

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NEW NGC, INC. dba NATIONAL GYPSUM COMPANY,
Petitioner,

v.

UNITED STATES GYPSUM COMPANY,
Patent Owner.

Case IPR2017-01352
Patent 8,142,914 B2

Before RAE LYNN P. GUEST, JON B. TORNQUIST, and
JEFFREY W. ABRAHAM, *Administrative Patent Judges*.

ABRAHAM, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
37 C.F.R. § 42.108

I. INTRODUCTION

New NGC, Inc. dba National Gypsum Company (“Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting *inter partes* review of claims 1–4, 6, 8, and 10 of U.S. Patent No. 8,142,914 B2 (Ex. 1038, “the ’914 patent”). United States Gypsum Company (“Patent Owner”) filed a Preliminary Response to the Petition (Paper 7, “Prelim. Resp.”).

We have authority to determine whether to institute an *inter partes* review. 35 U.S.C. § 314; 37 C.F.R. § 42.4(a). The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted “unless the Director determines . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.”

After considering the Petition and Preliminary Response we determine that Petitioner has not demonstrated a reasonable likelihood of prevailing with respect to the challenged claims. Accordingly, we do not institute *inter partes* review.

A. Related Proceedings

The parties inform us that the ’914 patent is currently at issue in *U.S. Gypsum Co. v. New NGC, Inc.*, Case No. 1:17-cv-00130 (D. Del. Feb. 6, 2017). Pet. 1; Paper 4, 1. In addition, related U.S. Patent Nos. 7,964,034 B2, 6,632,550 B1, 7,425,236 B2, 6,342,284 B1, 7,758,980 B2, and 8,500,904 B2 are at issue in IPR2017–01011, IPR2017–01086, IPR2017–01088, IPR2017–01350, IPR2017–01351, and IPR2017–01353, respectively. Pet. 1, Paper 4, 1.

B. The '914 Patent

The '914 patent discloses a method and composition for preparing “set gypsum-containing products that have increased resistance to permanent deformation (e.g., sag resistance) by employing one or more enhancing materials.” Ex. 1038, 1:26–34.

The '914 patent explains that most gypsum-containing products are prepared by forming a mixture of calcined gypsum (calcium sulfate hemihydrate and/or calcium sulfate anhydrite) and water, casting the mixture into a desired shape, and allowing the mixture to harden to form set gypsum. *Id.* at 2:9–14. During this process, the calcined gypsum is rehydrated with water, forming an interlocking matrix of set gypsum crystals (calcium sulfate dihydrate) and imparting strength to the gypsum structure of the gypsum-containing product. *Id.* at 2:14–22. Although the matrix of gypsum crystals increases the strength of the gypsum-containing product, the '914 patent posits that existing gypsum-containing products could still benefit if the strength of their component set gypsum crystal structures were increased. *Id.* at 2:23–34.

To increase the strength, dimensional stability, and resistance to permanent deformation of set gypsum-containing products, the '914 patent discloses mixing calcium sulfate material, water, and an appropriate amount of one or more enhancing materials. *Id.* at 1:31–52. In a preferred embodiment, the enhancing material is in the form of trimetaphosphate ions, derived from the addition of sodium trimetaphosphate (STMP). *Id.* at 4:17–19, 4:27–30. According to the '914 patent, set gypsum-containing products incorporating this compound were “unexpectedly found to have increased strength, resistance to permanent deformation (e.g., sag resistance), and

dimensional stability, compared with set gypsum formed from a mixture containing no trimetaphosphate ion.” *Id.* at 4:35–43. It was also “unexpectedly found that trimetaphosphate ion . . . does not retard the rate of the formation of set gypsum from calcined gypsum,” and, in fact, actually accelerates the rate of rehydration. *Id.* at 4:43–49. According to the ’914 patent, this is “especially surprising” because most “phosphoric or phosphate materials retard the rate of formation of set gypsum and decrease the strength of the gypsum formed.” *Id.* at 4:49–54.

C. Illustrative Claim

Claim 1 is the only independent claim challenged and is reproduced below:

1. A gypsum board comprising a core of material sandwiched between cover sheets, wherein the core comprises an interlocking matrix of set gypsum, and the board has been prepared by a method comprising:

forming or depositing a mixture between the cover sheets, wherein the mixture comprises a calcined gypsum, water, an accelerator, and one or more enhancing materials selected from the group consisting of: sodium trimetaphosphate, tetrapotassium pyrophosphate, tetrasodium pyrophosphate, aluminum trimetaphosphate, sodium acid pyrophosphate, ammonium polyphosphate having 1000-3000 repeating phosphate units, and acids, salts, or the anionic portions thereof, and

maintaining the mixture under conditions sufficient for the calcined gypsum to form the interlocking matrix of set gypsum, the enhancing material or materials having been included in the mixture in an amount such that the gypsum board has greater sag resistance than it would have if the enhancing material had not been included in the mixture,

said board having a sag resistance as determined according to ASTM C473-95 of less than about 0.1 inch per two foot length of said board,

the accelerator having been included in an amount such that the gypsum board has greater strength than it would have if the accelerator had not been included in the mixture.

