

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HID GLOBAL CORP.,
Petitioner,

v.

MORPHOTRUST USA, LLC,
Patent Owner.

Case IPR2017-01939
Patent 7,207,494 B2

Before KARL D. EASTHOM, CHRISTA P. ZADO, and
STACY B. MARGOLIES, *Administrative Patent Judges*.

EASTHOM, *Administrative Patent Judge*.

DECISION

Final Written Decision

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

Denying Motion to Amend

35 U.S.C. § 316(d) and 37 C.F.R. § 42.121

I. INTRODUCTION

This *inter partes* review, instituted pursuant to 35 U.S.C. § 314, addresses the patentability of claims 1–20 (the “challenged claims”) of U.S. Patent No. 7,207,494 B1 (Ex. 1001, the “’494 patent”). This review also addresses the patentability of substitute claims 21–40 (the “substitute claims”), submitted by Patent Owner in a Contingent Motion to Amend. Paper 18.

We have jurisdiction under 35 U.S.C. § 6. For the reasons discussed herein, Petitioner has shown by a preponderance of the evidence that the challenged claims are unpatentable. In addition, we deny Patent Owner’s Contingent Motion to Amend.

A. Procedural History

Petitioner, HID Global Corp., filed a Petition (Paper 1, “Pet.”) requesting an *inter partes* review of claims 1–20 of the ’494 patent”). See Pet. 4. Patent Owner, MorphoTrust USA, LLC, filed a Preliminary Response. Paper 8 (“Prelim. Resp.”). Subsequent to the Institution Decision (Paper 8, “Inst. Dec.”), Patent Owner filed a Response (Paper 17, “PO Resp.”) and Petitioner filed a Reply (Paper 23, “Reply”). The parties appeared for an Oral Hearing on November 15, 2018, a transcription of which appears in the record. Paper 34 (“Tr.”).¹ As indicated above, Patent

¹ During the Oral Hearing, the parties argued three other related proceedings in addition to IPR2017-01939, all transcribed together in Paper 40, namely IPR2017-01938, IPR2017-01940, and IPR2017-01941. See *infra* Section I.C. (Related Cases).

Owner also submitted a Contingent Motion to Amend, followed by other papers by the parties, as discussed further below in Section IV.

B. The '494 Patent

The '494 patent, titled “Laser Etched Security Features for Identification Documents and Methods of Making Same” (Ex. 1001, [54]), describes etching patterns in identification cards, documents, and “many different articles that can be marked” (*id.* at 9:43) using a laser. *Id.* at [57], 9:36–57, Fig. 1. Examples of identification cards and documents include “driving licenses, national or government identification cards, bank cards, credit cards, controlled access cards and smart cards, carry[ing] thereon certain items of information which relate to the identity of the bearer. Examples of such information include name, address, birth date, signature and photographic image” *Id.* at 2:61–3:4. The ID cards and documents may include other variant (e.g., employee number) and invariant (e.g., employer name) information. *See id.*

Figure 1, reproduced below, “is an illustrative example of a prior art identification document” 10 (*id.* at 4:54–55):

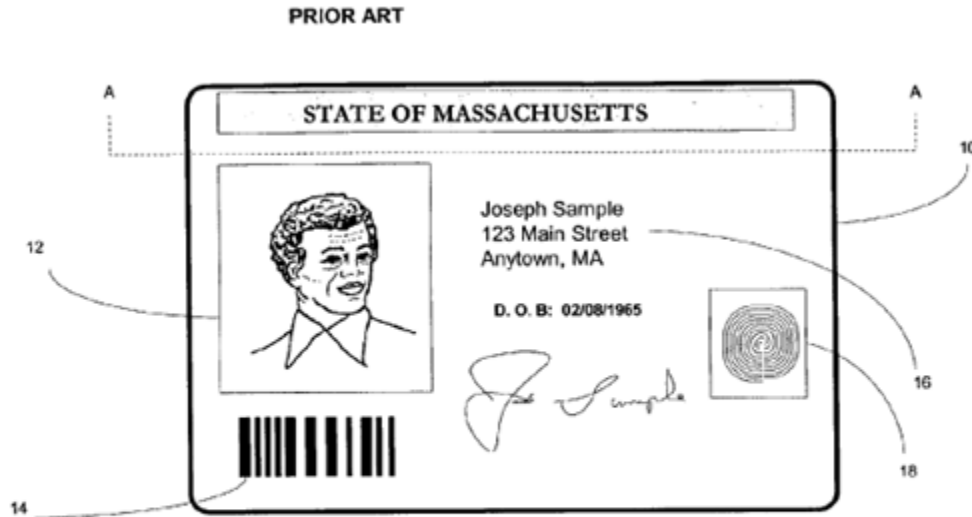


FIGURE 1

Prior art ID document 10, depicted above, includes “photographic image 12, a bar code 14 (which may contain information specific to the person whose image appears in photographic image 12 and/or information that is the same from ID document to ID document), variable personal information 16, such as an address, signature, and/or birthdate, and biometric information 18” such as a fingerprint. *Id.* at 3:10–17. The ID document may also include “a magnetic stripe . . . and various security features, such as a security pattern.” *Id.* at 3:19–21.

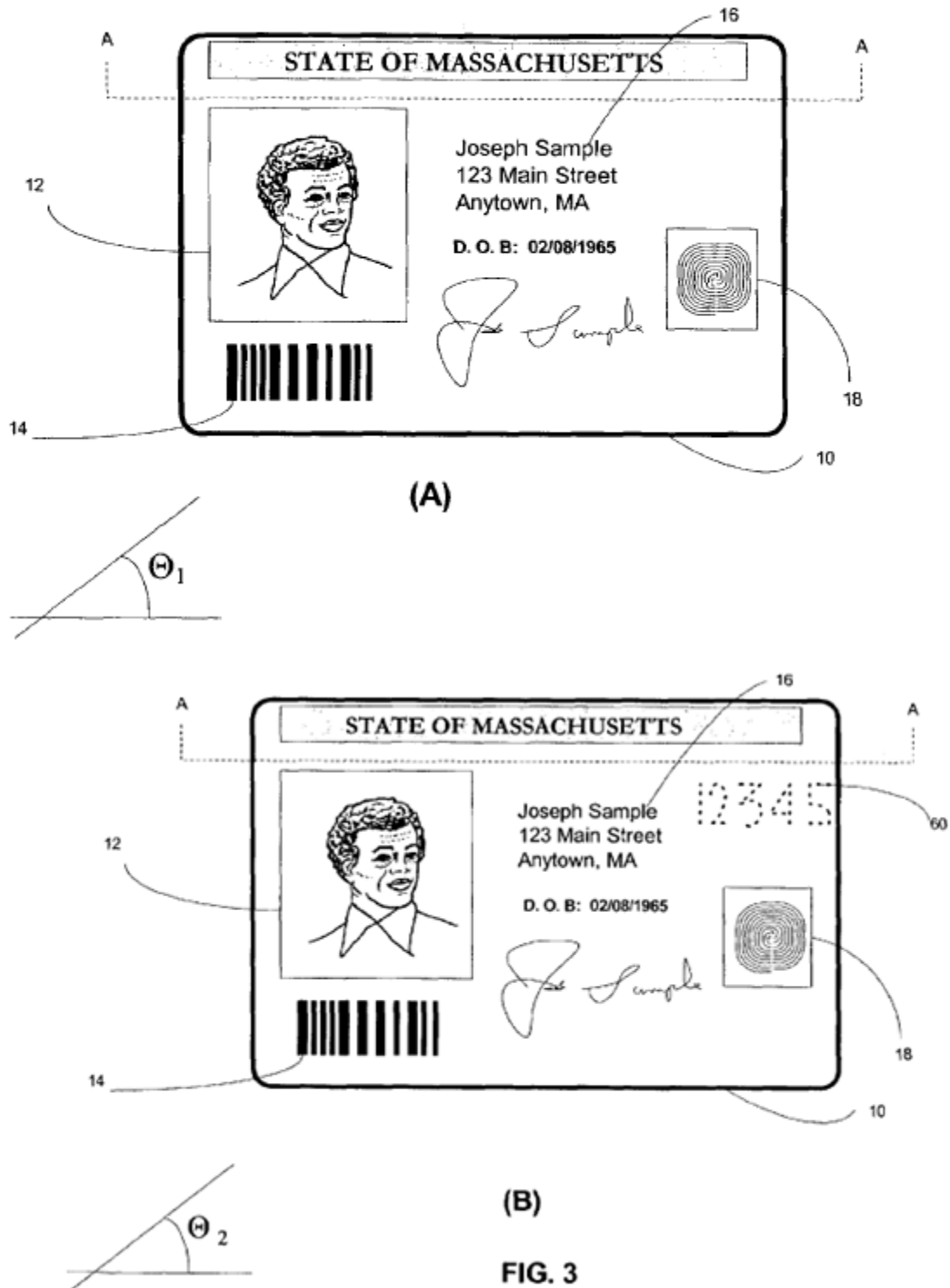
As further background, the ’494 patent states “printing techniques are not the only methods for printing information on . . . ID documents. Laser beams, for example can be used for marking, writing, bar coding, etching, and engraving many different types of materials, including plastics.” *Id.* at

3:58–62. The '494 patent states “[l]asers have been used, for example, to mark plastic materials to create indicia such as bar codes, date codes, part numbers, batch codes, and company logos. Lasers also have been used to engrave or etch very fine patterns into articles that are extremely difficult to replicate.” *Id.* at 3:62–67.

The '494 patent states that using lasers “to write or engrave information to ID cards presents a number of advantages over conventional printing.” *Id.* at 4:24–26. One advantage includes “provid[ing] an indicium having a tactile feel, which is a useful authenticator of a data carrier that also can be very difficult to counterfeit or alter.” *Id.* at 4:26–30. The '494 patent states “the foaming of the thermoplastic that can occur with some types of laser engraving can be adapted to provide . . . [the] tactile feel” noted. *Id.*

Another feature includes “a pattern that can be tactile or non-tactile, but is not readily visible when seen straight on (e.g., the pattern is visible only in low angle reflected light).” *Id.* at 8:42–45. The '494 patent refers to such a pattern as having “an optically variable (OV) quality.” *Id.* at 7:52–8:63; *cf. id.* at 8:48–50 (referring to a “non-OVD [optically variable device] pattern”).

With respect to the OV quality, Figures 3A and 3B, reproduced below, represent “one embodiment of the invention, viewed at first and second angles, respectively.” *Id.* at 4:59–61.



A comparison of Figure 3A to Figure 3B above represents how security feature 60 (12345), created by laser etching, creates an OV pattern that cannot be seen easily when viewed “straight on,” but can be seen at angles tilted relative to the “straight on” angle. *See id.* at 7:59–8:25 (further explaining the viewing angle depends on the angle of the light with the OV quality arising due to laser surfaces created non-parallel to the surface of the card).

Figures 6A of the '494 patent follows:

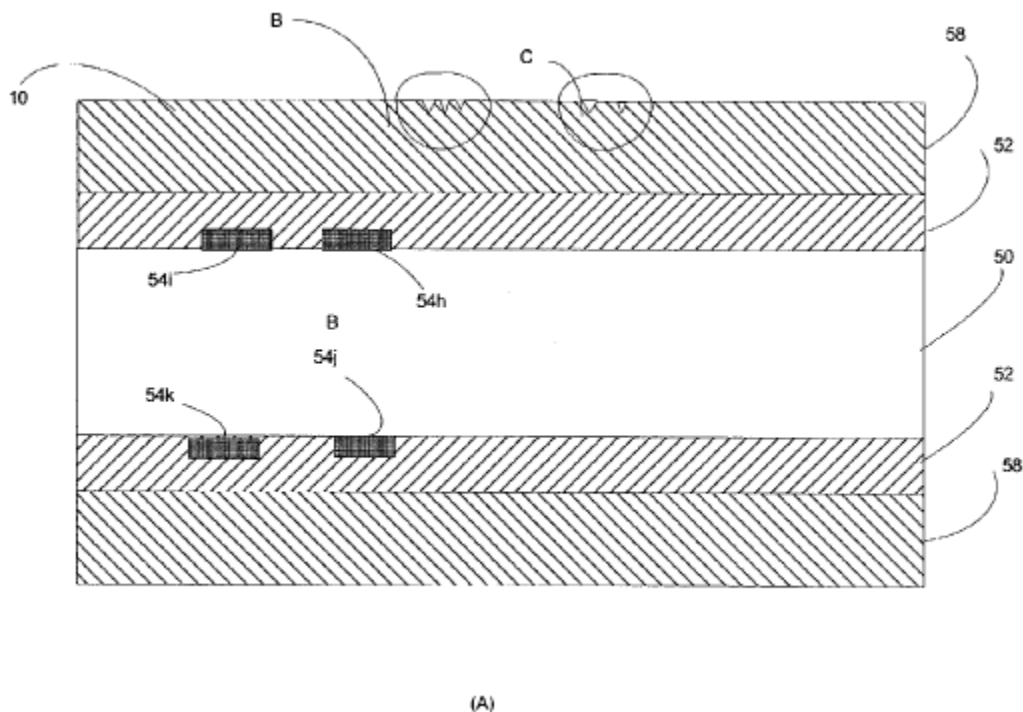


Figure 6A, reproduced above, represents the ID document such as that depicted in Figures 3A–3B having information 54h–l in layer 52 formed between core layer 50 and “overlamine” 58. *Id.* at 8:32–36. Information 54h–l may be formed by “many different types of conventional printing and also laser marking.” *Id.* at 8:37–39.

