or misinterprets Petitioner's arguments. Pet. Reply 24. Petitioner also replies that "rheopexic" is used to characterize dilatant materials and dilatant materials exhibit "inverse thixotropy." *Id.* (citing Shorten Decl. ¶ 276). Petitioner contends that Patent Owner's declarant conceded that "inverse thixotropy" and "rheopexcy" are the same. *Id.* (citing Ex. 1072, 189:22–190:2). Petitioner further replies that the Petition provides articulated reasoning. *Id.* at 26 (citing Pet. 54–56).

Patent Owner replies that Petitioner in its Reply does not dispute that it did not provide articulated reasoning. PO Sur-Reply 23 (citing Pet. Sur-Reply 24–26). Patent Owner also argues its declarant "explained that the rheopexic fluid disclosed by Rudy is not the dilatant compound of the '416 patent" and that neither "inverse thixotropy" nor "rheopexy" is the dilatant

material of the ’416 patent. *Id.* at 24 (citing Ex. 1068, 190:6–22; McKinley Decl. ¶¶ 17–23).

We find that Plant teaches a “protective member primarily for use as an energy absorbing pad for incorporation into garments to protect the wearer against accidental impacts” and that the “member comprises a putty-like energy absorbing material (2) encapsulated in a flexible envelope (3.4).” Ex. 1006 Abstract; *see also id.* at 2:13–15 (“According to the invention there is provided a protective member comprising an energy absorbing material in an envelope which contains said material in a controlled space.”), 4:23–25 (“Figures 1 and 2 show a protective member 1 of the invention which comprises a quantity of energy absorbing material 2 encapsulated in an envelope”).

We also find that Plant teaches that the “preferred material is a Dimethyl siloxane hydroterminated polymer such as the material sold by DOW CORNING under their Catalogue or Trade number 3179.” *Id.* at 2:26–28; *see also id.* at 5:1–5 (“The energy absorbing material 2 can be a strain rate sensitive polymer, a non-Newtonian fluid or a di[]lat[a]nt compound which is normally malleable under low strain rates and behaves in a manner similar to a putty like substance.”), 5:7–10 (“The preferred material is a dimethyl siloxane hydroterminated polymer such as the material manufactured by DOW CORNING and sold under their catalogue or trade No. 3179.”). We also credit Petitioner’s declarant testimony regarding Plant’s material or compound because Plant expressly teaches that it is a dilatant compound. Shorten Decl. ¶¶ 278–280.

As discussed above, our interpretation of “dilatant compound” would encompass Dilatant Compound No. 3179. Also, our interpretation of

"material consisting essentially of a dilatant compound" did not adopt Patent Owner's proposal that any additional compounds and additives "do not significantly diminish the energy storage and return of the dilatant compound at high rates of loading and/or high strain rates." Therefore, the fact that Plant's material may be energy absorbing does not place it beyond the scope of our interpretation of "material consisting essentially of a dilatant compound." The record, thus, persuades us that Plant teaches the claimed "dilatant material" and "material consisting essentially of a dilatant compound."

The record also persuades us that one of ordinary skill in the art would have modified Rudy to use the dilatant compound of Plant. In particular, Petitioner persuades us that the proposed combination represents both (1) an arrangement of old elements with predictable results or predictable variation and (2) a substitution of the cushioning insert of Rudy with the pad containing Dow Compound No. 3179 of Plant. Pet. 54–56; Shorten Decl. ¶¶ 282–286. The record shows that Plant's pad was known (Shorten Decl. ¶ 282) and would have been an obvious substitute (Ex. 1005, 5:17–28, 5:31–42; Ex. 1006, 1:4–6, 9:9–13; Shorten Decl. ¶ 284). The references themselves indicate that Petitioner's proposed combination has a reasonable expectation of success.

Because we determine that Rudy teaches "at least one cavity . . . below the bottom of the foot" and Plant teaches "material consisting essentially of a dilatant compound," we also determine that the combination of Rudy and Plant teaches or suggests "all of which material consisting essentially of a dilatant compound is retained below the bottom of the foot." We also credit Petitioner's declarant testimony regarding the "material

consisting essentially of a dilatant compound" being "retained below the bottom of the foot" because it finds support in the asserted references. Shorten Decl. ¶¶ 287–288 (citing Ex. 1005, 4:43–45, Fig. 4).

For the reasons above, we determine that Petitioner's proposed combination of Rudy and Plant teaches or suggests "said at least one cavity filled with material consisting essentially of a dilatant compound, all of which material consisting essentially of a dilatant compound is retained below the bottom of the foot," as recited by claim 1. Petitioner also provides a sufficient reason for combining Rudy and Plant.

ii. Claim 6

Turning to dependent claim 6, which depends from claim 1, Petitioner contends that claim 6 would have been rendered obvious by Rudy, Plant, and Chang. Pet. 56–57 (citing Ex. 1005, 11:2–6; Shorten Decl. ¶¶ 229–257, 290). Petitioner also contends that one of ordinary skill in the art would have been motivated to combine the asserted references. *Id.* at 57 (citing Ex. 1004, 3:36–37, Ex. 1005, 4:30–32, 5:52–55; Shorten Decl. ¶¶ 258–260, 291).