Ex. 1038, 31:64–32:23.

D. The Asserted Grounds of Unpatentability

Petitioner contends claims 1–4, 6, 8, and 10 of the '914 patent are unpatentable based on the following grounds (Pet. 2):¹

References	Basis	Claims Challenged
Graux, ² ASTM C473-95, ³ Hjelmeland, ⁴ Sucech, ⁵ and Summerfield ⁶	§ 103	1–4, 6, 8, and 10
Satterthwaite, ⁷ ASTM C473-95, Hjelmeland, Sucech, and Summerfield	§ 103	1–4, 6, 8, and 10

Petitioner contends that Hjelmeland is prior art under § 102(e). Pet. 19. Patent Owner contests the prior art status of Hjelmeland. Prelim. Resp. 14–15. In view of our determination that institution is not warranted on other grounds, we need not reach this issue.⁸

¹ Petitioner also relies on a declaration from Mr. Gerry Harlos (Ex. 1001).

² U.S. Patent No. 5,932,001, issued Aug. 3, 1999 (Ex. 1006).

³ Designation: C473-95; *Standard Test Methods for Physical Testing of Gypsum Board Products and Gypsum Lath*, AMERICAN SOCIETY FOR TESTING AND MATERIALS, 1995 (Ex. 1009).

⁴ U.S. Patent No. 5,980,628, issued Nov. 9, 1999 (Ex. 1008).

⁵ U.S. Patent No. 5,643,510, issued July 1, 1997 (Ex. 1036).

⁶ U.S. Patent No. 2,985,219, issued May 23, 1961 (Ex. 1017).

⁷ U.S. Patent No. 3,234,037, issued Feb. 8, 1966 (Ex. 1007).

⁸ On September 25, 2017, Petitioner requested authorization to file a reply addressing the prior art status of Hjelmeland. We took that e-mail request

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, “[a] claim in an unexpired patent shall be given its broadest reasonable construction in light of the specification of the patent in which it appears.” 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard). Claims of a patent that will expire within 18 months from the Notice of Filing Date, however, are construed using “a district court-type claim construction approach,” provided a motion under 37 C.F.R. § 42.20 is filed within 30 days from the filing of the petition. 37 C.F.R. § 42.100(b). Patent Owner timely filed such a motion, and Petitioner does not dispute that the ’914 patent expired shortly after the Petition was filed. Paper 6, 1; Pet. 10. Thus, to the extent necessary, we will construe the claims of the ’914 patent using “a district court-type claim construction approach.” 37 C.F.R. § 42.100(b); *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005).

Petitioner provides proposed constructions for the terms “enhancing material(s)” and “accelerator.” Pet. 12–14. Patent Owner responds to Petitioner’s proposed constructions with its own proposed constructions of these terms, and also offers a proposed construction of “set gypsum.” Prelim. Resp. 18–26. Upon review of Petitioner’s and Patent Owner’s arguments and supporting evidence, however, we determine that no claim terms require express construction for purposes of this Decision. See *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)

under advisement. In view of our denial of the Petition on other grounds, we deem Petitioner’s request moot.

(“[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.”).

B. Alleged Obviousness over Graux, ASTM C473-95, Hjelmeland, Sucech, and Summerfield

Petitioner contends the subject matter of claims 1–4, 6, 8, and 10 of the ’914 patent would have been obvious over the combination of Graux, ASTM C473-95, Hjelmeland, Sucech, and Summerfield. Pet. 22–44.

1. Graux

Graux discloses a plaster, coating, or adhesive composition based on plaster that contains a cationic amylaceous compound.⁹ Ex. 1006, 1:4–5, Abstract. Graux explains that the plaster in this composition may contain any form of calcium sulphate,¹⁰ including the hemihydrate, calcined/rehydrated, and anhydrous forms, and the cationic amylaceous compound has a fixed nitrogen content of at least 0.15% and a solubility in water of at least 50%. *Id.* at 1:35–39, 4:32–36, Abstract. The cationic amylaceous compound may also be crosslinked as described in European patent EP 603 727. *Id.* at 5:34–53.