Figures 6B and 6C of the '494 patent follow:

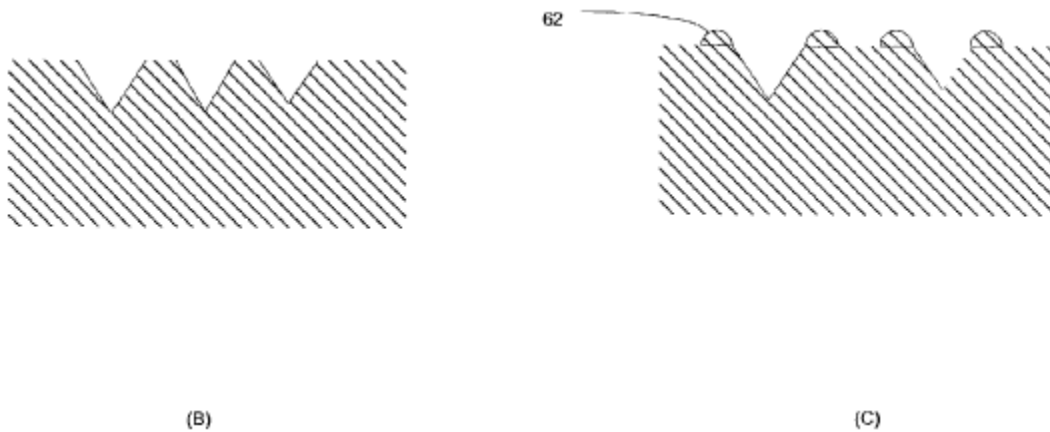


Figure 6B corresponds to “an enlarged view of section B in” Figure 6A, and represents a “non-tactile pattern” created by a laser, which “is not readily visible when seen straight on.” *See id.* at 8:42–47. Figure 6C corresponds to “an enlarged view of section C” in Figure 6A and represents “a tactile pattern with raised edges 62” created by a laser. *See id.* at 8:50–52. The '494 patent Specification describes a “tactile and/or non-OVD pattern” feature that “cannot be photocopied,” and appears to indicate Figure 6C represents such a feature. *See id.* at 8:48–53 (referring to the “alternative embodiment” with the “tactile and/or non-OVD pattern” and then describing “this alternative implementation” with respect to Figure 6C). Referring to Figure 6C, the '494 patent states “[e]ven in this alternative implementation, the feature cannot be photocopied.” *Id.* at 9:52–53.

C. Related Cases

Petitioner identifies the following proceedings involving the '494 patent: *MorphoTrust USA, LLC v. United States of America*, No. 1-16-cv-00227 (Fed. Cl.) (filed Feb. 16, 2016); *MorphoTrust USA, LLC v. CBN Secure Techs, Inc.*, No. 1-16-cv-00323 (E.D.Va.) (filed Mar. 23, 2016). Pet.

57. Petitioner also identifies the following related Patent Trial and Appeal Board (PTAB) Proceedings: *HID Global Corp. v. MorphoTrust USA, LLC*, Case IPR2017-01939 (PTAB Aug. 18, 2017) (challenging claims 1–20 of the '494 patent); *HID Global Corp. v. MorphoTrust USA, LLC*, Cases IPR2017-01940 & 41 (PTAB Aug. 18, 2017) (challenging claims in related patents). *Id.*; *supra* note 1.

D. Illustrative Claims

Challenged dependent claims 2, 3, 6, 8, 10, 12, 16, and 17 depend from one of challenged independent claims 1, 5, 9, 13, and 15. Illustrative independent claims 1, 4, 5, 9, 13, 15, 19, and 20, emphasized to highlight variants of the above-described OV and tactile features, follow:

1. A method of producing a security feature in an identification document comprising: providing a core including a top surface and a bottom surface; laminating a first laminate in contact with the top surface; and laminating a second laminate in contact with the bottom surface, the laminated core comprising the identification document, the identification document having a top side and a bottom side respectively corresponding to the core's top and bottom side, the top side having a top surface; and laser etching a pattern into the top surface of the identification document; wherein the pattern includes visual properties, and *wherein the visual properties comprise a characteristic of not being visible when viewed straight on.*

4. A method of producing a security feature in an identification document comprising: providing a core including a top surface and a bottom surface; laminating a first laminate in contact with the top surface; and laminating a second laminate in contact with the bottom surface, the laminated core comprising the identification document, the identification document having a top side and a bottom side respectively corresponding to the

core's top and bottom side, the top side having a top surface; and laser etching a pattern into the top surface of the identification document; *wherein the pattern comprises an Optically Variable Device (OVD).*

5. An identification document, including a core and at least one outer laminate layer, wherein a top surface of the outer laminate layer is laser-processed to form a pattern, *the pattern being essentially not visible when viewed straight-on.*

7. The document of claim 5, wherein said laser processing also forms a raised feature along at least part of said pattern, said raised feature extending above a nominal top surface level of said outer laminate and providing a tactile effect.

9. An identification document, including a core and at least one outer laminate layer, wherein a top surface of the outer laminate layer is laser-processed to remove material therefrom, a void defined by such removing *having a “V” cross section.*²

13. An identification document, including a core and at least one outer laminate layer, wherein a top surface of the outer laminate layer is laser-processed in a pattern to remove material therefrom, said laser-processing also forming a raised feature along at least part of said pattern, *said raised feature extending above a nominal top surface level of said outer laminate and providing a tactile effect.*

15. An identification document, including a core and at least one outer laminate layer, the document conveying a portrait image, text information, a signature, and a bar code, wherein *a*

² According to the written description, OV patterns and tactile features may arise from “laser etching [that] creates reflecting surfaces that are not parallel to the surface of the document.” Ex. 1001, 7:59–8:5.

top surface of the outer laminate layer is laser-processed to define an optically variable device.

19. An identification document including a core and an output layer of a laminate material, the top surface of the laminate material including a void pattern creating an indicia, the document characterized by raised features along edges of said void pattern, *said features comprising foamed laminate material, the raised features extending above a nominal top surface level of the document to provide a tactile effect that aids in verifying the authenticity of the document.*

20. A method of producing an identification document, the method including laminating an outer layer to a core layer, and laser-processing the outer layer to form a void pattern therein, *the method characterized by foaming said outer layer during said laser processing so as to form a tactile feature adjacent said void pattern, said tactile feature aiding in verifying the authenticity of the document.*³

Ex. 1001, 12:2–14:20.

E. Asserted Grounds of Unpatentability

Petitioner asserts the combination of Maurer⁴ (Ex. 1005), Bernecker⁵ (Ex. 1006), and Fry⁶ (Ex. 1007) would have rendered the subject matter of claims 1–14, 19, and 20 obvious. Pet. 4. Petitioner asserts the combination

³ Claim 20 does not specifically recite a raised tactile feature. The '494 patent states “the foaming of the thermoplastic that can occur with some types of laser engraving can be adapted to provide an indicium having a tactile feel.” Ex. 1001, 4:26–28.

⁴ Maurer et al., U.S. Patent No. 4,544,181 (issued Oct. 1, 1985).

⁵ Bernecker, U.S. Patent No. 5,958,528 (issued Sept. 28, 1999).

⁶ Fry, U.S. Patent No. 3,626,143 (issued Dec. 7, 1971).

of Maurer, Bernecker, Fry, and Gunn⁷ (Ex. 1008) would have rendered the subject matter of claims 15–18 obvious. *Id.*

To support its showing, Petitioner relies on the Declaration of Emmanouil M. Tentzeris, Ph.D. (Ex. 1002), submitted with its Petition, and the Reply Declaration of Emmanouil M. Tentzeris Ph.D. (Ex. 1012) submitted with its Reply. To counter Petitioner’s showing, Patent Owner cites prior art patents (Ex. 2002, Ex. 2003, Ex. 2004, Ex. 2006) and other documents and evidence (Ex. 2005, 2012), and relies on the Declaration of Darran R. Cairns, Ph.D., in Support of Patent Owner’s Response (Ex. 2010), submitted with its Response.

II. ANALYSIS

A. Claim Construction

In an *inter partes* review filed before November 13, 2018, the Board interprets claims of an unexpired patent using the broadest reasonable construction in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b)(2017); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–45 (2016). Under this standard, absent any special definitions, claim terms carry their ordinary and customary meaning, as would be understood by one of ordinary skill in the art, in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Only terms in controversy must be construed and only to the extent necessary to resolve the controversy. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017)

⁷ Gunn et al., U.S. Patent No. 6,066,594 (issued May 23, 2000).

(citing *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

Petitioner “interprets all claim terms for purposes of this review in accordance with their plain and ordinary meaning consistent with the specification.” Pet. 9 (omitted footnote cites Ex. 1002 ¶¶ 35–39, which includes proposed claim constructions in related district court litigation). Patent Owner provides claim constructions for “tactile feature” and “tactile effect,” and also a void having “V” cross section. PO Resp. 11–13. Petitioner submits none of Patent Owner’s proposed claim constructions create a dispositive issue. Reply 25–26. As Petitioner submits, no need exists to provide explicit claim constructions for tactile feature or tactile effect, because no dispute exists over whether the prior art discloses such a feature. *See Vivid Techs.*, 200 F.3d at 803.

Regarding the “V” cross section, which claims 6, 9, 10, and 17 recite, Patent Owner submits “[t]o be ‘V’ shaped, the void must consist of two generally flat sides that begin at the top surface of the card and meet at a single point below the top surface of the card.” PO Resp. 12. Patent Owner relies on Figure 6B of the ’494 patent for this construction. *See id.* at 12.

However, the ’494 patent specifically states

throughout this application, laser engraved indicia, information, identification documents data, etc., *may be shown as having a particular cross sectional shape (e.g., rectangular) but that is provided by way of example and illustration only and is not limiting, nor is the shape intended necessarily to represent the actual resultant cross sectional shape that occurs during laser engraving or manufacturing of identification documents.*

Ex. 1001, 5:9–17 (emphasis added). In other words, the figures do not provide a definition for a specific shape, “nor is the shape intended necessarily to represent the actual resultant cross sectional shape that occurs during laser engraving” (*id.*), contrary to the premise of Patent Owner’s claim construction argument. Claim 9 recites a “‘V’ cross section,” and claim 10 depends from claim 9 and further defines the “‘V’ cross section” as “defined by two intersecting surfaces, neither of which is parallel to the top surface of the outer laminate.” Claim 10 does not require the “V” shape to begin at two generally flat sides, but it does require an intersection.

Nothing in the ’494 patent requires a “V” shape to begin at two generally flat sides. Even if it does, the outcome would not change, because the prior art (i.e., Bernecker) discloses or at least suggests such a feature, as found and determined below. Therefore, no need exists to further define or construe the term. *See Vivid Techs.*, 200 F.3d at 803.

B. Level of Ordinary Skill in the Art

Petitioner, citing the testimony of its declarant, Dr. Tentzeris, asserts that a person having ordinary skill in the art of the alleged invention “would have held *at least* a bachelor’s degree in engineering or physics and at least one year of relevant work experience in either one of the fields of laser processing or security features for identity documents.” Pet. 9 (citing Ex. 1002 ¶¶ 31–34) (emphasis added). Petitioner also asserts that “[t]his is the level of ordinary skill offered by” Patent Owner’s expert (Henry Dreifus) in the Federal Court of Claims related matter. *Id.* (citing Ex. 1010, 7). In the cited exhibit, Mr. Dreifus states that a person of ordinary skill in the art “would have had a Bachelor’s degree in engineering or physics and at least

one year of relevant work experience in either one of the fields of laser processing or security features for identity documents.” Ex. 1010 ¶ 23.

With one minor exception, Patent Owner and Dr. Cairns essentially agree with Petitioner’s contention regarding the level of ordinary skill. PO Resp. 31. For example, Patent Owner contends that a person of ordinary skill in the art would have had “a [B]achelor’s degree in engineering or physics and at least one year of relevant work experience in either one of the fields of laser processing or security features for identity documents.” *Id.* (citing Ex. 2010 ¶ 27).

Petitioner’s addition of “at least” to the educational background constitutes the only difference between Petitioner’s and Patent Owner’s proposals. As noted above, however, Petitioner also asserts that its proposal tracks Patent Owner’s proposal in the Federal Court of Claims litigation, which did not include the qualifier “at least” for the educational background. The parties do not argue that any issue in the case turns on such a difference. The challenged patent and the asserted prior art reveal a level of ordinary skill in the art that supports Patent Owner’s proposal, which we adopt.

C. Obviousness Grounds of Unpatentability

As indicated above, Petitioner asserts the combination of Maurer, Bernecker, and Fry would have rendered obvious the subject matter of claims 1–14, 19, and 20, and the combination of Maurer, Bernecker, Fry, and Gunn would have rendered obvious the subject matter of claims 15–18. Pet. 4.

1. Overview of Maurer

Maurer discloses using a laser to create a “multi-layered identification card comprising a card core laminated between cover sheets with user information appearing in the card inlet.” Ex. 1005, [57]. Maurer describes “an underlying, basic need” to protect identification cards “as far as conceivably possible from being forged and/or counterfeited in entirety.” *Id.* at 1:13–16. Maurer explains that a “polylaminated identification card has proved to be valuable” in combating forgery (*id.* at 2:10–11), and that using a laser to mark a core of a laminated card “protect[s] it from manipulation or tampering to a far greater extent than with unlaminated card cores, should they fall into the wrong hands” (*id.* at 4:19–24).

Maurer discloses “inscrib[ing] individual features, in particular personal data, in the interior of [the] card after lamination of the card blank.” *Id.* at 4:5–7. Scoring the core also etches the outer lamination layer to create “a relief-type structure on the cover sheet”: “At the same time as the information is provided on the core of the card by means of the laser beam, it is possible to concurrently mark the cover sheet which is then accessible to manual inspection by virtue of the resultant, permanent relief-type structure *on the cover sheet.*” *Id.* at 4:25–30 (emphasis added). Maurer explains that by controlling the energy of the laser beam to engrave a security feature, it “can . . . be felt manually.” *Id.* at 6:14–23; *id.* at 9:8–11 (claim 3 reciting “[a] multilayer identification card according to claim 1 in which the information on said transparent cover sheet is in relief and can be sensed by touch”) (emphasis added).