Patent Owner responds that Petitioner's challenges to claim 6 rely on its challenge of claim 1. PO Resp. 23 (citing Pet. 42, 56, 64). Patent Owner states that "[c]laim 6 is also not unpatentable on any of those grounds at least because claim 1 is not unpatentable on the ground relied on [for the challenge of claim 6 based on, *inter alia*, Rudy, Plant, and Chang]." *Id.*; *see also* Tr. 50:6–9 (Patent Owner's counsel agreeing that there are no specific arguments for claim 6). Petitioner replies that Patent Owner "raises no

separate substantive arguments about the unpatentability of claim 6." Pet. Reply 27.

We find that Chang teaches cylindrical-shaped cavities that provide "energy return and shock absorption." Ex. 1001, 1:31–35, 2:64–67, 3:36–37, Fig. 1. We also find that the '416 patent does not indicate any unexpected results from the recited cavity dimensions. Ex. 1001, 5:1–2, 6:7–20, 6:50–62. We further credit the testimony of Petitioner's declarant regarding the recited dimensions and the motivation to combine Rudy, Plant, and Chang because the references support the testimony. Ex. 1004, 3:36–37; Shorten Decl. ¶¶ 258–260, 291. We additionally determine that the recited dimensions are "a matter of choosing from the limited available options." Pet. 45; Shorten Decl. ¶¶ 239, 242, 252.

For the reasons above, we determine that Rudy, Plant, and Chang teach or suggest the limitations of claim 6 and provide a motivation for combining their teachings to arrive at the subject matter of claim 6.

c. Challenges Based on Christensen and Ito

Petitioner further contends that claim 1 would have been rendered obvious by Christensen and Ito. Pet. 57–63. Patent Owner responds that Christensen and Ito do not teach or suggest "at least one cavity filled with material consisting essentially of a dilatant compound," as recited by claim 1. PO Resp. 57–60.

i. Claim 1

Petitioner contends that Christensen teaches or suggests all the limitations of claim 1, except "said shoe midsole fabricated from material having a fixed elastic modulus," for which Petitioner relies on Ito. Pet. 57–63 (citing Ex. 1007, 2:49–54, 2:62–63, Figs. 1–3; Ex. 1008 ¶¶ 5, 7, 27, 31–

33, 42, 59, Fig. 10; Shorten Decl. ¶¶ 206, 292–296, 299–307) (emphasis omitted). Petitioner also contends that one of ordinary skill in the art would have been motivated to combine Christensen and Ito. Pet. 63–64 (citing Ex. 1007, 1:24–28; Ex. 1008 ¶¶ 5, 42; Shorten Decl. ¶¶ 297–298, 308).

Relevant to the parties' dispute, for "said at least one cavity filled with material consisting essentially of a dilatant compound," Petitioner relies on Christensen's variable viscosity fluid 12 disposed in enclosure 14 of cell 10. *Id.* at 61–62 (citing Ex. 1008 ¶¶ 7, 33; Shorten Decl. ¶ 303). Because Christensen teaches that variable viscosity fluid 12 can include shear stiffening material and that an "example of such shear stiffening material is a composition of cornstarch and water," Petitioner asserts that one of ordinary skill in the art would have recognized that Christensen describes a dilatant compound. *Id.* at 62 (citing Ex. 1008 ¶¶ 5, 32, 42; Ex. 1047 ¶¶ 304–306).

Patent Owner responds that Christensen and Ito do not teach or suggest "at least one cavity filled with material consisting essentially of a dilatant compound," as recited by claim 1. PO Resp. 57, 59 (citing Pet. 61–62); *see also id.* at 58–59 (asserting what Christensen teaches). Patent Owner argues that the variable viscosity fluid of Christensen flows between chambers and "dilatant compound" does not encompass "a fluid that is not stiff, elastic and bouncy at high strain (load) rate." *Id.* at 59–60. Patent Owner asserts that Petitioner does not contend that Christensen's variable viscosity fluid is "stiff, elastic and bouncy at high strain (load) rate." *Id.* at 60. Patent Owner also asserts that Petitioner's declarant "agrees that the Christensen fluid remains a liquid and is never elastic and bouncy" and "agrees that the fluid in the Christensen cell does not behave as the dilatant compound described by the '416 Patent." *Id.* (citing Ex. 2009, 133:9–13,