Graux notes that, “[a]part from the plaster and the cationic amylaceous compound, the composition according to the invention may also contain . . . at least one additive,” including an accelerator, “for example, gypsum, potassium sulphate, [and] lime,” as well as one or more retarders,

⁹ Graux defines amylaceous compounds as including “all starches of natural or hybrid origin, including those derived from genetic mutations or manipulations.” Ex. 1006, 4:49–52.

¹⁰ Graux, as well as Hjelmeland, uses the term “sulphate,” whereas the ’914 patent uses the term “sulfate.” We understand these two terms to be synonymous.

fillers, water retaining agents, water-repelling agents, and lightweight additives. *Id.* at 7:28–59.

Example 1 of Graux describes forming a plaster composed of 75 wt. % calcium sulphate hemihydrate and 25 wt. % anhydrous calcium sulphate “of the ‘dead-burned’ type,” and adding 0.04 wt. % cationic amylaceous compound and 0.05 wt % retarder, which slows the setting of the plaster “to allow a better estimate of the effectiveness of the amylaceous compound.” *Id.* at 9:11–24. In one test plaster of Example 1, the cationic amylaceous compound is in the form of a cationic potato starch that has previously been crosslinked with STMP. *Id.* at 10:7–31.

2. ASTM C473-95

ASTM C473-95 provides standard test methods for gypsum board products. Ex. 1009, 1. These test methods include, *inter alia*, tests for humidified deflection (sag resistance), hardness, and nail pull resistance. *Id.* at 2–7.

3. Hjelmeland

Hjelmeland discloses a curable gypsum-based composition that is designed for use in the production of cured gypsum products. Ex. 1008, 3:52–57.

Hjelmeland explains that there was a need in the art for curable gypsum-based compositions having a long pot life but short setting time. *Id.* at 1:33–37. To achieve this goal, Hjelmeland provides a “two-component composition.” *Id.* at 3:57–59. The first component is a calcined gypsum suspension containing a set retarding agent in the form of an organic acid containing at least two acid groups and/or inorganic anions selected from the group consisting of polyphosphate and polyborate. *Id.* at 3:52–4:3, 4:46–48.

The second component contains a set accelerating substance comprising water soluble salts of multivalent metal ions and, optionally, organic or inorganic salts of ammonium and/or elements from the first group of the periodic table of elements. *Id.* at 4:4–10.

According to Hjelmeland, the set retarding agents of the first component impart a long pot life (on the order of 1 hour) to the product. *Id.* at 4:46–48. Then, when the product is to be applied to a particular surface, the second component is added to the first to cause its multivalent metal ions to form complexes with, or precipitate the set retarding substances of the first component, thereby neutralizing the retarding agent. *Id.* at 4:24–28. Once the two components are mixed, the gypsum composition has a gelation time of 2–15 minutes. *Id.* at 4:50–53.

4. *Sucech*

Sucech discloses a process for forming gypsum boards that utilizes two different foaming agents. Ex. 1036, 1:9–12. Sucech notes that it was previously known that foaming agents could be used to reduce the weight of a gypsum board without reducing its strength. *Id.* at 1:30–32. Such processes, however, used foaming agents that allow little control over the size distribution of voids within the foam. *Id.* at 1:52–60. In contrast to these known methods, Sucech utilizes a combination of two foaming agents, which Sucech contends allows an artisan to control “the size and distribution of foam voids in the [gypsum] board.” *Id.* at 1:10–12.

5. *Summerfield*

Summerfield discloses a process and apparatus for producing plasterboard. Ex. 1017, 1:4–5. Summerfield notes that in prior art processes for forming gypsum board, a gypsum-containing slurry is allowed to flow

onto a paper backing, is leveled by a roller, and is then topped off with another sheet of paper. *Id.* at 1:20–26, 4:13–19. The gypsum comprising the core is then allowed to set, the resulting board is cut to a desired length, and the cut board is passed through a drying kiln to remove excess water. *Id.* at 1:26–30.

6. Analysis

Petitioner contends that “Graux discloses all of the ingredients identified in the claimed composition,” including a mixture of calcined gypsum, water, an accelerator, and STMP, and that one of ordinary skill in the art, armed with the testing protocols of ASTM C473-95, would have been able “to apply the predictable solutions described in Graux to yield a product” that met the sag resistance levels set forth in the challenged claims. Pet. 23–24 (citing Ex. 1006, 1:24–30, 7:32–33, 9:29–30, 10:29–30; Ex. 1001 ¶ 92). Petitioner further asserts that, because STMP and the polyphosphates of Hjelmeland are both condensed phosphates, one of ordinary skill in the art would have found it obvious to “use the amount of condensed phosphate specified by Hjelmeland in the plaster compositions of Graux.” *Id.* at 25.