Figures 1 and 2 of Maurer appear below:

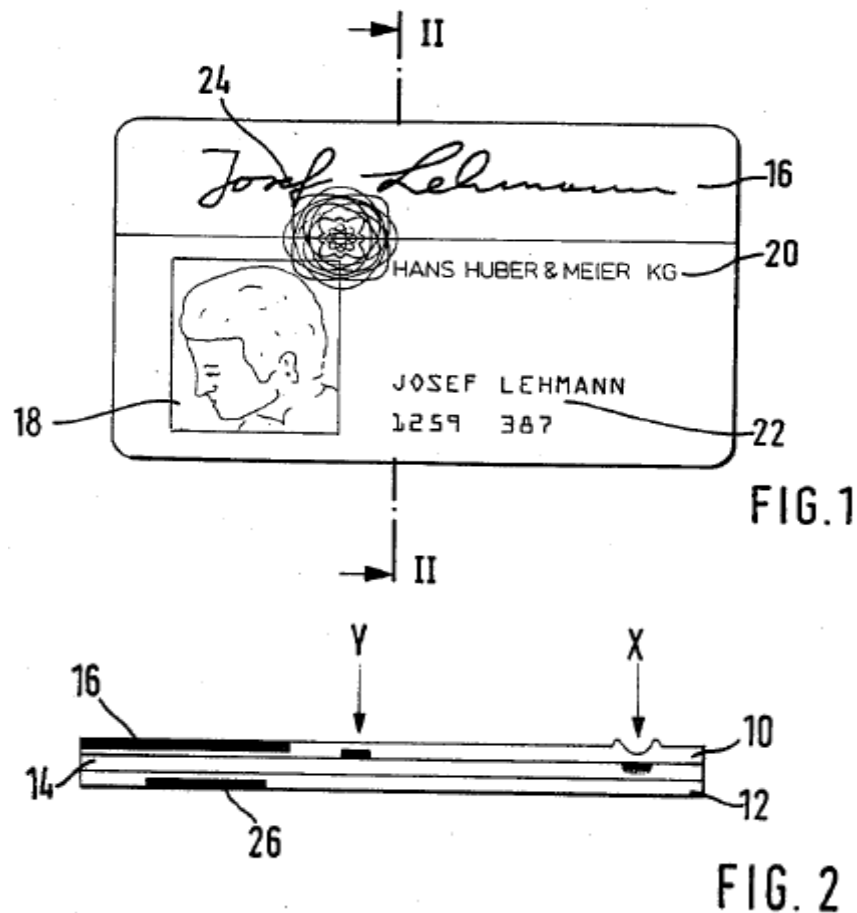


Figure 2 represents a cross-section of the security card depicted in Figure 1, and shows an example of a tactile security feature at area X on transparent cover 10. *See id.* at 6:18–23 (“Depending on the energy quantum of this laser beam, the upper cover sheet 10 can be melted concurrently in such a way that a relief is formed above the line of printed information, and in register therewith which can also be felt manually. An example is indicated by arrow X.”). Maurer describes as its “invention,” “information which can be perceived visually through said transparent cover sheet.” *Id.* at 1:9–10. This indicates a transparent depression and relief. *See id.*, Fig. 2.

The laser can cause the core to change colors (depending on the material coating the core) or to blacken/burn, thereby enhancing the ability to see the information and/or pattern (with some of the blackened information/pattern being in register with the tactile relief created by the laser melting through upper cover sheet 10). *See id.* at 6:14–31 (describing burning “alphanumeric indicia are printed on the card core 14” such as data strips 20 and 22 in register at X, and describing background pattern 24 as a different color from that of “burned-in indicia in the data strips 20 and 22”). Maurer notes that “the extent to which the core is burned [is] adjustable in a simple manner.” *Id.* at 4:39–40.

Maurer explains “[i]t is known in principle (German patent specification No. 1,499,422) to use the energy of laser beams to evaporate or even burn materials which absorb this energy.” *Id.* at 3:57–59. Maurer discloses “employing a number of different techniques” in order to safeguard cards (*id.* at 1:26–27), noting that multiple known techniques enhance security in part because “the amount of time and energy expended in counterfeiting or forging the document exceeds by far the gains which can be expected” (*id.* at 1:44–49). Maurer also discloses “other features not shown here may also be provided by means of the laser beam without departing from the scope of the invention.” *Id.* at 7:1–3. On the other hand, Maurer discloses that “the identification card does not have to contain all of the information and features mentioned.” *Id.* at 8:47–49.

2. Overview of Fry

Fry teaches “[a] process for grooving thermoplastic sheet[s] with a laser beam.” Ex. 1007, 1:69–70. Fry states “[w]hen a groove or score is

accomplished successfully, a bead is formed on both edges of the groove. The appearance of the groove is generally neat and regular, when accompanied by a bead.” *Id.* at 3:60–63.

Figure 2 of Fry follows:

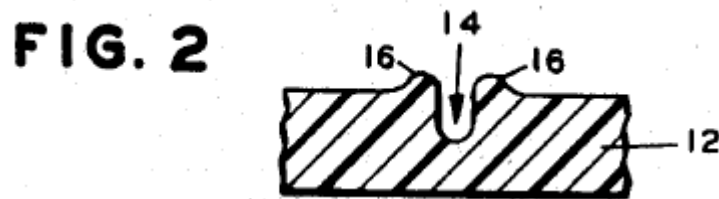


Figure 2 above shows bead 16 formed adjacent groove 14 produced by a laser in plastic substrate 12. *See id.* at 2:69–75. Fry explains “[f]airly large bubbles result in [the] process [of forming the groove], and microscopic examination reveals that the bubbles are formed only on the film side facing the [laser] beam.” *Id.* at 4:30–32. Fry generally explains “the energy density in the laser beam must be such that the plastic is evaporated or decomposed” (*id.* at 4:8–9), but the groove 14 “has a neat and clean surface, remaining unscorched after the scoring process has ended” (*id.* at 2:74–75). Fry also describes “the plastic material [a]s molten.” *Id.* at 4:24.

Bubbles released during the process form part of beads 16. *See id.* at 3:63–65. Fry explains “[i]n polyethylene, bubble formation occurs before the formation of the groove and not thereafter.” *Id.* at 4:52–53. Fry also explains “it is apparent that the groove is formed from the bubbles” (*id.* at 4:33–34), and states “[m]icroscopic examination of the grooves . . . reveals

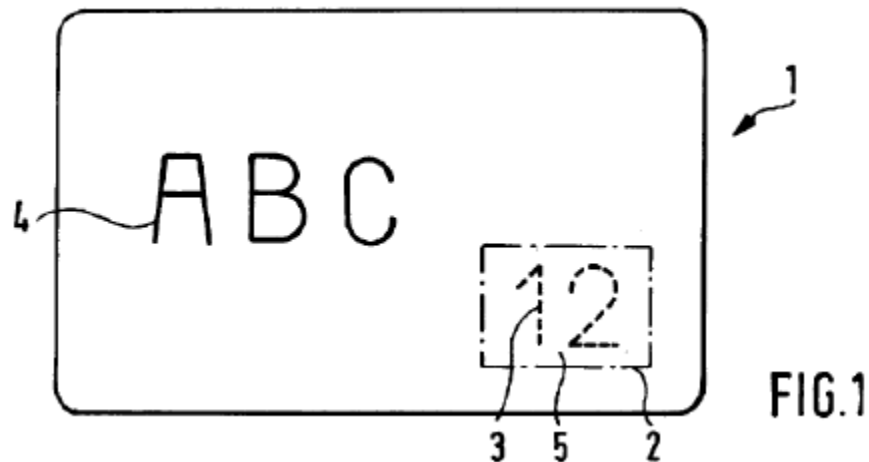
the presence of small bubbles in the beads formed on the sides of the grooves” (*id.* at 3:63–65).

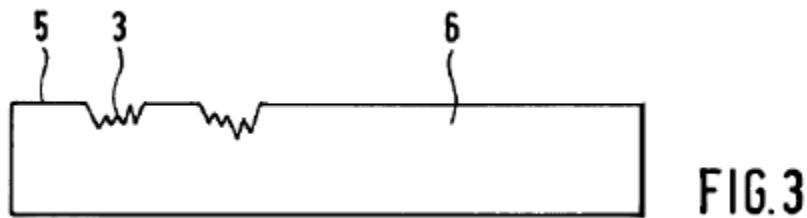
Fry discloses two possibilities for bubble formation: 1) “the release of entrained gases or water vapor from the plastics in the molten region, with the bubbles forming due to pressure buildup or release of these gases,” or 2) “the internal temperature of the plastics may exceed the point at which the material degrades, and thereby result in the formation of small gaseous molecules.” *Id.* at 4:43–47.

3. Overview of Bernecker

Bernecker discloses providing laser-produced credit cards, ID cards, and other cards with “an authenticity feature that is neither manipulable nor copiable” and “stand[s] out clearly only when viewed at the glancing angle.” Ex. 1006, 2:9–22.

Bernecker’s Figures 1 and 3 follow:





Figures 1 and 3 represent card embodiments having information areas 3 “which show readable information or a pattern or the like” with “diffusely light-scattering properties which make it possible to recognize the information clearly at a certain viewing angle.” *Id.* at 4:40–49. Figure 1 also represents a display of “usual information 4” in “color contrast” with its background. *See id.* at 4:41–42.

With respect to laser-notched information areas including areas 3, Bernecker generally states “the material in the radiation-exposed areas is melted and partly decomposed, giving rise to notches without color changes of the plastic.” *Id.* at 4:8–10. Bernecker refers to “evaporated” “plastic material” to create “depressions . . . in the form of readable information.” *Id.* at 3:15–17. Bernecker also explains that a notched area, viewable at glancing areas, “offers a simple possibility for designing data to be very inconspicuous” as a “protection against forgery,” and “in any case readily recognizable at the glancing angle.” *Id.* at 4:20–28. Bernecker also describes its invention as “a method for producing . . . an authenticity feature that is neither manipulable nor copiable and can be produced simply and cost effectively on the finished product.” *Id.* at 2:10–13. Bernecker explains the “optical scattering behavior” of the notches “cannot be recognized with the illuminating methods customarily used in reproduction devices.” *Id.* at 3:9–11.

Bernecker also indicates the laser-notched area can be colored or discolored. For example, Bernecker describes creating “notches without color changes of the plastic.” *Id.* at 4:9–10. Bernecker states this notched “information . . . without color contrast is added to” other data “already inscribed in color contrast by a laser.” *Id.* at 3:49–58. Color contrast information may include “photo, name, signature, etc.” *See id.* at 3:52–57. Bernecker notes “[u]sing a power-controllable laser it is therefore possible to produce halftone images.” *Id.* at 4:3–4. By shifting the focus of the laser beam to the surface, this “give[s] rises to notches without color changes of the plastic.” *Id.* at 4:9–10. Bernecker indicates it can create surface notches with or without color changes: “Alternatively, the material can also be melted in the surface area without any discoloration of the material occurring.” *Id.* at 5:9–10 (describing Figure 3).

Bernecker further states “[i]t is known from the field of contrasting laser inscription that discoloration occur only as of a certain laser power, becomes stronger as the laser power increases further, and finally leads to complete burning of the material.” *Id.* at 3:66–4:3. Bernecker adds that controlled power and focus creates halftone images and focusing the laser on the “surface area of the material” produces colorless notches in the plastic. *Id.* at 3:66–4:10. Bernecker further notes its invention builds on prior art anti-forgery efforts “developed exclusively from the point of view of producing clearly readable information contrasting with its surroundings in the form of discolorations of the material.” *See id.* at 2:33–34. Bernecker states its cards “can of course also have further security features.” *Id.* at 4:50–51.

4. Overview of Gunn

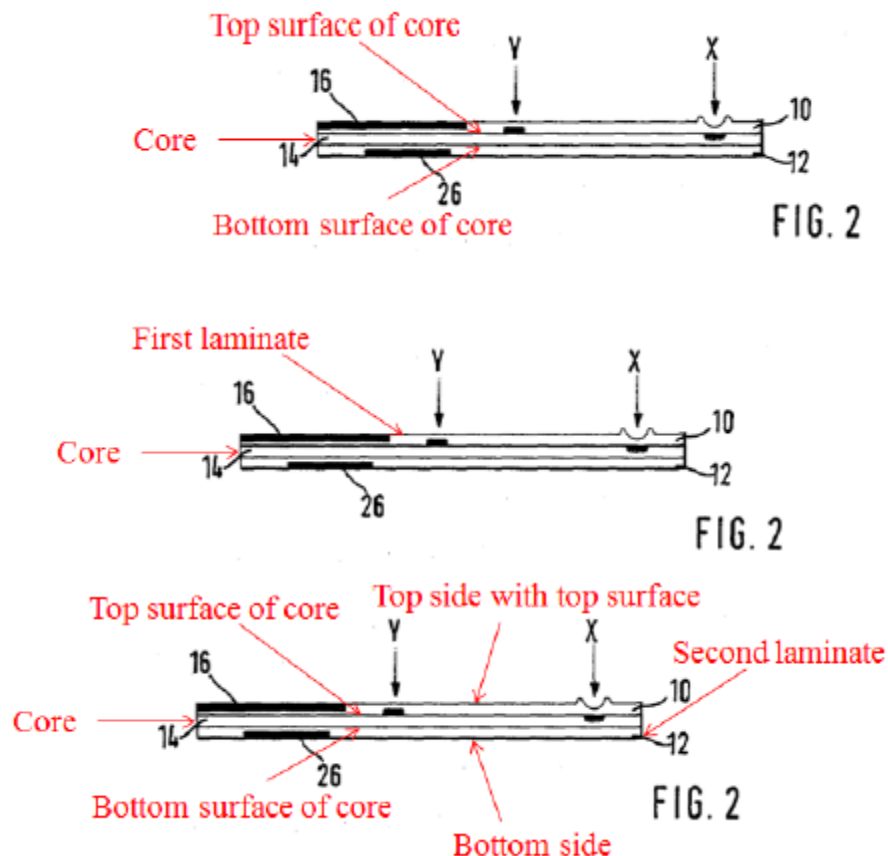
Gunn generally discloses identification documents that include a core layer sandwiched between two transparent polymer layers. Ex. 1008, [57]. Similar to the '494 patent (*supra* Section I.A), Gunn explains that such identification documents, including driving licenses, credit cards, bank cards, and other cards, bear important information including “name, address, birth date, signature[,] and photographic image,” and also including other “variant” data (e.g., employee number) and “invariant” data with respect to a large number of cards (e.g., employer name). *Id.* at 1:10–22.⁸

Gunn discloses bar codes, explaining “the identification [data] of the bearer are often covertly repeated on the document in encrypted form for data verification in a magnetic stripe, bar code, radio frequency module[,] or integrated circuit chip.” *Id.* at 2:4–8. Gunn adds “it is often convenient to provide one or more first indicia intended for human reading of the core layer [front] surface . . . and one or more additional first indicia intended for machine reading (e.g., bar codes) on the opposed ‘back’ surface of the core layer.” *Id.* at 3:19–25.