134:5–135:4, 139:1–12). Patent Owner further faults Petitioner for not asserting that Christensen's variable viscosity fluid fills a cavity in a shoe midsole and not asserting the variable resistance cell fills the cavity. *Id.*

Petitioner replies that Patent Owner's declarant testified that Christensen's material was dilatant. Pet. Reply 26 (citing Ex. 1008 ¶ 42; Ex. 1068, 192:18–193:2). Petitioner also replies that Patent Owner's implicit interpretation of "filled" is not consistent with the claims and reads in features of claim 2 into claim 1. *Id.* Petitioner further replies that Patent Owner attacks Christensen and Ito individually and "[i]t would have been obvious for a midsole to receive Christensen's cell in a manner Ito receives its cushioning members," thereby "teaching the feature." *Id.*

Patent Owner replies that its declarant testified that "'[c]ornstarch and water at high volume fraction' was rheopectic and dilatant," and that Petitioner does not show Christensen's "'composition of cornstarch and water' . . . is the composition to which Dr. McKinley referred." PO Sur-Reply 24. Patent Owner also argues that Petitioner argues for the first time in its Reply that it would have been obvious for Christensen's cell "to fill a cavity in a way not disclosed by Christensen." *Id.* at 24–25.

Based on the record, we agree with Patent Owner that Petitioner does not show by a preponderance of the evidence that the proposed combination of Christensen and Ito teaches, suggests, or would have rendered obvious "at least one cavity filled with material consisting essentially of a dilatant compound." As discussed above, we interpret "dilatant compound" to mean "a polymeric material that changes from soft and pliable under slow application of a load to elastic and bouncy under rapid application of a load." We also interpret "material consisting essentially of a dilatant

compound" to mean materials whose "formulation contains substances that are not dilatant so long as those other substances do not render the material non-dilatant as a whole," as proposed by Petitioner.

Petitioner asserts that variable viscosity fluid 12 that can include shear stiffening material, such as a composition of cornstarch and water, teaches or suggests the "dilatant compound." Petitioner, however, does not show by a preponderance of the evidence that Christensen's shear stiffening material is "a polymeric material that changes from soft and pliable under slow application of a load to elastic and bouncy under rapid application of a load," especially in view of the disclosed example of cornstarch and water. The record does not indicate that Christensen's shear stiffening material can be or include, for example, "Silly Putty," "Dilatant Compound No. 3179," or a mixture of dimethyl siloxane, hydroxyl-terminated polymers with boric acid, Thixotrol ST® brand organic rheological additive, polydimethylsiloxane, decamethyl cyclopentasiloxane, glycerine, and titanium dioxide.

Petitioner's declarant testimony also does not persuade us that Christensen's shear stiffening material would be encompassed by our interpretation of "dilatant compound" or "material consisting essentially of a dilatant compound." In particular, Petitioner's declarant testimony does not show sufficiently that Christensen's shear stiffening material is "elastic and bouncy under rapid application of a load." *See* Shorten Decl. ¶¶ 304–306; Ex. 2009 (133:9–13, 134:5–135:4, 139:1–12). Petitioner's reason for modifying Christensen in view of Ito does not address the limitation "at least one cavity filled with material consisting essentially of a dilatant compound." *See* Pet. 63–64.

Thus, for the reasons above, Petitioner does not show by a preponderance of the evidence that claim 1 is unpatentable over Christensen and Ito.

ii. Claim 6

Petitioner contends that claim 6 would have been rendered obvious by Christensen, Ito, and Chang. Pet. 64 (citing Ex. 1008 ¶ 33; Shorten Decl. ¶¶ 229–257, 308). Petitioner also contends that one of ordinary skill in the art would have been motivated to combine the asserted references "to apply Chang's teachings on the particular dimensions of the cavity of the shoe in Christensen to render obvious the claimed subject matter." *Id.* at 64–65 (citing Ex. 1004, 3:49–51; Ex. 1008 ¶ 31; Shorten Decl. ¶¶ 258–260, 309).

Petitioner's arguments for claim 6 do not cure the deficiencies of its arguments for "at least one cavity filled with material consisting essentially of a dilatant compound," as recited by claim 1, from which claim 6 depends. Thus, for similar reasons, Petitioner does not show by a preponderance of the evidence that claim 6 is unpatentable over Christensen, Ito, and Chang.

3. Objective Evidence of Nonobviousness

Petitioner contends that a declaration submitted during prosecution does not support "unexpected results, or any other factor of non-obviousness." Pet. 69–70 (citing Ex. 1016 ¶ 3, Ex. B; Ex. 1017, 7–8; Shorten Decl. ¶¶ 326, 327, 330–337, 344–361; Ex. 1058; Ex. 1059; Ex. 1060).