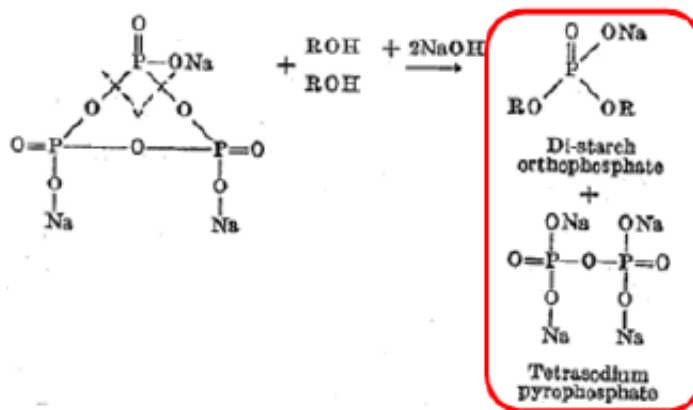
Additionally, Petitioner contends that Sucech discloses the use of foaming agents in set gypsum-containing products, and Summerfield discloses a basic process for manufacturing gypsum board that includes a gypsum-containing slurry placed between two sheets of paper. *Id.* at 26–27. Petitioner asserts that a person of ordinary skill in the art would have found it obvious to add Sucech’s foaming agent to Graux to achieve a gypsum product having a lower weight and density, and to use the basic manufacturing process disclosed in Summerfield to make gypsum boards with paper coverings. *Id.* According to Petitioner, “[e]ach of Graux, ASTM

C473-95, Hjelmeland, Sucech, and Summerfield are narrowly and directly related to improvements of certain specific and well-known properties of set gypsum-containing products.” *Id.* at 27 (citing Ex. 1001 ¶ 99).

Patent Owner responds that the subject matter of the challenged claims would not have been obvious over the recited references because, among other things, Petitioner has not demonstrated that Graux teaches or suggests adding STMP to a mixture of calcined gypsum, water, and an accelerator. Prelim. Resp. 38, 41–42. We agree with Patent Owner.

Independent claim 1 requires, among other things, a mixture comprising calcined gypsum, water, an accelerator, and one or more enhancing materials selected from a group that includes STMP. Ex. 1038, 32:2–9. Petitioner does not direct us to any embodiment or teaching in Graux in which STMP is added directly to a mixture of gypsum, water, and an accelerator. Instead, Petitioner relies on the addition of a cross-linked starch in Graux as satisfying the requirement that the claimed matrix of set gypsum is prepared from a mixture comprising sodium trimetaphosphate. Pet. 33. On this record, we are not persuaded that this disclosure is sufficient to show that STMP is present in the mixture of gypsum, water, and an accelerator in Graux.

As noted above, the cross-linked starch of Graux is created by mixing STMP and a potato starch. Ex. 1006, 10:7–31. Mr. Harlos discusses the reaction between STMP and a potato starch, and provides the following figure depicting this reaction:



Ex. 1001 ¶ 50. This figure shows the reaction between potato starch and STMP results in the formation of di-starch orthophosphate and tetrasodium pyrophosphate. *Id.* Consistent with Mr. Harlos’ testimony, Patent Owner’s declarant, Dr. Bruce, testifies that the STMP of Graux is “consumed” during the crosslinking reaction.¹¹ Ex. 2001 ¶ 110; *see also id.* at ¶ 111 (stating that “STMP reacts with the ROH starch groups to produce a di-starch orthophosphate and tetrasodium pyrophosphate”).

Because the reaction of STMP and potato starch in Graux occurs *before* the starch is added to the gypsum and water mixture, and because the reaction converts the starch and STMP into di-starch orthophosphate and tetrasodium pyrophosphate, i.e., STMP is consumed during Graux’s reaction process, we are not persuaded that Graux expressly teaches or suggests a mixture comprising calcined gypsum, water, and sodium trimetaphosphate, as required by claim 1.

Although STMP is consumed during the crosslinking process, Petitioner demonstrates that tetrasodium pyrophosphate, which is also

¹¹ Mr. Harlos testifies that the “crosslinks between starch molecules” in Graux are “permanent” and “require a large amount of energy to break.” Ex. 1001 ¶ 49.

recited in claim 1 as an enhancing material, is produced during the crosslinking reaction of Graux. Ex. 1001 ¶ 50. In addition, Dr. Bruce implicitly acknowledges that unreacted STMP could remain in the cross-linked starch after the crosslinking process is completed. Ex. 2001 ¶ 111 (Dr. Bruce acknowledging that residual STMP may remain after the crosslinking reaction is completed). We are presented with insufficient evidence, however, that these compounds would be present when the starch is ultimately added to the gypsum, water, and accelerator mixture.