⁸ The '494 patent states the “present invention is also related to” several applications and Gunn, all of which the '494 patent incorporates by reference. See Ex. 1001, 2:22–29. No dispute exists over whether Gunn, which issued May 23, 2000, constitutes prior art to the '494 patent (which would have an earliest possible effective filing date of December 24, 2001, based on continuity to a provisional application). See *id.* at [60].

5. Analysis of claims 1–14, 19, and 20

Petitioner contends the combination of Maurer, Bernecker, and Fry would have rendered obvious the subject matter of claims 1–14, 19, and 20 obvious. Pet. 17–52. Petitioner reads most of the method steps of claim 1 primarily on the Maurer’s method of producing a security feature in a card comprised of a laminated core. See Pet. 25–30. As an aid to demonstrating how Maurer teaches the core providing and laminating steps of claim 1, Petitioner annotates Maurer’s Figure 2 a number of times, as reproduced below:



Id. at 26–28 (citing Ex. 1005, Abstract, 4:19–30, 5:38–41, Fig. 2; Ex. 1002

¶¶ 145–148). Maurer’s Figure 2, as annotated by Petitioner and reproduced above, reveals card core 14 laminated by first 10 and second 12 laminates, etched with a tactile security feature at location X. *See id.* at 19 (discussing Maurer’s transparent relief structure X); 26–27 (citing Ex. 1005, 5:38–41).

Petitioner contends the combination of Maurer and Bernecker teaches or suggests the laser etching step and wherein clause of claim 1: “laser etching a pattern into the top surface of the identification document; wherein the pattern includes visual properties, and wherein the visual properties comprise a characteristic of not being visible when viewed straight on.” *Id.* at 28–30. Petitioner contends Fry generally shows “creating such a security feature would have been well within the skill of a” person of ordinary skill in the art. *See id.* at 24–25.

Petitioner relies on Bernecker’s OV notched patterns, created by a laser, and contends it would have been obvious to include such notches on the top layer of Maurer’s similar card, in order to provide additional security features not subject to tampering or manipulation. *See id.* at 29 (citing Ex. 1006, 3:13–17, 4:40–49; Ex. 1002 ¶ 149; Pet. Section VII.B.1). Further addressing motivation, Petitioner relies on “the reasons stated . . . in Section VII.B.1” of its Petition. *Id.* In the cited section, Petitioner explains the combination of Maurer and Bernecker suggest using a laser to create at least two properties in order to provide better security for the card, the raised tactile feel feature disclosed by Maurer, and the OV feature disclosed by Bernecker. *See id.* at 18 (citing Ex. 1002 ¶¶ 129–143; Ex. 1006, 4:50–51; quoting Ex. 1005, 1:26–29 (stating “cards ‘can be safeguarded by a number of different measures and by employing a number of different

techniques”’)). Petitioner also relies on motivation supplied by Bernecker, which states colorless engraving “permit[s] a quick comparison of the two pieces of information.” *Id.* at 19 (quoting Ex. 1006, 3:18–26). Petitioner also contends it would have been obvious to employ Bernecker’s OV feature combined with Maurer’s raised colorless feature over colored and/or colorless areas, to create a raised OV tactile area, thereby providing the benefits advanced by Maurer and Bernecker—i.e., creating a card that would be difficult to manipulate or copy due to the touted features. *See id.* at 18–22 (citing Ex. 1002 ¶ 133; Ex. 1006, 2:9–13, 2:16–25, 2:53–56).

To address the challenged claims, Petitioner refers to the “combined security feature.” Pet. 22. Petitioner persuasively contends

[i]t would have been a straightforward and obvious design choice to implement a laminated identification document with a security feature that has both (1) a tactile/raised relief and (2) an optically variable feature that is visible only at a glancing angle to provide the desired benefits of tactility and resistance to copying, as disclosed by *Maurer* and *Bernecker* respectively. Ex. 1002, ¶132. And it would have been clear to a POSITA that such a combination would work and provide the expected functionality. *Id.*

Pet. 20–21; *accord. id.* at 1–3, 18. Petitioner argues persuasively that “the proposed single combined security feature” would render challenged claims 1–6, 8–10, 12–13, 16, and 19–20 obvious, even though some of the challenged claims only require “one (but not both) of the visual or tactile effects of the combined feature.” Pet. 8.⁹

⁹ For example, claim 1 does not recite a raised feature, but recites “wherein

Petitioner persuasively points out retaining Maurer’s raised feature, which claim 1 does not require and claims 7, 11, 13, and 19 do require, further allows information to be sensed by touch. *Id.* at 19 (citing Ex. 1005, 6:18–23 (claims 1 and 3 of Maurer)). Petitioner further explains persuasively that employing Bernecker’s and Maurer’s engraving features, over a colorless area, would have been obvious, because Maurer describes a tactile feel benefit via a colorless top layer portion, and Bernecker explicitly discloses a colorless feature “cannot be recognized by reflected light and appears only at the glancing angle.” *See id.* at 20 (quoting Ex. 1006, 2:63–65; citing Ex. 1002 ¶¶ 131–132); *see also id.* at 21–22 (explaining the “combined security feature” would have created an obvious result of “both a tactile and visual effect” that would be “neither manipulable nor copiable”; citing Ex. 1002 ¶¶ 133–134), 23–25 (further addressing the combination as being well within the skill level of an ordinary artisan regardless of whether Maurer or Bernecker constitutes the “primary” reference).

In general and by way of summary regarding motivation, Petitioner asserts “[u]sing a laser to create features that include *both* such [tactile and

the visual properties comprise a characteristic of not being visible when viewed straight on.” As another example, claim 14 recites separate OV and raised features on the card. Claim 14 depends from claim 13. Claim 13 recites “wherein a top surface of the outer laminate layer is laser-processed in a pattern to remove material therefrom, said laser-processing also forming a raised feature along at least part of said pattern,” and claim 14 recites “wherein said laser processing also defines an optically variable device.” But claim 14 does not require “said laser processing” to create optically variable features along the same pattern as recited in claim 13. In both cases, the combine security feature satisfies the claims.

OV] properties—rather than only one of the two properties—was both obvious and well within the skill of a [person of ordinary skill in the art]” in order to enhance the security features of a simple card. *See id.* at 18 (citing Ex. 1002 ¶ 129). Similarly, Petitioner generally asserts “a [person of ordinary skill in the art] would have appreciated that multiple security features were desirable and would have selected [known] security features” to enhance the security of a card. *Id.* (citing Ex. 1002 ¶ 129). Petitioner also generally contends Fry discloses specifics about how to score thermoplastics commonly used in ID cards without scorching or discoloration, and that it would have been obvious to employ Fry’s technique to create grooves, resulting in a card with combined security features as Maurer and Bernecker suggest. *See id.* at 23. As noted above (Section II.C.2), Fry states “[w]hen a groove or score is accomplished successfully, a bead is formed on both edges of the groove. The appearance of the groove is generally neat and regular, when accompanied by a bead.” Ex. 1007, 3:60–63. Therefore, as Petitioner argues, Fry suggests specifics about how to form a neat groove with adjacent beads, which would have aided Maurer’s ID card in forming grooves for reading information as Bernecker suggests, and/or providing a ready tactile feel via beads and grooves and providing authenticity, *See id.*; Ex. 1005, Fig. 2, Ex. 1006, Figs. 1, 3.

In other words, Petitioner proposes maintaining Maurer’s raised tactile pattern with underlying blackened printing areas and also to form, in colorless areas of the card, a combined raised tactile OV pattern with clear features, as Bernecker, Fry, and Maurer suggest. This combination retains Maurer’s features at some card areas and combines Maurer’s raised colorless

features with Bernecker's OV features at adjacent card areas as desired for enhancing card authenticity and preventing forgery. *See, e.g.*, Pet. 17–18 (generally contending it would have been obvious to provide “multiple security features” (citing Ex. 1002 ¶¶ 129–143; Ex. 1005, 1:26–29; Ex. 1006, 4:50–51)); 26–28 (annotating Ex. 1005, Fig. 2, generally proposing keeping Maurer's laminated core card features at some printed card areas X), 29–30 (modifying portions of Maurer laminated card with Bernecker's OV features).

Claim 2 depends from claim 1 and recites “visual properties” that “resist[] image capture.” Claim 3 depends from claim 2 and recites “the image capture is one of photocopying and optical sensor capture.” Petitioner persuasively relies on similar showings for these claims. *See* Pet. 31–32. For example, Petitioner persuasively relies on Bernecker's “security feature that solves the problem of ‘scanners [and] color copiers’ by being ‘neither manipulable *nor copiable*’ and ‘cannot be recognized with the illuminating methods customarily used in reproduction devices.’” *Id.* at 32 (quoting Ex. 1007, 2:9–13, 3:9–12). Petitioner persuasively contends “[a] POSITA would have thus understood the combined security feature to resist image capture from photocopying and optical sensor capture.” *Id.* (citing Ex. 1002 ¶ 152).

Claim 4 recites limitations similar to those of claim 1, with differences in the “wherein” clause: i.e., claim 4 reciting “wherein the pattern comprises an Optically Variable Device (OVD)” (instead of reciting “wherein the pattern includes visual properties, and wherein the visual properties comprise a characteristic of not being visible when viewed straight on”).

See id. at 32–33 (noting similarities and differences between claims 1 and 4). Claim 5 also tracks most of the features of claim 1, albeit in a product-by-process format: “An identification document, including a core and at least one outer laminate layer, wherein a top surface of the outer laminate layer is laser-processed to form a pattern, *the pattern being essentially not visible when viewed straight-on.*” Claim 7 depends from claim 5, and recites “[t]he document of claim 5, wherein said laser processing also forms a raised feature along at least part of said pattern, said raised feature extending above a nominal top surface level of said outer laminate and providing a tactile effect.” Petitioner’s persuasive showing with respect to claims 4, 5, and 7 tracks its persuasive showing summarized above with respect to claim 1, as it relies on the combined security feature. *See* Pet. 32–35, 37–38.

For example, regarding claim 5, similar to its showing with respect to claims 1 and 4, Petitioner contends that combining Bernecker’s OV feature and Maurer’s raised tactile and laminated core features, further in light of Fry’s techniques, would have suggested and resulted in a card having additional security features, including being visible only at a glancing angle, with such additional features added to produce a card protected “from manipulation or tampering.” *See id.* at 34 (citing Pet. Section VII.B.1; Ex. 1002 ¶¶ 157–158).

Petitioner persuasively shows that the combined feature resists copying, enhances security, and provides ready recognition of the card. *See* Pet. 20–21. Attempting to forge an ID card having the combination of Maurer’s raised features with Bernecker’s OV features, in color and non-colored areas would have required more effort than separately copying one

feature or the other, further thwarting forgery as Maurer explains. *See supra* Section II.C.1 (citing Ex. 1005 for its teaching of “employing a number of different techniques” in order to safeguard cards (*id.* at 1:26–27), noting that multiple known techniques enhance security in part because “the amount of time and energy expended in counterfeiting or forging the document exceeds by far the gains which can be expected” (*id.* at 1:44–49)); Pet. 18–25.

Claim 6 recites “[t]he document of claim 5, wherein said laser-processing removes material from the laminate and defines at least one void having a ‘V’ cross section.” Claim 9 recites a similar “V” shaped limitation: “[a]n identification document, including a core and at least one outer laminate layer, wherein a top surface of the outer laminate layer is laser-processed to remove material therefrom, a void defined by such removing having a ‘V’ cross section.”

Persuasively addressing claim 6, Petitioner contends Maurer, Fry and Bernecker disclose similar laser processes for forming voids, Bernecker and Fry refer to evaporating or melting plastic to make voids, and Bernecker discloses removing plastic, including by evaporating it, and making notches that appear as “V” shaped cross-sections. *See* Pet. 35–36 (citing Ex. 1005, 6:18–23; Ex. 1006, 2:22–25, 3:13–17; Ex. 1007, 4:6–12). Petitioner adds it would have been obvious in view of Bernecker to form “V” shaped notches, where Figure 3 of Bernecker depicts what appear to be V-shaped notches, and Bernecker describes the shapes as retaining different light-scattering properties—i.e., providing the desired OV light-scattering qualities of Bernecker. *See* Ex. 1007, 3:57–63, 4:20–28; Pet. 36–37 (citing Ex. 1002 ¶ 162; annotating Ex. 1006, Figure 3).

Bernecker describes its OV feature referenced in Figure 3 as “notches without color changes of the plastic.” Ex. 1006, 4:9–10. At the time of the invention, the term “notch” ordinarily meant “[a] V-shaped cut.” Ex. 3001; Inst. Dec. 27 n.7 (citing same dictionary definition).¹⁰ As noted above, Bernecker discloses that the OV feature in a card “offers a simple possibility for designing data to be very inconspicuous” as a “protection against forgery,” and “in any case [the card would be] readily recognizable at the glancing angle.” Ex. 1006, 4:20–28.

Petitioner also persuasively relies on its claim 5 and 6 showing and disclosures in Bernecker to address the similar “V” shaped void features recited in claim 9. Pet. 39–40. Claim 10, which depends from claim 9, recites specific features of a “V” shape (i.e., intersecting surfaces). Petitioner’s showing for claim 10 tracks its persuasive showing with respect to claims 6 and 9, with Petitioner persuasively asserting that Figure 3 of Bernecker portrays a “cross section . . . defined by two intersecting surfaces, neither of which is parallel to the top surface of the outer laminate.” *See id.* at 40–41 (citing Ex. 1002 ¶ 166); 35–37 (discussing motivation to employ Bernecker’s OV feature, which also applies, *inter alia*, to claims 9 and 10).

Claim 11 depends from claim 9, and further recites “wherein said laser processing also forms a raised feature, said raised feature extending above a nominal top surface level of said outer laminate and providing a tactile effect.” Petitioner persuasively relies on the combined teachings of

¹⁰ WEBSTER’S II NEW RIVERSIDE DICTIONARY 804 (1984).

Maurer, Bernecker, and Fry, and the motivation noted above with respect to claims 1, 4, and 5, as teaching a combined security feature having raised features and OV features. *See id.* at 41.