Patent Owner states that "Petitioner's expert tried and failed in 1985 to create shoes that had a dilatant compound in the sole," and that failure constitutes objective indicia of nonobviousness. PO Resp. 61 (citing Ex. 2009, 148:10–150:18) (quoting that "evidence that others tried and

failed to develop a claimed invention may carry significant weight in an obviousness inquiry" from *Eurand, Inc. v. Mylan Pharms., Inc.*, 676 F.3d 1063, 1081 (Fed. Cir. 2012)). Patent Owner contends that "[e]vidence also shows that Mr. Townsend succeeded in developing running shoes that have his claimed dilatant compound in the midsole." *Id.* (citing Exs. 1016, 1050).

Petitioner replies that its declarant "explains there was not a failed attempt, but a reasonable decision to not to try because better materials were available." Pet. Reply 27 (citing Shorten Reply Decl. ¶¶ 164–170).

Based on the record, a preponderance of the evidence persuades us that others tried but decided for economic reasons that using a dilatant compound in a shoe was an unattractive option. Shorten Reply Decl. ¶¶ 164 ("Silly Putty is heavy and costly compared to EVA, a benchmark material."), 170 ("Given the additional cost and weight compared to EVA, Silly Putty does not provide a better option."); Ex. 2009, 150:14–17 ("I don't think it has any -- in the form we see it in, you know, the patent referenced in the Townsend, I don't think there's any commercial value there personally."). A preponderance of the record does not persuade us that others tried and failed to create a shoe with a dilatant compound in the sole, as argued by Patent Owner.

4. Petitioner's Remaining Challenges

Petitioner contends that claim 1 is rendered obvious by applicant admitted prior art ("AAPA") and Izumi. Pet. 65–67. Petitioner also contends that claim 6 would have been rendered obvious by AAPA, Izumi, and Chang. Pet. 68–69.

As discussed below in Section II.D.5, because we determine that claim 1 is (1) unpatenable over Izumi and (2) unpatentable over Rudy and

Plant and that claim 6 is (1) unpatentable over Izumi and Chang and (2) unpatentable over Rudy, Plant, and Chang, we do not need to reach these additional challenges of claims 1 and 6.

5. Conclusion as to Obviousness

"Once all relevant facts are found, the ultimate legal determination [of obviousness] involves weighing of the fact findings to conclude whether the claimed combination would have been obvious to an ordinary artisan." *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1361 (Fed. Cir. 2017) (quoting *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1068–69 (Fed. Cir. 2012)). As discussed above, based on the full record before us, we provide our factual findings regarding (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of ordinary skill in the art, and (4) objective evidence of nonobviousness.

In particular, for the challenges based on Izumi alone or combined with Chang, we find that (1) Izumi alone teaches or suggests all the limitations of claim 1, and Izumi and Chang teach or suggest all the limitations of claim 6; (2) one of ordinary skill in the art would have had a reason to modify Izumi or combine Izumi and Chang with a reasonable expectation of success; (3) the asserted references reflect the level of ordinary skill in the art; and (4) the objective evidence of nonobviousness in the record does not show persuasively that others tried and failed to develop the claimed shoe. Weighing these underlying factual determinations, we are persuaded by a preponderance of the evidence in the record that claim 1 of the '416 patent is unpatentable over Izumi and that claim 6 of the '416 patent is unpatentable over Izumi and Chang.

For the challenges based on Rudy, we find that (1) Rudy and Plant teach or suggest all the limitations of claim 1, and Rudy, Plant, and Chang teach or suggest all the limitations of claim 6; (2) one of ordinary skill in the art would have had a reason to combine Rudy and Plant and Rudy, Plant, and Chang with a reasonable expectation of success; (3) the asserted references reflect the level of ordinary skill in the art; and (4) the objective evidence of nonobviousness in the record does not show persuasively that others tried and failed to develop the claimed shoe. Weighing these underlying factual determinations, we are persuaded by a preponderance of the evidence in the record that claim 1 is unpatentable over Rudy and Plant and that claim 6 is unpatentable over Rudy, Plant, and Chang.

For the challenge based on Christensen and Ito, we find that Christensen, Ito, and Chang do not teach or suggest all the limitations of claims 1 and 6.

E. Motion to Exclude

Patent Owner filed its objections to evidence served with the Petition. Paper 10. In particular, Patent Owner objected to Exhibits 1002, 1003, 1011, 1052, and 1064. *Id.* at i. According to Patent Owner, Exhibits 1011, 1052, and 1064 are not a patent or printed publication, not relevant, not authenticated, and not admissible hearsay. *Id.* Additionally, for Exhibits 1052 and 1064, Patent Owner contends that they are not prior art. *Id.*

Patent Owner moves to exclude Exhibits 1011, 1052, and 1064. Mot. 1. Patent Owner contends that these exhibits are not authenticated, not admissible hearsay, and not relevant. *Id.* at 1–3. Petitioner filed an opposition (Paper 25), and Patent Owner filed a reply in support of its motion to exclude (Paper 26).