First, Petitioner does not even attempt to demonstrate that residual STMP and/or tetrasodium pyrophosphate are present in the cross-linked starch when it is added to the mixture of gypsum, water, and an accelerator of Graux. Second, as noted by Patent Owner, Graux relies upon European patent EP 603 727 (Ex. 2002) for a description of how various crosslinked starches were manufactured in the art, including starches crosslinked with STMP. Ex. 2001 ¶ 110 (citing Ex. 1006, 5:46–53); Ex. 2002, 3:9–18. In Examples I and II of EP 603 727, a crosslinking agent is applied to a starch, the cross-linking reaction is completed, and the cross-linked samples are then “filtered, washed with water (two parts water per part of starch) and dried.” Ex. 2002, 5:42–47, 6:54–55; *see also id.* at 7:46–50 (explaining that the samples “were worked up as described above”). Dr. Bruce testifies that this washing process would remove any excess STMP from the cross-linked starch of Graux, and neither Petitioner nor Mr. Harlos present evidence to suggest otherwise. Ex. 2001 ¶ 110. Thus, on this record, we are not persuaded that Graux discloses, expressly or inherently, a mixture comprising calcined gypsum, water, an accelerator, and one or more of the enhancing materials recited in claim 1.

Claim 1 also requires including the enhancing material in the mixture in an amount such that the gypsum board has greater sag resistance than it would have if the enhancing material had not been included in the mixture, said board having a sag resistance as determined according to ASTM C473-95, of less than about 0.1 inch per two foot length of said board.

Ex. 1038, 32:13–19. Petitioner contends a person of ordinary skill in the art “would understand that the combination of Graux and ASTM C473-95 discloses this claim element.” Pet. 35–36. Specifically, Petitioner maintains that Graux discloses including STMP and that the addition of this enhancing material to the mixture in Graux results in a composition with “better resistance to deformation than if it was not added.” *Id.* at 34. Petitioner further argues that it would have been obvious to a person of ordinary skill in the art to use ASTM C473-95 to test the sag resistance of the composition disclosed by Graux, and “[m]erely measuring an inherent property of an already-known composition does not make the composition patentable.” *Id.* at 35. Petitioner also notes that the ’914 patent identifies prior art set-gypsum containing products having a sag resistance value of less than 0.1 inch. *Id.* at 36.

Patent Owner argues that Graux is not concerned with sag resistance, and the ASTM C473-95 standards, which apply to finished gypsum board products, are not applicable to Graux’s plaster products. Prelim. Resp. 38–39. Patent Owner also argues that Petitioner offers no evidence to support the idea that sag resistance is an inherent element of set-gypsum containing materials, and a person of ordinary skill in the art “could not use the ATSM standard together with Graux to arrive at the challenged claims” because “the ASTM C473-95 standards do not disclose a method of making a

gypsum board or any other set gypsum products.” *Id.* at 39. Patent Owner further contends that the prior art products identified in the ’914 patent are examples of prior art products with problems the ’914 patent addressed and solved. *Id.* at 44.

After reviewing the parties’ positions, we are not persuaded that Petitioner has demonstrated sufficiently that the prior art references teach or suggest including an enhancing material in the mixture of Graux in an amount such that when the mixture is cast in the form of a gypsum board, the board has a sag resistance of less than about 0.1 inch per two feet in length, as determined according to ASTM C473-95. Petitioner has not directed us to any sag resistance values for gypsum boards made using the ingredients disclosed in Graux and measured according to ASTM C473-95.¹² Nor has Petitioner directed us to evidence sufficient to establish that the claimed sag resistance value is an inherent property of a gypsum-containing product formed from a mixture comprising calcined gypsum, water, an accelerator, and STMP, i.e., the product of the combination asserted by Petitioner. *Trintec Indus., Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292, 1295 (Fed. Cir. 2002) (“Inherent anticipation requires that the missing descriptive material is ‘necessarily present,’ not merely probably or possibly present, in the prior art.”)(quoting *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999)). With regard to Petitioner’s argument that the ’914 patent discloses prior art gypsum boards having a sag resistance of less than 0.1

¹² Even if we were to agree with Petitioner that Graux discloses a mixture comprising calcined gypsum, water, an accelerator, and an enhancing material—which, for the reasons discussed above, we do not—Petitioner’s argument still suffers from this deficiency.

inch, Petitioner has not directed us to any evidence demonstrating that these products contain the enhancing materials recited in claim 1, or that they were tested using the ASTM C473-95 test method.