Claim 20, a method claim, recites “laser-processing the outer layer to form a void pattern therein . . . the method characterized by foaming said outer layer during said laser processing . . . so as to form a tactile feature adjacent [to] said void pattern, said tactile feature aiding in verifying the authenticity of the document.”¹¹ Petitioner persuasively relies on bubbling in Fry’s plastic, as further suggested by the same or similar laser process in Maurer as modified by Bernecker, to constitute at least a suggestion of forming a raised colorless tactile feature using foaming during laser processing. *See* Pet. 49–52. As indicated above, claims 7, 13, 19, and 20 claim similar raised features, with claim 7 also reciting an OV feature through its dependency with claim 5. Petitioner sets forth a persuasive showing for each of these claims, relying on the combined security feature. *See* Pet. 37–38, 42–52 (addressing similar features).

Claims 8, 12–14, and 19 recite features similar to one or more of the features in the claims summarized above (i.e., the OV feature (which resists image capture), the raised tactile feature, and/or the V-shaped feature (an OV feature)). For all of the claims, Petitioner persuasively relies on the same or similar motivation as outlined above with respect to claims 1, 4, and

¹¹ Claim 20 does not specifically recite a raised tactile feature. The ’494 patent states “the foaming of the thermoplastic that can occur with some types of laser engraving can be adapted to provide an indicium having a tactile feel.” Ex. 1001, 4:26–28.

5 and as set forth at Section VII.B.1 of the Petition. *See id.* 17–24 (Petitioner Section VII.B.1), 38–39 (addressing claim 8), 42–49 (addressing claims 12–14, and 19, citing Section VII.B.1, contending *inter alia*, that it would have been obvious to provide a tactile OV combined feature to provide ready manual inspection and authenticity). Petitioner persuasively contends it would have been obvious to retain most or all of Maurer’s features and also to provide Bernecker’s OV feature with Maurer’s raised colorless features over colorless areas, as desired, in order to better protect a card from forgery, manipulation, and to see the card at different angles for authenticity. *See, e.g.*, Pet. 17–25, 37–39, 42–49.

The record shows that attempting to forge an ID card having the combination of Maurer’s features with Bernecker’s OV features would have required more effort than copying a simpler card with fewer features, as Maurer explains. *See supra* Section II.C.1 (citing Ex. 1005 for its teaching of “employing a number of different techniques” in order to safeguard cards (*id.* at 1:26–27), noting that multiple known techniques enhance security in part because “the amount of time and energy expended in counterfeiting or forging the document exceeds by far the gains which can be expected” (*id.* at 1:44–49)). In other words, the combined card would have provided additional security features relative to a simpler card, thereby providing resistance to manipulation and forgery, including via photocopying.

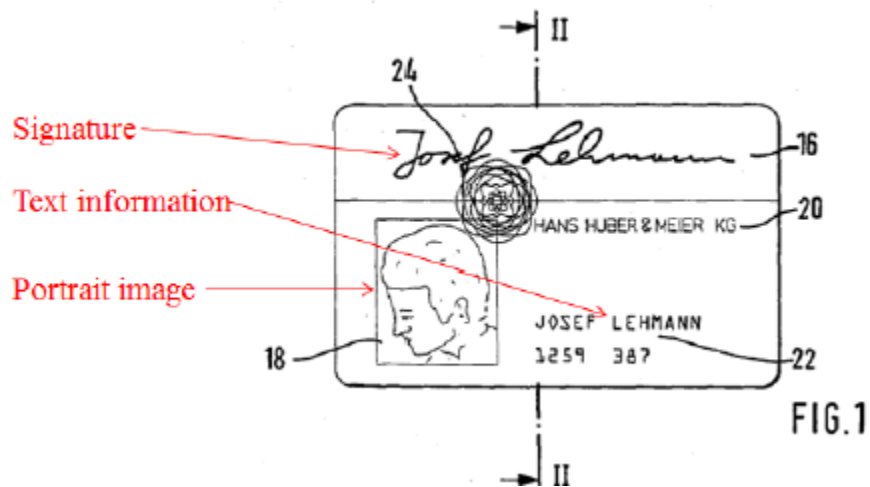
In summary, Petitioner prevents a detailed and persuasive showing supported by rational underpinning regarding challenged claims 1–14, 19, and 20. *See* Pet. 17–52. Based on the foregoing discussion and review of the record, Petitioner persuasively shows that the combination of Maurer,

Bernecker, and Fry would have rendered the subject matter of claims 1–14, 19, and 20 obvious. Patent Owner’s arguments, addressed below, do not undermine Petitioner’s persuasive showing.

6. Analysis of claims 15–18

Petitioner contends the combination of Maurer, Bernecker, Fry, and Gunn would have rendered obvious the subject matter of claims 15–18. Pet. 52–63. Petitioner persuasively reads claim 15’s first clause, “[a]n identification document, including a core and at least one outer laminate layer,” onto “[Maurer’s] multi-layered identification card comprising a card core laminated between cover sheets with user information appearing on the card inlet” (Ex. 1005, [57]). Pet. 55 (citing Ex. 1005, [57]; Ex. 1002 ¶¶ 195–196). Claim 15 also requires “the document conveying a portrait image, text information, a signature, and a bar code, wherein a top surface of the outer laminate layer is laser-processed to define an optically variable device.”

In addition to arguing prior art Figure 1 of the ’494 patent admits many of the recited features (with the exception of the OV feature) were known (*see* Pet. 57), Petitioner cites and annotates Maurer’s Figure 1, as follows:



Pet. 57. As Petitioner’s annotations show above, Maurer’s Figure 1 depicts portrait image 18, text information at areas 20 and 22, and signature area 16. *Id.* at 57–58 (citing Ex. 1005, 5:38–55). Petitioner points to similar features in Bernecker and Gunn. *See id.* at 58.

To address the recited OV feature, Petitioner persuasively relies partly on its showing and rationale discussed above in connection with claim 5, contending it would have been obvious to employ Bernecker’s security feature of rendering a card viewable at an angle for the purpose of keeping the card difficult to forge while providing the benefits of Maurer’s tactile features. *See id.* at 17–25 (discussing motivation, citing Ex. 1002 ¶ 132), 52 (noting the combined raised tactile and OV features provide a ready “manual inspection” and “predictably aids in verifying the authenticity of a document”), 59–60 (citing Ex. 1002 ¶ 202).

Petitioner persuasively relies primarily on Gunn to address the recited bar code feature, noting Bernecker and Maurer disclose providing machine readable information on a document, and contending further it would have been obvious to use the well-known bar code feature in order to provide

machine readable security features that include encryption and provide further authenticity via data duplication, as Gunn suggests. *See id.* at 34 (addressing claim 5, citing Section VII.B.1; Ex. 1002 ¶¶ 157–158), 58–59 (citing Ex. 1008, 2:4–8).

Claim 16 depends from claim 15, and recites “wherein said laser processing also defines a pattern that is essentially not visible when viewed straight-on.” Claim 17 depends from claim 15 and requires the laminate to include “a void having a ‘V’ cross section.” Claim 18 depends from claim 15 and requires a raised feature with a tactile effect. Petitioner persuasively relies on its showing and rationale provided with respect to similar features recited in claims 1, 5, 6, and 8. *See* Pet. 60–63 (citing Ex. 1002 ¶¶ 203–06).

Petitioner presents a detailed and persuasive showing supported by rational underpinning regarding challenged claims 15–18. *See* Pet. 52–63. Based on the foregoing discussion and review of the record, Petitioner persuasively shows that the combination of Maurer, Bernecker, Fry, and Gunn would have rendered the subject matter of claims 15–18 obvious. Patent Owner’s arguments, addressed below, do not undermine Petitioner’s persuasive showing.

7. Patent Owner’s Arguments

Grouping together claims 1–20, Patent Owner generally contends Petitioner “failed to meet its burden” because “the alleged rationale for combining the prior art references is based on a fundamental misunderstanding of these references; requires abandoning the key features in the references, rendering them inoperable for their intended purpose; and results in *fewer* security features.” PO Resp. 32. Patent Owner presents a

number of arguments, generally asserting a lack of motivation to combine, based on allegedly disparate teachings in the references. *See* PO Resp. 31–50.

Patent Owner’s arguments do not undermine Petitioner’s showing that it would have been obvious to combine the features of Maurer and Bernecker, as further suggested by Fry, to create added protection for Maurer’s card, as discussed above and further below. *See* Pet. 1–3, 8–9, 17–18.

a. Fewer Security Features, Motivation

Patent Owner contends Petitioner’s showing of motivation “is fatally flawed” because the proposed combination “results in . . . fewer security features.” PO Resp. 46. Contrary to this argument, as discussed further above and further below, Petitioner shows persuasively that combining Bernecker’s OV feature with Maurer’s raised tactile feature to create a combined OV raised feature would have provided an additional security feature to the card of Maurer. *See* Pet. 18–24, 37–38, 44. This combined raised OV feature would cause a forger to expend more time and effort to duplicate a card. *See* Ex. 1005, 1:42–49.

The combined card of Maurer, Fry, Bernecker, or Maurer, Fry, Bernecker, and Gunn, as proposed by Petitioner, beneficially renders photocopying, forgery, and reproduction more difficult, and visual inspection easier, as compared to a simple card that does not include Bernecker’s OV features, including notched “V” features. Patent Owner’s assertions about fewer security features fail to address Petitioner’s showing that results in keeping all or most of Maurer’s card features, while adding

Bernecker's OV features to form combined raised OV features in colorless areas of Maurer's card, as explained above and further below. *See supra* Section II.C.6; PO Resp. 47–49 (arguing Petitioner's showing strips features from Maurer's card and results in “only two security features”).

Maurer explicitly describes the benefits of employing a variety of features, suggesting features like that of Bernecker. For example, Maurer discloses “employing a number of different techniques” in order to safeguard cards (Ex. 1005, 1:23–29), noting that multiple known techniques enhance security in part because “the amount of time and energy expended in counterfeiting or forging the document exceeds by far the gains which can be expected” (*id.* at 1:42–49).

In addition, Petitioner sufficiently shows that employing Bernecker's OV feature in combination with Maurer's raised features in colorless areas would have provided a card with the security feature of appearing to be different based on the viewing angle. *See* Pet. 30 (citing Ex. 1006, 2:16–20). This OV feature provides another facet of authenticity to existing cards such as that of Maurer. *See* Ex. 1006, 3:49–64 (disclosing the “inventive authenticity feature” as “added without color contrast” to existing cards). A card not having the expected OV feature more readily could be recognized as a forgery. Therefore, contrary to Patent Owner's arguments, the proposed card would provide additional security features and would not undermine Maurer's card.

b. Registration, Combining OV Features with Raised Features

Similar to Maurer's registration of printed information with raised colorless features (*see supra* Section II.C.1), Petitioner persuasively argues

Bernecker taught that colorless laser engraving can be disposed directly under or over printed information (ex. 1006, 3:24–26) or *by itself* in a separate information carrier (ex. 1006, 3:27–43). That is, *Bernecker* recognized that colorless laser engraving need not be disposed in register with printed information and is useful by itself as a security feature, separate from protected printed information or other security features.

Pet. 21 (citing Ex. 1002 ¶ 133).

Patent Owner disputes Petitioner’s characterization of *Bernecker* as teaching registration similar to that of Maurer, i.e., “colorless engraving of the surface of a document directly over (or in register with) printed information.” See PO Resp. 39 (citing Pet. 19); see Pet. 21 (quoted above). Patent Owner contends this characterization of *Bernecker* by Petitioner “is false,” because

Bernecker’s reference to disposing the colorless engraving “directly under or over” the printed information specifies the relative position of this information on the face of the card (from a 2-dimensional perspective). It does not suggest superimposing the color-contrasting and the colorless engraving on top of one another, as Petitioner asserts.

Id. (citing Ex. 2010 ¶ 109). Although none of the challenged claims requires such registration of *Bernecker*’s features, Petitioner contends this registration teaching in *Bernecker* provides further motivation, because it shows similarities between Maurer and *Bernecker*. See Pet. 19–21 (asserting persuasively that both references show colorless engraving over registration). As indicated in the quotation above, Patent Owner disputes the alleged similarity, asserting *Bernecker* refers to a “2-dimensional perspective” of comparing OV features with *adjacent* printed features. See PO Resp. 39.

As Petitioner argues, Patent Owner’s contention that Bernecker limits its teaching so that “under or over” means adjacent or “offset on the card,” lacks support. *See* Reply 18–19 (quoting Ex. 1006, 3:18–26); PO Resp. 39; Ex. 1012 ¶¶ 51–53 (testifying “under or over” provides a ready comparison of printed information in registration with laser engraving). After describing “personalization data . . . in the form of a color contrast,” Bernecker states parts of that data can be “provided on the document once again in the form of a colorless laser engraving. The engraving can be disposed *for example directly under or over* the particular printed or color-contrasting lasered information to permit a quick comparison of the two pieces of information.” Ex. 1006, 3:22–26 (emphasis added). This description of “*directly under or over*” supports Petitioner’s interpretation of the engraving being in registration on the lower (under) or upper (over) laminate layer relative to the core. *See id.* (emphasis added); Ex. 1012 ¶¶ 51–53; Reply 18–19.

Even if Patent Owner’s characterization is correct—i.e., characterizing Bernecker as teaching or suggesting adjacent OV and raised features to provide a ready comparison—*this teaching or suggestion satisfies the challenged claims*, because not one challenged *requires* a combined OV raised feature.¹² Patent Owner’s characterization provides a reason to

¹² Claim 7 comes closest to requiring a combined raised OV feature, but it does not require it. Claim 7 depends from claim 5. Claim 5 recites “the *pattern being essentially not visible* when viewed straight on.” Claim 7 recites “wherein said laser processing also forms *a raised feature along at least a part of said pattern.*” So claim 7 does not require the “raised feature *along a part of said pattern*” to be part of the “essentially not visible” “pattern” of claim 5—i.e., the “raised feature” of claim 7 may be visible or

combine Bernecker's OV feature next to Maurer's raised features—to provide a ready comparison of text and heighten authenticity of the card—a suggestion that applies to Petitioner's characterization also (ready comparison of text in registration with OV engravings). *See* Reply 18–19. During the Oral Hearing, Patent Owner argued only claim 7 requires a combined raised OV feature—allegedly like the substitute claims addressed below in Section III.E.¹³

In context to Bernecker's disclosed invention, Bernecker describes creating “contrasting laser inscription and the colorless lasering,” creating “notches without color changes of the plastic,” and using the same laser, producing “halftone images.” Ex. 1006, 3:64–4:10. Bernecker also describes shifting the power and focus of the laser, implying registration of the notches with the contrasting laser inscription as an option. *See id.* Bernecker's other option—an “essential feature of the invention . . . takes place without discoloration of the substrate material and *without producing color contrast with the surroundings.*” *Id.* at 2:53–56, Fig. 3. So one option,

even essentially visible.