Because we do not rely on any of Exhibits 1011, 1052, or 1064 for any of our determinations, we dismiss as moot Patent Owner's Motion to Exclude.

III. CONCLUSION

For the foregoing reasons, based on the full record before us, we determine that Petitioner has demonstrated, by a preponderance of the evidence, that claims 1 and 6 of the '416 patent are unpatentable. We also *dismiss as moot* Patent Owner's motion to exclude Exhibits 1011, 1052, and 1064.

IV. ORDER

Accordingly, it is:

ORDERED that claims 1 and 6 of U.S. Patent No. 7,490,416 B2 have been shown, by a preponderance of the evidence, to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Exclude is *dismissed as moot*; and

FURTHER ORDERED that, because this is a Final Written Decision, the parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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Paper 39
Date: May 17, 2021

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BROOKS SPORTS, INC.,
Petitioner,

v.

HERBERT E. TOWNSEND,
Patent Owner.

IPR2018-00577
Patent 7,490,416 B2

Before MEREDITH C. PETRAVICK, HYUN J. JUNG, and SCOTT A. DANIELS, *Administrative Patent Judges.*

JUNG, *Administrative Patent Judge*.

DECISION
Granting in Part Patent Owner's Request for Rehearing of Final Written Decision of *Inter Partes* Review
37 C.F.R. § 42.71(d)

I. INTRODUCTION

A. Background and Summary

Brooks Sports, Inc. ("Petitioner") filed a Petition (Paper 1, "Pet.") requesting institution of an *inter partes* review of claims 1 and 6 of U.S. Patent No. 7,490,416 B2 (Ex. 1001, "the '416 patent"). Petitioner contended that claim 1 was anticipated under 35 U.S.C. § 102 by Izumi[1] ("challenge 1").[2] Pet. 2. Petitioner also challenged claim 1 under 35 U.S.C. § 103 as unpatentable over (1) Izumi ("challenge 2"), (2) Rudy[3] and Plant[4] ("challenge 4"), (3) Christensen[5] and Ito[6] ("challenge 6"), and (4) applicant admitted prior art and Izumi ("challenge 8"). *Id.* at 2–3. Petitioner challenged claim 6 under 35 U.S.C. § 103 as unpatentable over (1) Izumi and Chang[7] ("challenge 3"), (2) Rudy, Plant, and Chang ("challenge 5"), (3) Christensen, Ito, and Chang ("challenge 7"), and (4) applicant admitted prior art, Izumi, and Chang ("challenge 9").

After we issued a Decision to Institute an *inter partes* review of the challenged claims (Paper 6, 22), Herbert E. Townsend ("Patent Owner") filed a Patent Owner's Response (Paper 16, "PO Resp."), to which Petitioner

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[1] JP H7-9105, published February 10, 1995. Exs. 1002, 1003.
[2] Patent Owner refers to Petitioner's challenges as challenge 1, challenge 2, challenge 3, etc. in its Request for Rehearing. We use the same labeling in this Decision.
[3] U.S. Patent No. 6,158,149 B1, issued December 12, 2000. Ex. 1005.
[4] GB 2 349 798 A, published November 15, 2000. Ex. 1006.
[5] U.S. Patent Application Publication No. US 2003/0120353 A1, filed February 5, 2003, published June 26, 2003. Ex. 1008.
[6] U.S. Patent No. 4,768,295, issued September 6, 1988. Ex. 1007.
[7] U.S. Patent No. 4,918,838, issued April 24, 1990. Ex. 1004.

replied (Paper 28, "Pet. Reply"[8]). Patent Owner also filed a Sur-Reply (Paper 27, "PO Sur-reply"[9]). Oral argument was conducted thereafter. *See* Paper 31.

We entered our Final Written Decision, in which we determined that Petitioner had shown by a preponderance of the evidence that claims 1 and 6 of the '416 patent were unpatentable over certain combinations of cited art. Paper 32, 71–72 ("Final Dec."). Specifically, we determined that Petitioner did not show by a preponderance of the evidence that claim 1 is anticipated by Izumi (challenge 1). *Id.* at 35. We also determined that the combinations based on Christensen and Ito do not teach or suggest all the limitations of claims 1 and 6 (challenges 6 and 7). *Id.* at 72. We determined, however, that claim 1 is unpatentable over (1) Izumi (challenge 2) and (2) Rudy and Plant (challenge 4) and that claim 6 is unpatentable over (1) Izumi and Chang (challenge 3) and (2) Rudy, Plant, and Chang (challenge 5). *Id.* at 71–72. We did not reach the other challenges of claims 1 and 6 (challenges 8 and 9). *Id.* at 71.

Patent Owner timely filed a Request for Rehearing in which it asks that we modify the Final Written Decision to reject challenges 3 and 8, to disregard the testimony of Petitioner's expert, and to provide a ruling and grounds for denying Patent Owner's request to disregard Petitioner's testimony. Paper 34, 1–8 ("Request," or "Req. Reh'g").