Further, we agree with Patent Owner that the mere fact that a person of ordinary skill in the art would have been aware of the test methods set forth in ASTM C473-95 does not establish that boards tested according to those test methods would have a particular sag resistance value or that a person of ordinary skill in the art would have been able to produce a board having a particular sag resistance value. For example, under the heading “Significance and Use” in the section discussing Humidified Deflection (i.e., sag resistance), ASTM C473-95 states only that “[t]his test method covers a procedure for *evaluating* the deflection of gypsum board.” Ex. 1009, 8 (Section 49.1) (emphasis added). We are not persuaded that such a disclosure would have motivated a person of ordinary skill in the art to “utilize the known enhancing materials disclosed in Graux” to arrive at the claimed invention, as Petitioner argues. Pet. 24.

Based on the foregoing, Petitioner has not demonstrated that Graux, ASTM C473-95, Hjelmeland, Sucech, and Summerfield disclose or suggest every limitation of independent claim 1,¹³ or that one of ordinary skill in the art would have sought to modify Graux in view of ASTM C473-95, Hjelmeland, Sucech, and Summerfield to arrive at the subject matter of claim 1. As dependent claims 2–4, 6, 8, and 10 depend directly from claim 1, we are not persuaded that the subject matter of claims 1–4, 6, 8, and 10

¹³ Petitioner does not rely on Sucech or Summerfield to cure the aforementioned deficiencies.

would have been obvious over Graux, ASTM C473-95, Hjelmeland, Sucech, and Summerfield.

C. Alleged Obviousness over Satterthwaite, ASTM C473-95, Hjelmeland, Sucech, and Summerfield

Petitioner contends that the subject matter of claims 1–4, 6, 8, and 10 would have been obvious over Satterthwaite, ASTM C473-95, Hjelmeland, Sucech, and Summerfield. Pet. 44–65.

1. Satterthwaite

Satterthwaite discloses “the production of a starch binder comprising a thick-boiling starch and a polyhydric alcohol fatty acid ester.” Ex. 1007, 1:10–12. Satterthwaite explains that the disclosed starch binder, when gelatinized, “has a greater viscosity and a greater viscosity stability than other starches, and is therefore particularly suitable for use in the manufacture of acoustical ceiling tile and other tile products made from a mixture of water, gypsum, mineral wool and other ingredients.” *Id.* at 1:13–18.

The disclosed “super-thick” boiling starch is manufactured by treating corn starch in aqueous slurry with, among other things, sodium trimetaphosphate, which crosslinks the starch molecules. *Id.* at 1:66–2:13. The resulting product is then “filtered and washed and dried by conventional means.” *Id.* at 1:53–55, 2:29–31.

In a preferred embodiment of Satterthwaite, polyhydric alcohol fatty acid ester is sprayed into the disclosed super-thick boiling starch in dry form. *Id.* at 3:32–36. The resulting composition is then added to a tile mix consisting of water, gypsum, boric acid, and paraffin wax, and heated to 200° F. *Id.* at 3:36–38. The resulting mixture is then diluted with water,

cooled, and blended with mineral wool to form gypsum sheets. *Id.* at 3:38–41.

2. Analysis

Petitioner contends that Satterthwaite discloses using a starch treated with STMP in combination with a mixture of water, gypsum, mineral wool, and other ingredients, to form acoustical ceiling tiles and other products. Pet. 17, 53–54. Petitioner does not argue that Satterthwaite discloses the use of accelerators, but instead asserts that Hjelmeland “teaches the inclusion of accelerators that ‘accelerate the hardening process.’” *Id.* at 56. Petitioner contends a person of ordinary skill in the art would have sought to use an accelerator in the composition of Satterthwaite because accelerators are expressly taught in Hjelmeland and were known to improve strength. *Id.*

Patent Owner asserts the combination of Satterthwaite, ASTM C473-95, Hjelmeland, Sucech, and Summerfield would not have rendered the subject matter of the challenged claims obvious because, contrary to Petitioner’s assertions, the proposed combination of references fails to disclose all elements of the challenged claims. Prelim. Resp. 49–63. For example, Patent Owner contends that Satterthwaite “does not disclose or suggest adding STMP, or any other claimed enhancing material, to a set gypsum-containing product.” *Id.* at 49. We agree with Patent Owner.

Petitioner directs our attention to no disclosure in Satterthwaite that STMP is ever added directly to the disclosed mixture of water, gypsum, and mineral wool. At best, the evidence relied upon by Petitioner establishes that “a starch treated with STMP” is subsequently added to a mixture of water, gypsum, mineral wool, and other ingredients. Pet. 17; *see also id.* at 53–54 (stating that “Satterthwaite discloses including STMP as it describes

‘treating the starch in aqueous alkali slurry with reagents such as . . . sodium trimetaphosphate . . . or others which form cross-links between the starch molecules’”) (citing Ex. 1007, 2:9–13; Ex. 1001 ¶¶ 168), 55 (stating “Satterthwaite discloses treating starch with STMP”). Petitioner does not explain why the addition of “a starch treated with STMP” to a mixture of gypsum, water, and wool means that the mixture comprises STMP, as required in claim 1. Nor does Petitioner even attempt to establish that the STMP added to crosslink the potato starch molecules in Satterthwaite would necessarily be present after the cross-linked starch is filtered, washed, and dried. *See* Ex. 1007, 1:53–55, 2:29–31.