¹³ *See* Tr. 106:13–22 (Patent Owner stating “[t]hat’s why I’m focusing on claim 7” and “[c]laim 7’s a big deal”), 119:16–19 (“I am focusing on this claim 7 because it’s something special, and it’s different from the rest”), 125:8–9 (focusing on claim 7), 127:9–11 (“The purpose of the amended claims is to align the patent claims with the notion that is reflected in claim 7, this concept of a raised, clear, tactile feature.”); 134:10–14 (“I would emphasize what we’re talking about here with respect to the amendments is by and large these very same features of claim 7, the only difference being some of the claims also have the 30 percent thickness limitation, but I think we can stand on the briefing as far as that feature goes.”)

registration, provides color contrast with the surroundings, and the other option, Bernecker's "essential feature," does not. *See* Ex. 1012 ¶ 53.

As Petitioner also argues, Patent Owner's reliance on Figure 1 of Bernecker does not help Patent Owner, because contrary to Patent Owner's arguments, it does not show "the same information on the card twice" "offset from one another" for comparison; rather, it shows different information offset from each other (i.e., numerals and letters). *See* PO Resp. 39–40; Reply 19 ("‘ABC’ is different from ‘12’ and the two pieces of information are not disposed ‘directly under or over’ each other."). Finally, as Petitioner notes, direct registration over or under printed information provides a ready comparison of information, further supporting Petitioner's characterization of Bernecker's teachings. *Id.* (citing Ex. 1012 ¶53).

c. Blackened Cover Sheet, OV Features, Motivation

Patent Owner also argues that Maurer's process causes "a blackening of the outer cover sheet." PO Resp. 37 (citing Ex. 2010 ¶ 102). According to Patent Owner, by citing to the German priority document to Maurer, Bernecker recognized "that colorless laser engraving was not utilized in . . . Maurer." *Id.* at 38 (citing Ex. 1006, 2:26–34). Patent Owner quotes Bernecker as describing Maurer's process as follows: "*this technology has been discussed and developed exclusively from the point of view of producing clearly readable information contrasting with its surroundings in the form of discolorations of the material.*" *Id.* (quoting Ex. 1006, 2:30–34) (emphasis by Patent Owner).

Contrary to the arguments, Maurer does not suggest blackening of the "transparent" layer. *See* Ex. 1005, 1:5–10. Patent Owner equivocates,

stating “[t]he layer *need not be transparent* directly above the area of the burned-in indicia on the core” and stating “nothing in Maurer’s disclosure suggests that the laser inscription process does not cause a blackening of the outer cover sheet laminate while it simultaneously burns the core of the card.” PO Resp. 37 (citing Ex. 2010 ¶ 102) (emphasis added).¹⁴ These equivocal arguments about what Maurer does not disclose amounts to contending Maurer’s silence concerning the lack of blackening shows blackening must occur, which “misapprehends the law. Contrary to [Patent Owner’s] suggestion, a reference need not state a feature’s absence in order to disclose a negative limitation.” *See also AC Techs. S.A. v. Amazon.com, Inc.*, 912 F.3d 1358, 1367 (Fed. Cir. 2019) (citing *Sud-Chemie, Inc. v. Multisorb Techs., Inc.*, 554 F.3d 1001, 1004–05 (Fed. Cir. 2009) (*AC Techs.* characterizing *Sud-Chemie* as “affirming finding that reference disclosed ‘uncoated’ film where it did not describe the film as coated and did not suggest necessity of coatings”)).

Moreover, Maurer discloses a clear raised feature. *See* Ex. 1005, 1:5–10; *supra* Section II.C.1, .5; Ex. 1012 ¶¶ 46–48, 55 (testifying Maurer does not teach blackening the raised tactile feature (citing Ex. 1005, 1:5–10, Fig. 2, claim 3 of Maurer)). Contrary to Patent Owner’s argument based on

¹⁴ Patent Owner also argues “[t]he *depression* identified with the ‘X’ in Figure 2 would not be carried over to a photocopy,” Maurer “already provided . . . ‘resistance to copying,’” and “Maurer’s tactile features could not be photocopied.” PO Resp. 52 (emphasis added). Of course, a blackened top layer would be photocopied if it contrasts with its surroundings, but Patent Owner concentrates on Maurer’s *feature of depth* (i.e., the depression) as not being photocopyable.

Bernecker's description of Maurer's priority document, Bernecker does not state clearly what "material" it references with respect to Maurer's German priority document (or any of the three references cited as a group)—i.e., it does not state that the "discolorations" necessarily occur in both the plastic and in the paper core of Maurer's priority document. *See* Ex. 1006, 2:30–34.¹⁵

Bernecker also states "[i]t is known from the field of contrasting laser inscription that discoloration occurs only as of a certain laser power, becomes stronger as the laser power increases further, and finally leads to complete burning of the material. Using a power-controllable laser it is therefore possible to produce halftone images." *Id.* at 3:66–4:4 (emphasis added). By referring to halftone images and "burning," Bernecker suggests it refers to burning the paper core as a "discoloration" of that material. But even if the vague reference to "material" includes the plastic top layer *and* the paper core of Maurer or some other reference, Bernecker recognizes that "it is known" that laser power controls discoloration. Bernecker also states "[i]n contrast, it is an essential feature of the invention that the material processing . . . takes place without discoloration of the of the substrate material *and* without producing color contrast with the surroundings." *Id.* at

¹⁵ Also, Patent Owner's argument assumes, without requisite support, that Maurer's German priority document and Maurer disclose the same thing. In addition, the relied-upon passage cites three German patents as showing the "common practice" instead of focusing on a single document such as Maurer's German priority document. *See id.* at 2:26–2 (listing DE 2907004 C2, DE 3048736 A1, and DE 3151407 C1).

2:52–56 (emphasis added). So Bernecker stresses that its inventive *contribution* provides no color contrast—i.e., it provides OV colorless depressions in colorless areas—but Bernecker *also claims and discloses* a color contrast feature in combination with a colorless feature, for example, in combination with “usual information 4 shown in color contrast” (*id.* at 4:40–41). *See id.* at 6:34–36 (claim 17: “using said laser to apply further information in the form of discolorations or burnings of material”).

With further respect to Bernecker’s claims, independent claim 15 of Bernecker recites “providing a plastic layer” and “applying said laser beam to said plastic layer . . . to define information on said plastic layer . . . without discoloring said plastic.” Ex. 1006, 6:19–31. Claim 17 depends from claim 15 and recites “further comprising the step of using said laser to apply *further information in the form of discolorations or burnings of the material.*” Ex. 1006, 6:33–36 (emphasis added). Claim 17 does not indicate if “material” refers to the plastic layer of claim 15. In any event, in context of column 6, lines 6–31, with claims 15 and 17, Bernecker teaches the plastic layer can lack discoloration in some places even if it, or another core layer, may be burned or otherwise discolored in other places or in the core. In any case, Bernecker teaches that forming grooves without color contrast in a plastic layer provides a beneficial OV quality. *Id.* at 2:60–65, 3:9–17.

Bernecker’s stated “finding” that the invention involves removing plastic without discoloring it (*id.* at 2:16–19) appears to be somewhat self-serving, given the admission by Bernecker that “[i]t is known from the field of contrasting laser inscription that discoloration occurs only as of a certain laser power” (*id.* at 3:66–4:1). *See* Reply 17–18 (citing Ex. 1012 ¶¶ 49–50)

(arguing Bernecker merely describes an essential feature as producing engravings without discoloration, and Bernecker contrasts that “essential feature” with the prior art, which does not focus on a lack of discoloration).

Moreover, as Petitioner persuasively adds, Maurer “depicts the relief X as transparent/colorless in Fig. 2, despite showing blackening elsewhere in the cover sheet.” Reply 16 (citing Ex. 1012 ¶¶ 46–50; Ex. 1006, 1:5–10); Section II.C.1 (reproducing Ex. 1006, Fig. 2); Ex. 1012 ¶¶ 46–48, 55; Ex. 1006, 1:5–10. Also, “*Maurer* . . . explains that its invention relates to providing information on a core that ‘can be perceived visually *through [the] transparent cover sheet.*’” Reply 16 (quoting Ex. 1005, 1:5–10) (emphasis added). And Patent Owner’s expert, Dr. Cairns describes Maurer as involving a “gentle” melting process in the context of evaporation, so this lower level of laser energy suggests no discoloration of the plastic (albeit high enough energy for some evaporation). *See id.* & n.6 (discussing Dr. Cairns’ testimony about Maurer as presenting an “internal inconsistenc[y]” (citing Ex. 2010 ¶ 45)).

Further, as Petitioner persuasively points out, tribunals must presume the enablement of Maurer’s disclosure and claims. *See* Reply 6 (citing *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1355 (Fed. Cir. 2003)). Regarding enablement, claim 1 of Maurer specifically recites “*degraded core portions*” and a “transparent” cover sheet, so it covers “an identification card” having *unburned* transparent cover sheets:

In a multilayer identification card, comprising *two cover sheets at least one of which is transparent* and an opaque card core laminated between the cover sheets and provided with visually perceptible information defined by patterns, letters,

numbers and/or pictures, the improvement comprising the presence of said information in the card core in the form of localized, visible, thermally and irreversibly *degraded core portions* formed in said core by means of a laser beam traversing the transparent cover sheet subsequent to core lamination to said cover sheet, whereby the information is also formed in said cover sheet in register with and simultaneously with the information in the card core.

Ex. 1005, 8:58–9:2 (emphases added).

Responding to Petitioner’s point that Maurer discloses transparent cover sheets, Patent Owner maintains that “[t]he fact that the cover sheet is transparent (*before laser processing*) is unremarkable.” PO Resp. 37 (emphasis added). Contrary to this characterization, Maurer’s claim 1, and claim 3, dependent therefrom, constitute product-by process claims and require an improved card that maintains a transparent cover sheet *after laser processing*. See Ex. 1005, 8:58–9:2 (claim 1); *id.* at 9:8–11 (claim 3 reciting the “card according to claim 1 in which the information *on said transparent cover sheet* is in relief and can be sensed by touch”) (emphasis added). Maurer’s specification supports this reading by referring to the “*invention*” as including “information which can be *perceived visually through [the] transparent cover sheet*.” Ex. 1005, 1:5–10 (emphases added). Therefore, given Maurer’s statement at column 1 and Figure 2’s depiction of a transparent cover sheet, Patent Owner’s evidence and arguments do not overcome the presumption of enablement regarding a transparent relief. See Reply 20 (citing (Ex. 1005, 1:9–10, 5:41–43, claim 3).

In related arguments concerning alleged blackening in Maurer, Patent Owner also contends Bernecker and Maurer provide “divergent teachings”

resulting in “two significant conflicts”: 1) Maurer provides blackening of the card and Bernecker avoids “discoloration at all cost”; and 2) “Maurer teaches the use of laser energy to alter the core of a laminated card whereas Bernecker teaches that the core should be left undisturbed and that laser processing should only affect the outer laminate layer of the card.” PO Resp. 44 & nn. 5–6 (citing Ex. 1005, 4:37–43; 6:14–16, Fig. 2; Ex. 1006 (no pin citation); Ex. 2010 ¶¶67–76, 106). Patent Owner contends these “divergent teachings” render Petitioner’s approach to obviousness “wholly improper because it ignores the fundamental purpose of Maurer, which again is the creation of verifiable blackened inscriptions in the core of a prelaminated security document.” *Id.* at 44–45 (citing Ex. 1005, 4:3–42).

Contrary to these arguments, however, as generally outlined above, Bernecker does not teach avoiding discoloration of the core at all costs, Maurer’s process alters the same outer laminate that Bernecker’s process does, and neither the challenged claims nor Petitioner’s challenges require omitting Maurer’s blackened printing areas. *See, e.g.*, Reply 19 (“Indeed, Bernecker taught that its colorless engraving can be ‘disposed for example directly under or over the particular printed or color-contrasting lasered information.’” (quoting Ex. 1006, 3:23–28; citing Ex. 1012 ¶¶ 54–55)).

As Patent Owner recognizes, applying Bernecker’s OV features does not disturb the core of a card. *See* PO Resp. 44. So adding Bernecker’s OV feature to Maurer’s card, as part of the pattern of Maurer’s raised features or by creating a combined raised OV feature, while maintaining all of Maurer’s features including registration in some areas, does not alter the purpose of Maurer’s card. *See* Pet. 29 (“And a POSITA would have been motivated to

include the combined security feature in place of or in addition to other security features for the reasons stated above in Section VII.B.”); Pet. 3 (“The claims directed to both the visual and tactile feature simply use a colorless and tactile laser engraving by itself as a security feature, which would have been obvious in view of this prior art.”); Pet. 19–20 (“*Bernecker* recognized that laser engraving without discolorations or color contrast is useful by itself as a security feature because the colorless laser engraving ‘gives rise to areas with different light scattering properties’ that cannot be recognized when viewed directly ‘and stand out clearly only when viewed at the glancing angle’” (quoting Ex. 1006, 2:16–25)).

As explained above, Petitioner generally proposes keeping several of, if not all of Maurer’s features, including Maurer’s “laminated card design,” and adding Bernecker’s OV feature to create “security feature that has both (1) a tactile/raised relief and (2) an optically variable feature that is visible only at a glancing angle to provide the desired benefits of tactility and resistance to copying, as disclosed by *Maurer* and *Bernecker* respectively.” Pet. 19 (citing Ex. 1002, ¶132); *see also* Pet. 19–21 (modifying a driver’s license by adding Bernecker’s additional security feature, either in register or not in register with underlying printed information); PO Resp. 33 (“According to Petitioner, Bernecker also recognizes the benefit of moving the transparent relief so that it stands by itself—not in register with the visible information (*e.g.*, printed or formed with a contrasting laser inscription process)”).