For the reasons set forth below, Patent Owner's rehearing request is *granted in part*.

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[8] We refer hereinafter to Petitioner's Corrected Reply (Paper 28) which replaced Petitioner's earlier-filed Reply (Paper 18).
[9] We refer hereinafter to Patent Owner's Corrected Sur-Reply (Paper 27) which replaced Patent Owner's earlier-filed Sur-Reply (Paper 20).

II. ANALYSIS

A. Legal Standards

37 C.F.R. § 42.71(d) sets forth, in relevant part that:

> A party dissatisfied with a decision may file a single request for rehearing without prior authorization from the Board. The burden of showing a decision should be modified lies with the party challenging the decision. The request must specifically identify all matters the party believes the Board misapprehended or overlooked, and the place where each matter was previously addressed in a motion, an opposition, or a reply.

See also Req. Reh'g 1 (quoting, in part, 37 C.F.R. § 42.71(d)).

B. Whether the Decision should be modified to reject challenge 8 to claim 1 because it is based on challenge 1 of claim 1 that the Board denied

Patent Owner contends that the Final Written Decision overlooked Petitioner's challenge 8's reliance on challenge 1 (*see* Pet. 3), which challenges claim 1 as being unpatentable over applicant admitted prior art ("AAPA") and Izumi. Req. Reh'g 4 (citing Final Dec. 70–71). Patent Owner argues that this challenge relied on Petitioner's assertion that Izumi discloses "material consisting essentially of a dilatant compound." *Id.* Patent Owner further argues that, because the Final Written Decision rejected this assertion in Petitioner's challenge 1 (anticipation of claim 1 over Izumi; *see* Pet. 2), the Decision necessarily must reject challenge 8 as well. *Id.*; *see also id.* at 1–3 (citing Dec. 34; Pet. 67). Patent Owner requests that the Decision be modified to reflect this. *Id.* at 4.

For challenge 8, Petitioner asserted that "Izumi also discloses use of a silicone bouncing putty equivalent to the claimed dilatant compound" and thus discloses the limitation of claim 1, "said at least one cavity filled with

material consisting essentially of a dilatant compound." Pet. 67. Petitioner relied on AAPA for limitations of claim 1 other than a "material consisting essentially of a dilatant compound." *See id.* at 65–67. For challenge 9, Petitioner argued that dependent claim 6 is unpatentable over AAPA, Izumi, and Chang. *Id.* at 68–69.

In our Final Written Decision, with respect to challenge 1, we were "not persuaded by a preponderance of the evidence that Izumi discloses that its putty is the claimed material," i.e., a "material consisting essentially of a dilatant compound." Final Dec. 34. We did not reach challenges 8 and 9 because Petitioner showed by a preponderance of the evidence that claims 1 and 6 were unpatentable based on challenges 2–5. *Id.* at 70–71. However, because challenges 8 and 9 rely on Izumi for "material consisting essentially of a dilatant compound," Petitioner did not show by a preponderance of the evidence that claim 1 is unpatentable over AAPA and Izumi and that dependent claim 6 is unpatentable over AAPA, Izumi, and Chang.

As such, Patent Owner's request that we modify the Final Written Decision by determining that Petitioner failed to meet its burden on challenge 8, in addition to challenge 1, is granted. We also modify the Final Written Decision to determine that Petitioner failed to meet its burden on challenge 9.

C. Whether the Decision should be modified to reject challenge 3 to claim 6 to the extent that it is based on challenge 1

Patent Owner contends that Petitioner's challenge 3 (*see* Pet. 2), the challenge of claim 6 as being unpatentable over Izumi and Chang, relied upon either challenge 1 (*see id.*) or challenge 2 (*see id.*). Req. Reh'g 5 (citing Pet. 42). Patent Owner argues that, because the Final Written Decision held that Petitioner did not show by a preponderance of the

evidence that claim 1 is anticipated by Izumi (challenge 1), the Final Written Decision necessarily must reject challenge 3 to the extent that it relied on challenge 1. *Id.* (citing Dec. 34–35). Patent Owner requests that the Decision be modified to reflect this. *Id.*

For challenge 3, Petitioner asserted for claim 6, which depends from claim 1, that "[a]ll of the limitations of claim 1 are disclosed by *or* obvious in view of Izumi." Pet. 42 (emphasis added). Thus, challenge 3 relies upon challenge 1, which is the anticipation of claim 1 by Izumi, or upon challenge 2, which is the obviousness of claim 1 over Izumi. As discussed above, we were not persuaded by Petitioner's challenge 1. Final Dec. 34. As such, we grant Patent Owner's request that we modify the Final Written Decision by determining that Petitioner did not show by a preponderance of the evidence that claim 6 is unpatentable over Izumi and Chang to the extent that this challenge relied upon the anticipation challenge of claim 1 by Izumi.