To the extent that Petitioner contends Hjelmeland discloses STMP, we note that Petitioner directs our attention to no express disclosure in Hjelmeland of using STMP. Pet. 55 (asserting that Hjelmeland “discloses STMP”)(citing Ex. 1001 ¶¶ 173). Petitioner directs our attention instead to Hjelmeland’s disclosure of using a genus of set retarding agents comprising: “(i) an organic acid containing at least two acid groups selected from the group consisting of . . . phosphate or phosphonate . . . and/or (ii) inorganic anions selected from the group consisting of polyphosphate.” Pet. 20; *see also id. at* 46–47 (stating that Hjelmeland discloses a set gypsum-containing product including “a set retarding substance comprising . . . inorganic anions selected from the group consisting of polyphosphate and polyborate, or mixtures thereof”); Ex. 1001 ¶ 155 (citing Ex. 1008, 3:60–4:3). The disclosure of a genus, however, is not necessarily a disclosure of each species within that genus. *See Abbvie v. Mathilda & Terence Kennedy Institute*, 764 F.3d 1366, 1379 (Fed. Cir. 2014); *In re Baird*, 16 F.3d 380, 382 (Fed. Cir. 1994) (“The fact that a claimed compound may be

encompassed by a disclosed generic formula does not by itself render that compound obvious.”).

Furthermore, Petitioner’s explanation for why a person of ordinary skill in the art would have had a reason to combine the teachings of Satterthwaite and Hjelmeland is based on Petitioner’s assertions that Satterthwaite and Hjelmeland each disclose a set gypsum-containing product formed from a mixture of water, calcined gypsum, and a condensed phosphate. Pet. 46–47. Based on this common disclosure, Petitioner argues that a person of ordinary skill in the art would look to Hjelmeland for guidance as to *how much* STMP to add to Satterthwaite’s mixture. Specifically, Petitioner states:

a [person having ordinary skill in the art] would understand that STMP, as disclosed by Satterthwaite, is a salt of a condensed phosphate. [Ex. 1001 ¶ 155]. As such, a [person having ordinary skill in the art], understanding the similarities between Hjelmeland, which discloses the amount of condensed phosphoric acid or ion of condensed phosphate to include in a set gypsum-containing product, [Ex.] 1008, 4:13-15, and Satterthwaite, would find it obvious to use the amount of condensed phosphate specified by Hjelmeland in the plaster compositions of Satterthwaite and would have a reasonable expectation of success in doing so. [Ex.] 1001, ¶ 155.

Pet. 47.

As discussed above, however, Petitioner has not established sufficiently that Satterthwaite discloses adding STMP or any other salt of a condensed phosphate directly to the disclosed mixture of water, gypsum, and mineral wool. This deficiency undermines Petitioner’s argument that a person of ordinary skill in the art would look to Hjelmeland to determine how much STMP to add to Satterthwaite’s composition. Rather, in view of our determination regarding the disclosure of Satterthwaite, the more

appropriate inquiry is whether, in view of Hjelmeland, a person of ordinary skill in the art would have had reason to add STMP to the starch-gypsum-water mixture of Satterthwaite in the first place.

Petitioner, however, does not explain adequately why one of ordinary skill in the art, having already utilized STMP to crosslink the starch, would have then sought to add STMP or any other condensed phosphate to Satterthwaite's mixture in view of Hjelmeland's disclosure. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (“[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.”). As a result, Petitioner has failed to identify a reason why a person of ordinary skill in the art would have combined the disclosed elements in the art in the same fashion as recited in the claims of the '914 patent. *Id.* (“[I]t can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.”).

Claim 1 also requires including the enhancing material in the mixture in an amount such that the gypsum board has greater sag resistance than it would have if the enhancing material had not been included in the mixture, said board having a sag resistance as determined according to ASTM C473-95 of less than about 0.1 inch per two foot length of said board.

Ex. 1038, 32:13–19. Petitioner contends that a person of ordinary skill in the art “would understand that the combination of Satterthwaite and ASTM C473-95 discloses this claim element.” Pet. 58. Specifically, Petitioner argues that Satterthwaite “discloses STMP,” that this material acts as an enhancing material in the reference, and that a person of ordinary skill in the

art “would understand that adding an ‘enhancing material’ to the mixture would provide better sag resistance than if it was not added.” *Id.* at 56–57.