Similar to Maurer, Bernecker specifically envisions “providing further security features,” including keeping some coloring processes on portions of

the card, including “[p]ersonalization data 4 . . . preferably incorporated with a laser in the form of discolorations of the plastic material.” Ex. 1006, 4:53–54; *accord id.* at 3:49–57. So nothing in the combined teachings precludes employing or combining the two features, even if the laser must focus on different parts of the card (i.e., in the core and on the surface). *See* Ex. 1006, 4:3–10 (describing shifting the focus and power of the laser to obtain different results, including halftone imaging and colorless notches).

Maurer also specifically states “[a]s already mentioned hereinbefore, the identification card *does not have to contain all of the information and features mentioned. . . . Changes involving the number, form and positioning of the information can be made as desired.*” Ex. 1005, 8:47–52 (emphasis added). Maurer specifically contemplates not burning in features—even for printing information (including picture) areas. For example, Maurer states that information “‘burned’ into the paper core” may involve “many shades of gray” using “corresponding technology . . . already known” (*id.* at 8:23–26), and if the card designer desires color, “the laser does not have to cause a blackening or destruction of the core, but merely a change in color” using “a suitable substance capable of causing a thermochemical [color] reaction” (*id.* at 6:25–28). And Bernecker supplements Maurer, by teaching that “[i]t is known from the field of contrasting laser inscription that discoloration occurs only as of a certain laser power, becomes stronger as the laser power increases further, and finally leads to complete burning of the material. Using a power-controllable laser it is therefore possible to produce halftone images.” Ex. 1006, 3:66–4:4. Bernecker also specifically teaches adding its OV features

to existing cards as “*without complication*” as “*a simple possibility*.” *Id.* at 4:21–26 (emphasis added).

In summary, Petitioner shows persuasively that the proposed combination suggests retaining Maurer’s blackened areas at certain information portions of the laminated card. *See* Pet. 18–25. Petitioner also shows persuasively that it would have been obvious to add Bernecker’s OV features to, or combine them with, Maurer’s raised features, in order to create an OV pattern at colorless non-registered areas, thereby retaining Bernecker’s OV feature, Maurer’s tactile features at desired card portions, and Maurer’s blackened core and lamination features at other areas. Bernecker suggests that Maurer’s colorless raised features, provided at colorless background areas, would have provided an OV quality to raised features not parallel to the surface of the card. *See* Pet. 1–3, 17–25 (persuasively contending that providing multiple security features, including Maurer’s lamination features, and Bernecker’s OV feature, would have been obvious to protect Maurer’s card further from photocopying, tampering, or manipulation).

Patent Owner does not dispute that providing Maurer’s raised features, if clear, would exhibit OV properties, when presented without registration on colorless background, as Bernecker suggests. *See, e.g.*, PO Resp. 48–49. Rather, Patent Owner argues this would “strip[] the secured credential in Maurer of its blackened inscriptions” and present only “two security features.” *Id.* But as explained, Petitioner proposes keeping Maurer’s blackened inscriptions with raised features in Maurer’s card, and also adding raised colorless OV features to colorless areas (with no

blackened core or laminate) as the combination of Bernecker suggests. Contrary to Patent Owner's related arguments that Petitioner does not provide motivation to combine Bernecker, Fry, and Maurer (PO Resp. 49–50 (arguing “Fry discusses a scorched bead”), Petitioner shows that the proposed combination would provide additional OV security benefits that lends authenticity as Bernecker suggests, with Fry lending implementation details for colorless grooves. *See, e.g.*, Pet. 2–3, 18, 25, 38.

As Petitioner argues, one of skill would have recognized that “multiple security features were desirable” (Pet. 18), and Bernecker recognized that “by implementing the engraving in a colorless or contrastless manner, the engraving would be visible only at a glancing angle” (*id.* at 21 (citing Ex. 1006, 2:16–25, 2:53–56; Ex. 1002 ¶ 133)) so as to enhance security. Bernecker's OV features result from clear notches having non-parallel reflecting surfaces relative to the top layer, creating a layer with “different light scattering properties,” thereby suggesting similarly non-parallel features such as Maurer's raised ridges would beneficially include OV features or could be modified as such, implemented in a colorless areas, as Petitioner proposes. *See* Ex. 1006, Fig. 3; 2:16–25; Ex. 1005, Fig. 2; Ex. 1002 ¶¶138–143.

d. Divergent Teachings, Fry

Patent Owner asserts a skilled artisan would not turn to Fry, because Fry involves “scoring plastics to form a weakened line, not for use in inscribing” information in a “divergent field of endeavor.” *Id.* at 49. This appears to be an attempt to raise an analogous art issue without adequate

explanation (i.e., a waiver of the issue). *See* Reply 23 (“Idemia does not allege otherwise or contend that *Fry* is not analogous art.”).

Assuming Patent Owner adequately raises the issue in its assertion about a “divergent field of endeavor,” contrary to that assertion, the ’494 patent teaches scoring plastics with a laser just like *Fry*. *See* Ex. 1001, Abstract; Ex. 1007, Abstract. According to *Fry*, “[a] score, by definition, is a groove into a material surface and penetrates only a portion of the total depth of the material being scored.” Ex. 1007, 2:32–33. As discussed at length above, Maurer also teaches marking or scoring a plastic layer. Ex. 1006, 4:24–36, 6:57–58.

To determine if a prior art reference is analogous, one must consider “(1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the inventor’s endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.” *In re Clay*, 966 F.2d 656, 658 (Fed. Cir. 1992). “A reference is reasonably pertinent if, even though it may be in a different field from that of the inventor’s endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor’s attention in considering his problem.” *Id.* at 659; *see Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1000–01 (Fed. Cir. 2016) (relying on *Clay*).

Here, the ’494 patent and *Fry* fall in the same field of endeavor of using a laser to form grooves (or score lines) in plastic substrates. The ’494 patent generally and broadly states it involves “marking a structure”: “[i]t is often desirable to mark a portion of a structure, such as a multi-layered

structure (including after lamination), such as an ID document.” Ex. 1001, 7:43–45 (emphasis added). The ’494 patent embraces a wide field of products to mark:

Also, instead of ID documents, the inventive techniques can be employed with product tags, product packaging, business cards, bags, charts, maps, labels, etc., etc., particularly those items including engraving of an over-laminate structure. The term ID document is broadly defined herein to include these tags, labels, packaging, cards, etc.

Ex. 1001, 11:22–29. The ’494 patent emphasizes marking “many different articles” without limiting marking to inscribing information:

Of course, it will be appreciated that embodiments of *the invention have applicability for the laser engraving and/or marking of plastic materials used to make many different articles formed by virtually any known method, including molding and extruding.*

Id. at 9:31–35; *accord id.* at 9:41–46 (methods apply to “virtually any product” and “the inventive laser etching methods . . . have applicability to the manufacture [of] many different articles that can be marked with . . . a tactile pattern,” including “packaging,” “containers,” “military products,” “consumer products,” and “toys”). The ’494 patent further notes “[t]he technology disclosed herein can be used in combination with other technologies.” *Id.* at 11:18–19. So the technology includes simply marking any type of package or container, without necessarily providing textual information, just like Fry.

Dr. Tentzeris testifies that “*Fry* expressly discloses that it is applicable to the same types of plastic film or sheet material used in identification cards. . . . A person of ordinary skill in the art would not have ignored

known techniques for processing the same materials used in identification cards.” Ex. 1012 ¶ 44 (disagreeing that Fry “is from a divergent field of endeavor,” because “Fry expressly discloses that it is applicable to the same types of plastic film or sheet material used in identification cards” (citing Ex. 1007, 2:18, Tables 1–2); Ex. 1002 ¶¶ 111–115 (testifying an artisan of ordinary skill would have turned to Fry for “particular implementation details” for scoring plastics in light of Maurer’s similar teachings).

Petitioner explains that Fry discloses forming beaded grooves in a plastic structure using lasers. *See* Pet. 16 (citing Ex. 1007, 2:69–75, 3:59–65, 4:30–40). The record supports Dr. Tentzeris’s testimony that “a person of ordinary skill in the art would have looked to known techniques for scoring and/or grooving thermoplastic, like those disclosed in Fry, in order to form the raised/tactile relief structure of Maurer.” Ex. 1002 ¶¶ 111–115. Accordingly, Fry, like Maurer, constitutes analogous art to the ’494 patent, based on the same field of endeavor, each involving forming grooves and/or beads in a plastic layer.

In addition, the ’494 patent particularly contemplates “using laser beams to write or engrave information to ID cards.” Ex. 1001, 4:24–26. It involves laser engraving to create “characters, text, tactile marks—including text, patterns designs, . . . photographs, etc.” *Id.* at 4:1–6. It also involves using a laser to create “slits” or “ridges” to form the desired text or design. *Id.* at 8:26–28. As such, Fry logically would have commended itself to an inventor’s attention in considering the problem of marking plastic with a beaded groove having a regular and neat appearance—in order to read the

text. *See* Ex. 1007, 3:61–63 (noting “[t]he appearance of the groove is generally neat and regular, when accompanied by a bead”).

e. Blackening or Scorching in Fry

Similarly to its assertions about Maurer’s depression addressed above, Patent Owner contends “one of ordinary skill in the art would understand that the process described in Fry results in a bead that would be scorched.” PO Resp. 31 (citing Ex. 2010 ¶ 115; 1007, 2:73–75). Patent Owner similarly contends a scorched bead shows Fry’s process cannot be employed to provide a bead that lacks discoloration, so “Petitioner does not present any motivation to combine these references.” *Id.* at 50. Contrary to these arguments, the record shows no scorching would occur in Fry (or Maurer). Nothing in Fry (or Maurer) describes a scorched bead. *See* Ex. 1012 ¶¶ 37–38 (testifying Fry does not disclose scorching, but even if Fry’s process results in minimal discoloration, Bernecker discloses colorless engravings and skilled artisans knew how to obtain same); Ex. 1002 ¶¶ 135–137 (Fry does not teach discoloration or scorching).

Patent Owner relies on the following statement in Fry: “*Aside from this bead, the score 14 has a neat and clean surface, remaining unscorched after the scoring process has ended.*” PO Resp. 31 (quoting Ex. 1007, 2:73–75; citing Ex. 2010 ¶ 115) (emphasis by Patent Owner). Patent Owner refers to “this express language in Fry” as supporting its position that the process described in Fry results in a scorched bead. *Id.* Dr. Cairns relies on the same language. Ex. 2010 ¶ 115. But Fry specifies “[a] score, by definition, is a groove into a material surface and penetrates only a portion of the total depth of the material being scored.” Ex. 1007, 2:32–33. So a

score does not include the bead. In the relied upon sentence, Fry emphasizes that the groove does not include the bead in the first clause, compares the bead and groove in the second clause (i.e., the groove is neat and regular), and then further describes the groove in the last clause (i.e., without comparing it to the bead). *See* Ex. 1012 ¶ 38 (testifying Fry does not teach a scorched bead, noting the relied upon sentence only refers to the “structural irregularity (i.e., the raised feature) produced by the bead, which makes the surface less smooth”); Ex. 1002 ¶¶ 135–137 (testifying Fry does not teach discoloration/scorching). At another place, Fry states “[t]he appearance of the groove is generally neat and regular, when accompanied by the bead.” Ex. 1007, 3:62–63. Fry describes observing “small bubbles in the beads” via “microscopic examination” and “small cracks . . . in the groove bottom and on the beaded edge of the polyethylene.” *Id.* at 3:63–67. But Fry does not describe any bead scorching. Moreover, the ’494 patent does not describe how it obtains an unscorched bead.

f. Raised Feature of Maurer and Fry, Evaporation, Motivation

Patent Owner cites its expert, Dr. Cairns, in support of the contention that Maurer does not disclose a raised feature. *See, e.g.*, PO Resp. 55 (arguing “[a]s explained by . . . Dr. Cairns, *Maurer* does not . . . teach or disclose a raised feature that can be felt by touch” (citing Ex. 2010 ¶¶ 29–50, 67–109)). Patent Owner asserts Maurer’s process does not involve evaporation or degradation, a process that the parties agree results in a raised tactile feature. *See id.* (citing Dr. Tentzeris’s deposition testimony (Ex. 2008, 188:23–189:7)). Patent Owner also asserts that Maurer’s Figure 2,

which shows a raised tactile feature, represents a “cartoon” and cannot be relied upon to show what it shows—a raised feature. *See id.* at 55–56.

Turning to Maurer’s Figure 2 and its description of a “relief,” Patent Owner contends Petitioner cannot rely on the raised tactile feature as depicted at area X of Maurer’s Figure 2, because “patent drawings do not define the precise proportions of the elements and *may not be relied on to show particular sizes if the specification is completely silent on the issue.*” *Id.* at 56 (quoting *Hockerson-Halberstadt, Inc. v. Avia Group Int’l*, 222 F.3d 951, 956 (Fed. Cir. 2000) (emphasis by Patent Owner)).

Figure 2 of Maurer follows:

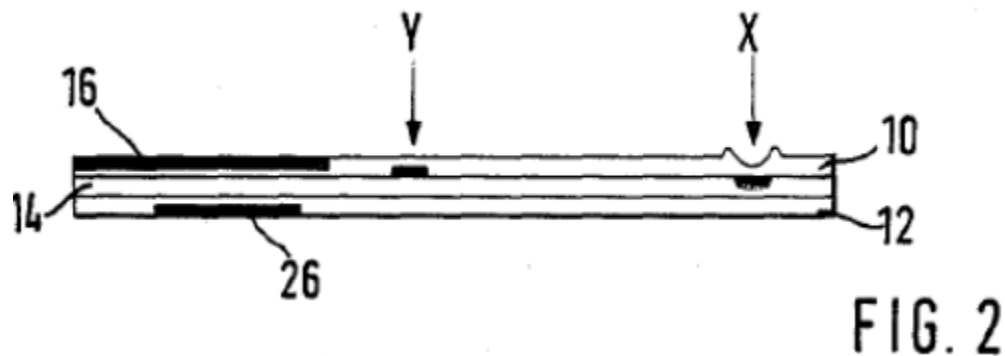


Figure 2 of Maurer shows area X, with a depression in, and ridges on, top laminate layer 10 above printed information (blackened area) in core layer 14. *See Ex. 1005*, 6:18–23. Maurer describes “arrow X” as follows: “[A] relief is formed above the line of printed information and in register therewith which can also be felt manually. An example is indicated by arrow X.” *Id.*

According to Patent Owner’s interpretation of Figure 2, the “relief depicted in Maurer is the *depression* . . . formed above the line of printed information [in core layer 14] . . . and *below* the nominal top surface of the

upper cover sheet.” PO Resp. 22 (emphasis added). Contrary to this argument, Maurer’s description of a “manual inspection by virtue of a . . . permanent relief-type structure on the cover sheet” does not limit itself to a depression. *See* Ex. 1005, 4:29–30. In describing Figure 2, Maurer refers to the “example is indicated by arrow X” and describes “a relief above the line of printed information” without limiting it to the depicted depression.