D. Whether the Decision should be modified to set out the Board's decision and reasoning on Patent Owner's request that the testimony of Petitioner's expert's be disregarded

Patent Owner contends that in its Sur-Reply, Patent Owner asked the Board to "disregard Petitioner's Expert's testimony as lacking credibility in view of his relationship to Petitioner and his failure to correct testimony even though he acknowledged that he knew that prior testimony was wrong." Req. Reh'g 6 (citing PO Sur-reply 5–10). According to Patent Owner, the Final Written Decision "makes clear that Patent Owner's request that Petitioner's Expert's testimony be disregarded was denied" but "[t]he Decision does not set out any ruling on Patent Owner's request nor any grounds for that ruling." *Id.* (citing Dec. 22, 46, 49, 51, 53, 62, 63). Patent

Owner requests that the Final Written Decision be modified to set out the Board's decision on Patent Owner's request that Petitioner's Expert's testimony be disregarded and the grounds for that decision. *Id.* at 6–7.

In its Sur-reply, Patent Owner pointed out that Petitioner's Expert, Dr. Shorten, "testified that he and his company began working for Brooks [(Petitioner)] in 2005 testing shoes that Brooks provided." PO Sur-reply 5. Patent Owner contended that Dr. Shorten first testified that he had never seen a running shoe that had a dilatant compound in the sole. *Id.* at 7. Patent Owner argued that in a second declaration, "Dr. Shorten stated that he tested dilatant compound ('Silly Putty') inserts in a shoe midsole" in 1985, and pointed out that he also tested a "Power Bounce shoe" from "Brooks" around 2005. *Id.* at 8–9. Patent Owner further argued that "Dr. Shorten plainly knew that his testimony at his first deposition concerning the Power Bounce shoe was flatly wrong when the second deposition began" but "[h]e refused to correct that testimony." *Id.* at 10. Patent Owner stated that "[t]he Board has discretion to determine the credibility of and the weight to give testimony" and contended that "Dr. Shorten's long relationship with Brooks, convoluted positions, and failure to tell the truth render his testimony not credible." *Id.* at 10.

Patent Owner does not point to where it asked the Board to disregard Dr. Shorten's testimonies entirely. Nonetheless, in the Final Written Decision, in addressing Patent Owner's arguments concerning the relevant art and level of ordinary skill in the art, we stated that the parties' arguments "address what weight we should give to the testimony of the parties' declarants" and "[f]or the reasons addressed below, the parties' declarants both provide relevant testimony on issues being assessed dependent on the declarant's particular background and expertise." Final Dec. 13. We, thus,

did not disregard any of the declarants' testimonies in their entireties. Rather, we assessed portions of the testimonies and how much weight should be given to them. In doing so, we considered Dr. Shorten's relationship with Petitioner and the alleged conflicting testimony. Such matters go to credibility of the witness, but do not justify disregarding the testimony altogether as requested by Patent Owner.

Even if there were conflicting testimonies as to whether Dr. Shorten ever tested a running shoe that has a dilatant compound in the sole, Dr. Shorten effectively corrected such discrepancy in his second declaration by testifying that his employee tested the Power Bounce shoe. *See* PO Sur-Reply 9. These two matters raised by Patent Owner did not rise to the level that Dr. Shorten's entire testimony should be disregarded.

Thus, the request that the Final Written Decision be modified to indicate that the testimony of Petitioner's expert, Dr. Shorten, be disregarded, is denied. To the extent that Patent Owner requests the Final Written Decision be modified to provide grounds or explanations in regard to the denial of Patent Owner's request that Petitioner's expert testimony be disregarded, that request is granted as shown by our additional reasoning provided above.

E. Whether the Decision should be modified to set out the grounds for the Board's decision to disregard the conclusion of Petitioner's Expert that dilatant compound does not work in a shoe midsole

Patent Owner contends that in its Response, "Patent Owner argued that Petitioner's Expert's testimony represented a failure to create the claimed shoe and that failure was a secondary consideration that supported nonobviousness of claim 1 of the 416 Patent." Req. Reh'g 7 (citing PO Resp. 61). Patent Owner argues that, however, "[t]he Decision does not

identify any grounds for disregarding Petitioner's Expert's original specific testimony as to his conclusion in 1985." *Id.* at 8 (citing Final Dec. 70; Ex. 2009, 149:25–150:9). Thus, "Patent Owner requests that the Decision be modified to set out the grounds for the Panel's decision not to credit Petitioner's Expert's deposition testimony as to his conclusions in 1985 concerning use of 'Silly Putty' in a shoe in favor of his later and different testimony." *Id.*

In its Response in regard to secondary considerations, Patent Owner argued that "Petitioner's expert tried and failed in 1985 to create shoes that had a dilatant compound in the sole." PO Resp. 61. Petitioner replied that "Dr. Shorten explains there was not a failed attempt, but a reasonable decision to not to try because better materials were available." Pet. Reply 27 (citing Ex. 1071 at ¶¶ 164–170). In his Reply Declaration, Dr. Shorten testified that Silly Putty in a shoe component "does not perform better than EVA [(ethyl vinyl acetate)]," that "it performed worse," and that "[g]iven the additional cost and weight compared to EVA, Silly Putty does not provide a better option." Ex. 1071 ¶ 170.