Petitioner also repeats arguments discussed above regarding ASTM C473-95, namely that it would have been obvious to a person of ordinary skill in the art to use ASTM C473-95 to test the sag resistance of Satterthwaite’s tile products, and that “[m]erely measuring an inherent property of an already-known composition does not make the composition patentable.” *Id.* at 57. Likewise, Petitioner again notes that the ’914 patent identifies prior art set-gypsum containing products having a sag resistance value of less than 0.1 inch. *Id.* at 58 (citing Ex. 1038, Figs. 2, 3).

Patent Owner argues that Satterthwaite is not concerned with sag resistance of gypsum boards, and the ASTM C473-95 standards, which apply to finished gypsum board products, are not applicable to Satterthwaite’s ceiling tiles. Prelim. Resp. 49–50. Additionally, Patent Owner argues “[t]he ’914 Patent does not claim the measurement of an inherent property of known compositions” (*id.* at 58 n. 5), and “Petitioner offers nothing more than pure speculation that a [person having ordinary skill in the art] would have reasonable success in satisfying the claimed parameter of ‘sag resistance, as determined according to ASTM C473-93, of less than about 0.1 inch per two foot length’” (*id.* at 57). Patent Owner further contends that the prior art products identified in the ’914 patent are examples of prior art products with problems the ’914 patent addressed and solved. *Id.* at 58.

After reviewing the parties’ positions, we are not persuaded that Petitioner has demonstrated sufficiently that the prior art references teach or suggest including an enhancing material in an amount such that when the

mixture is cast in the form of a gypsum board, the board has a sag resistance of less than about 0.1 inch per two feet in length, as determined according to ASTM C473-95. Petitioner has not directed us to any sag resistance values of gypsum boards made using the ingredients disclosed in Satterthwaite and measured according to ASTM C473-95.¹⁴ Nor has Petitioner directed us to evidence sufficient to establish that the claimed sag resistance value is an inherent property of gypsum-containing products that include the materials of Satterthwaite and Hjelmeland. *Trintec*, 295 F.3d at 1295. With regard to Petitioner’s argument that the ’914 patent discloses prior art gypsum boards having a sag resistance of less than 0.1 inch, Petitioner has not directed us to any evidence demonstrating that these products contain the enhancing materials recited in claim 1.

Further, as stated above, the mere fact that a person of ordinary skill in the art would have been aware of the test methods set forth in ASTM C473-95 does not establish that boards tested according to those test methods would have a particular sag resistance value or that a person of ordinary skill in the art would have been able to produce a board having a particular sag resistance value using the materials of Satterthwaite, Hjelmeland, Sucech, and Summerfield, as proposed in the Petition. For example, under the heading “Significance and Use” in the section discussing Humidified Deflection (i.e., sag resistance), ASTM C473-95 states only that “[t]his test method covers a procedure for *evaluating* the deflection of

¹⁴ Even if we were to agree with Petitioner that Satterthwaite discloses a mixture comprising calcined gypsum, water, and an enhancing material—which, for the reasons discussed above, we do not—Petitioner’s argument still suffers from this deficiency.

gypsum board.” Ex. 1009, 8 (Section 49.1) (emphasis added). We are not persuaded that a person of ordinary skill in the art, in view of these tests, “would have been motivated to utilize the known enhancing materials disclosed in Satterthwaite” to arrive at the claimed invention, as Petitioner argues. Pet. 45.

In light of the foregoing, we are not persuaded that the combination of Satterthwaite, ASTM C473-95, Hjelmeland, Sucech, and Summerfield, as formulated by Petitioner, teaches or suggests every element of independent claim 1,¹⁵ or that a person of ordinary skill in the art would have had a reason to combine the claimed elements in the way the claimed invention does. And, as each of the challenged dependent claims depend from claim 1, Petitioner has likewise not demonstrated that the subject matter of these claims would have been obvious over Satterthwaite, ASTM C473-95, Hjelmeland, Sucech, and Summerfield.

III. CONCLUSION

Upon consideration of the Petition and the Preliminary Response, as well as the testimony of Mr. Harlos and Dr. Bruce, we conclude that Petitioner has not demonstrated a reasonable likelihood that claims 1–4, 6, 8, and 10 are unpatentable over the recited prior art references. Accordingly, we do not institute *inter partes* review with respect to any of the asserted grounds.

IV. ORDER

It is hereby

ORDERED that *inter partes* review is not instituted.

¹⁵ Petitioner does not rely on Sucech or Summerfield to cure the aforementioned deficiencies.

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