We stated in the Final Written Decision that Petitioner replied that its declarant "explains there was not a failed attempt, but a reasonable decision to not to try because better materials were available." Final Dec. 70 (citing Pet. Reply 27). Also, as pointed out in the Final Written Decision, Dr. Shorten testified that "Silly Putty is heavy and costly compared to EVA, a benchmark material," "[g]iven the additional cost and weight compared to EVA, Silly Putty does not provide a better option," and "I don't think it has any -- in the form we see it in, you know, the patent referenced in the Townsend, I don't think there's any commercial value there personally." *Id.* (citing Ex. 1071 (Shorten Reply Dec.) ¶¶ 164, 170; Ex. 2009 (Shorten

Deposition), 150:14–17). The Final Written Decision explained that "[b]ased on the record, a preponderance of the evidence persuades us that others tried but decided for economic reasons that using a dilatant compound in a shoe was an unattractive option." Final Dec. 70. Thus, the Final Written Decision provided grounds for disregarding Petitioner's Expert's testimony with respect to his conclusion in 1985 to the extent that it conflicts with the later testimony. The fact that Dr. Shorten clarified or corrected his earlier testimony does not mean that we should disregard his later testimony, because there is nothing in the record to hold against the veracity of later testimonies, other than that earlier inconsistent testimony itself.

Consequently, the request to modify the Final Written Decision to set out the Board's decision and reasoning on Patent Owner's request that the testimony of Petitioner's expert's be disregarded, is granted as shown by our additional reasoning provided above.

III. CONCLUSION

For the forgoing reasons, Patent Owner has shown that:

(1) Petitioner did not show by a preponderance of the evidence that claim 1 is unpatentable over AAPA and Izumi (challenge 8), and we thus grant Patent Owner's request to modify the Final Written Decision to reflect this and that Petitioner did not show by a preponderance of the evidence that claim 6 is unpatentable over AAPA, Izumi, and Chang (challenge 9);

(2) Petitioner did not show by a preponderance of the evidence that claim 6 is unpatentable over Izumi and Chang (challenge 3) to the extent that it relied upon the anticipation of claim 1 by Izumi (challenge 1), and we thus grant Patent Owner's request to modify the Final Written Decision to reflect this;

(3) to the extent that the Final Written Decision did not provide grounds or explanations for denial of Patent Owner's request that Petitioner's expert testimony be disregarded, we grant Patent Owner's request to modify the Final Written Decision by providing the grounds or explanations set forth above; and

(4) to the extent that the Final Written Decision did not provide grounds or explanations for denial of Patent Owner's request that the conclusion of Petitioner's expert that dilatant compound does not work in a midsole, we grant Patent Owner's request to modify the Final Written Decision by providing the grounds or explanations set forth above.

However, Patent Owner has not shown that the relationship between Petitioner's expert and Petitioner and the conflicting testimonies of Petitioner's expert rise to the level that Dr. Shorten's entire testimony should be disregarded, and we thus we deny Patent Owner's request to modify the Final Written Decision to reflect this.

Accordingly, Patent Owner's Request for Rehearing is granted in part.

Outcome of Decision on Rehearing:

Claim	35 U.S.C. §	Reference(s)/Basis	Denied	Granted
6	103	Izumi, Chang		6[10]
1	103	Applicant admitted prior art, Izumi		1
6	103	Applicant admitted prior art, Izumi, Chang		6
Overall Outcome				1, 6

[10] As discussed above, the request is granted only to the extent that this challenge to claim 6 as unpatentable over Izumi and Chang relies on Izumi anticipating claim 1.

Final Outcome of Final Written Decision after Rehearing:

Claim	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1	102	Izumi		1
1	103	Izumi	1	
6	103	Izumi, Chang	6	
1	103	Rudy, Plant	1	
6	103	Rudy, Plant, Chang	6	
1	103	Christensen, Ito		1
6	103	Christensen, Ito, Chang		6
1	103	Applicant admitted prior art, Izumi		1
6	103	Applicant admitted prior art, Izumi, Chang		6
Overall Outcome			1, 6	

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Patent Owner's Request for Rehearing Pursuant to 37 C.F.R. § 42.71(d) (Paper 34) is *granted in part*.

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