Patent Owner also argues that the ordinary meaning of “relief” as employed by Maurer supports Patent Owner. *See* PO Resp. 35 (citing Ex. 3002; Ex. 2010 ¶ 104).¹⁶ As noted above, Maurer describes a “relief” in conjunction with the depicted raised portion of Figure 2. The applicable plain and ordinary meaning of “relief” is “[t]he projection of figures or forms from a flat background.”¹⁷ Ex. 3002; Inst. Dec. 40 & n.10 (citing Ex. 3002). Therefore, the plain and ordinary meaning of relief, which Maurer describes in reference to Figure 2, supports the finding that Maurer’s “relief,” as depicted in Figure 2 and which can be felt manually according to Maurer, includes a raised feature—i.e., “a projection . . . from a flat background.” *See* Ex. 3002; Ex. 1005, 4:28–30, 6:18–23.

¹⁶ Patent Owner also contends “one skilled in the art would not find a general purpose dictionary helpful.” PO Resp. 35 (citing Ex. 2010 ¶ 104). No trade dictionary of record contradicts the general purpose dictionary, and the general purpose dictionary corresponds to what Maurer and another prior art reference describes and depicts, as noted further below.

¹⁷ The full sentence reads as follows: “The projection of figures or forms from a flat background, or such a projection that is apparent only, as in painting.” WEBSTER’S II NEW RIVERSIDE DICTIONARY 993 (1984).

Nevertheless, Patent Owner contends that the panel's cited definition (Ex. 3002) in the Institution Decision also shows that "relief" means "variations in elevation," which conforms to "the depression or valley identified by the 'X' in Maurer." PO Resp. 35 (citing "definition 6" of Ex. 3002). Patent Owner also notes that Bernecker refers to a "microrelief" to describe "'depressions' formed when the plastic material is evaporated during laser processing." PO Resp. 37 (citing Ex. 1006, 3:13–17; Ex. 2010 ¶ 104).

The definition cited by Patent Owner in Exhibit 3002 defines a relief as consisting of "[v]ariations in elevation of *a portion of the earth's surface*." Ex. 3002 (definition 6) (emphasis added). The definition in Exhibit 3002 cited by the panel more closely tracks Maurer's flat card and raised bead at Figure 2 as a "projection of . . . forms from a flat background," as Maurer's card does not include the "earth's surface." See note 17; Ex. 3002. Even if Patent Owner's definition also applies, "variations in elevation" still include the raised portions of Maurer's Figure 2 (e.g., like mountains and valleys on the earth's surface). Also, as Petitioner persuasively argues, even though Bernecker refers to a microrelief as a depression, another prior art reference entered into the record by Patent Owner supports Petitioner and shows that the normal meaning of "relief" in the art means a raised feature. See Reply 7 n.3 (citing Ex. 2002, Abstract ("[T]he 'natural foamability' that laser action brings about in the plastic materials . . . is exploited to obtain a relief height sufficient for a clear impression of the characters.")). Also, Maurer's claims 1 and 3, and Maurer's description (Ex. 1005, 4:28–30, 6:19–24, Fig. 2), support the

finding that a relief on the cover sheet that can be felt manually includes a raised feature.

Moreover, Patent Owner’s arguments specifically contradict assertions it made in its Preliminary Response about Maurer’s disclosure of raised features: “[M]elting [as Maurer discloses only] can create localized distortions that may at some point, smoothly and unpredictably undulate above the top surface.” See Prelim. Resp. 24 (citing Ex. 2001 ¶¶ 56–59).¹⁸ Patent Owner similarly contended in its Preliminary Response that even melting creates “unpredictable undulations [that] are not discrete and do not provide any tactile effect, let alone one that would be reproducible.” *Id.* In other words, Patent Owner contended earlier in the proceeding that Maurer *does* create “localized distortions that may at some point . . . *undulate above the top surface.*” *Id.* (emphasis added).

None of the challenged claims require predictable or discrete undulations. The arguments and evidence submitted by Patent Owner show that Maurer at least includes some raised unpredictable undulations that provide a tactile feel (albeit not “easily felt”). See Ex. 2001 ¶ 56 ((testifying “the undulations that are potentially formed by the process taught in *Maurer* would not manifest themselves as discrete raised features” and “certainly not raised features *that can be easily felt*” (emphasis added)), ¶ 57 (testifying

¹⁸ See *In re Baxter Travenol Labs*, 952 F.2d 388, 390 (Fed. Cir. 1991) (holding extrinsic evidence, including *admissions*, may be used to explain what a reference discloses in a reexamination proceeding).

“[b]ecause *Maurer* only teaches melting, the undulations that could be formed by that process would not manifest themselves as discrete raised features like those required by the ‘494 Patent”). Setting aside that *Maurer* produces at least “unpredictable undulations” as Patent Owner argued (Prelim. Resp. 24), Patent Owner now contends “*Maurer* attributed the tactile feature to the depression, not a raised feature.” PO Resp. 36. The record does not support Patent Owner’s arguments, because a person can feel raised undulations in *Maurer*’s card (which Patent Owner concedes exist) if that person can feel depressions. Also, *Maurer* does not limit the tactile feel to depressions. See Ex. 1005, 4:29–30 (marking the card renders it “accessible to *manual inspection* by virtue of the resultant, *permanent relief-type structure on the cover sheet*”).

Given the description of a relief in *Maurer* corresponds with the plain meaning of that term and with what Figure 2 depicts, Figure 2 must be relied upon for what it teaches. See *In re Mraz*, 455 F.2d 1069, 1072 (CCPA 1972) (“[W]e did not mean that things patent drawings show clearly are to be *disregarded*.”); *In re Wagner*, 63 F.2d 987, 986–87 (CCPA 1933) (“While it is true that drawings may not always be relied upon for anticipation of a later application, it is also true that, if a drawing clearly suggests to one skilled in the art the way in which the result sought is accomplished by a later applicant, it is immaterial whether the prior patentee’s showing was accidental or intentional.”) (internal citations omitted); *In re Seid*, 161 F.2d 229, 231 (CCPA 1947) (Even “an accidental disclosure, if clearly made in a drawing, is available as a reference.”); *Jockmus v. Leviton*, 28 F.2d 812, 814 (2d Cir. 1928) (“We know of no rule

that figures can never of themselves be an adequate anticipation of mechanical inventions, as of course they must be of designs, and we can see no reason for importing into the statute an arbitrary distinction, unrelated to its purposes.”) (L. Hand, J.); *see also Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563 (Fed. Cir. 1991) (earlier-filed design drawings support later-filed utility claims reciting certain dimensions).

Unlike the patentee in *Hockerson-Halberstadt*, Petitioner does not rely on Maurer for its “precise proportions,” “particular sizes,” or any “quantative relationship” between the groove and bead. *See Hockerson-Halberstadt*, 222 F.3d at 956 (“The ‘792 patent is devoid of any indication that the proportions of the groove and fins are drawn to scale. HHI’s argument thus hinges on an inference drawn from certain figures about the quantitative relationship between the respective widths of the groove and fins.”).¹⁹ Also, Maurer’s disclosure is not “completely silent on the issue,” *see id.*, it describes what Figure 2 clearly shows as a relief on a cover sheet that can be felt manually. Ex. 1005, 4:28–30, 6:19–24, 9:8–11.

¹⁹ In addition to distinguishing *Hockerson-Halberstadt* here because Petitioner does not rely on “precise proportions” or “particular sizes” of the raised ridges in the prior art patent to Maurer, *Hockerson-Halberstadt* involves another distinction—a prosecution history disclaimer wherein the court disallowed an accused infringer from relying on specification drawings lacking precise proportions to broaden claim scope that the patentee clearly disavowed during prosecution. *See id.* (“Thus, in the present case, a reasonable competitor, being aware that figures in a patent are not drawn to scale unless otherwise indicated, would understand the arguments in the prosecution history as clearly disclaiming a groove having a width greater than the combined width of the fins.”).

In addition to the disclosure describing the “relief-type structure on . . . cover sheet” 10 (Ex. 1005, 4:29–30), Maurer’s Figure 2 shows a generally raised feature in cross section at area X on the cover sheet 14, and Maurer explains that “a relief . . . can . . . be . . . felt manually” (*id.* at 6:18–23) at area X. In addition, Figure 2’s depiction of a raised portion at area X surrounding a groove looks much like the raised bead and groove depicted in Fry’s Figures 1 and 2, and also somewhat similar to raised features 62 and grooves depicted in the ’494 patent’s Figure 6c, which involve the same technology of using a laser to score plastics, as discussed in the previous subsection.

Patent Owner argues that the X in Maurer indicates only the depression in the cover sheet—an argument in which Patent Owner relies on allegedly precise features of Figure 2 for support. *See* PO Resp. 18–22 (reproducing precise annotations of Figure 2 and arguing the “feature” X must exactly line up with outer contours of the printed information on core layer 14 (citing Ex. 2012 ¶¶ 81–83)). Patent Owner also argues “‘arrow X’ merely designates the [whole] depression” and “is not intended to be an accurate depiction of the features and dimensions of the final identification card” (PO Resp. 20), but then Patent Owner contends “Maurer . . . pointed the arrow [from X] directly at the center of this depressed area” (*id.* at 21). Patent Owner explains Maurer “used a slightly curved line connecting the reference number 10” “to generally identify the entire cover sheet 10.” *Id.* Patent Owner’s arguments, taken to their logical extreme, contradict each other, because if the arrow from the X only points to the center of the depression, it must relate only to the center per Patent Owner’s theory, yet

Patent Owner also maintains the arrow from the X represents the whole depression. The record does not support these arguments, related arguments about the nature of Maurer's Figure 2, and Dr. Cairn's related testimony. See PO Resp. 18–22 (citing Ex. 2010 ¶¶ 79–83); Ex. 2010 ¶¶ 81–86.

Dr. Cairns' testimony tracks Patent Owner's arguments and relies on the same annotations of Figure 2. See Ex. 2010 ¶¶ 79–86. Dr. Cairns also states “[m]y opinions in this regard are based on the important recognition that the melting process taught in Maurer cannot result in the creation of a raised tactile feature like that proposed by Petitioner.” Ex. 2010 ¶ 87. Dr. Cairns' testimony ignores the depicted features of Figure 2 and does not account for Maurer's corresponding description of the “relief-type structure on the cover sheet” (Ex. 1005, 4:27–30), and Maurer's claim 3, which recites “information on said transparent cover sheet is in relief and can be sensed by touch” (*id.* at 9:10–11). See Ex. 2010 ¶ 102 (addressing claim 1 of Maurer and asserting “nothing in Maurer supports a conclusion that the area of the upper cover sheet exposed to the laser in Maurer remains transparent *after the laser inscription* process” (emphasis added)). With this background, given the clear depiction in Maurer's Figure 2 of a raised tactile feature corresponding to the description and claim 3, an artisan of ordinary skill would have recognized that Maurer's process involves more than idealized melting in order to create the relief. See Ex. 1012 ¶ 26 (“Idemia's assertion is based on the idea that the word “melting” in *Maurer* means *idealized* melting, that is, purely bringing a material to a liquid state, and nothing else.).

As noted above, Maurer explains that “[d]epending on the energy quantum of this laser beam, . . . a relief is formed above the line of printed information and in register therewith which can also be felt manually. An example is indicated by arrow X [in Figure 2].” Ex. 1005, Fig. 2; 6:18–23. Contrary to Patent Owner’s arguments, Maurer does not limit the tactility of the feature to the depression. *See* Ex. 1005, 6:18–23). At another place, Maurer states marking the card renders it “accessible to *manual inspection* by virtue of the resultant, *permanent relief-type structure* on the cover sheet.” *Id.* at 4:28–30 (emphases added). This indicates the relief on the cover sheet (i.e., at least including the raised feature) can be felt manually.

Addressing Petitioner’s contention that Fry would have aided a skilled artisan by teaching implementation details about forming a ridge in Maurer, Patent Owner also contends “the dimensions involved in the embodiment discussed in Fry” “would have been useless to a skilled artisan implementing laser processing techniques to create identification documents, such as taught in Maurer.” PO Resp. 50 (creating a hypothetical plastic substrate 12 with a wide score 14 based on cited dimensions in Fry (citing Ex. 2010 ¶¶ 110–113)), 30 (arguing “the width of the groove is over 20 times greater than the thickness of the plastic”). Contrary to these arguments, as Petitioner persuasively shows, Fry does not limit its teachings to any score width or substrate width. *See* Reply 13–14. Rather, Fry lists several “controlling variables” in scoring plastics. *Id.* at 13 (citing Ex. 1012 ¶¶ 35–36). Both experts agree that artisans of ordinary skill would have recognized that the score line depends on multiple factors, including laser power, speed, and the type of plastic. *See* Ex. 2010 ¶¶ 31, 32, 35 (listing

multiple factors); Ex. 1012 ¶¶ 32–33 (listing similar factors cited in Maurer and Fry). Moreover, Petitioner points out that the bubbles disclosed in Fry (Ex. 1007, 4:32–33) would be on the same order of thickness as the plastic substrate in the embodiment relied upon by Patent Owner, thereby showing an artisan of ordinary skill would have recognized that Fry contemplates other plastic thicknesses and groove dimensions in addition to the embodiment relied upon by Patent Owner. *See* Reply 13 (discussing “bubbles . . . about 6 *mils* wide”—i.e., as wide as the thickness of the plastic being grooved in Patent Owner’s cited embodiment (quoting Ex. 1007, 4:32–33) (emphasis by Petitioner)).

Patent Owner also argues that Fry only discloses vaporizing, and Maurer does not disclose a raised feature, because Maurer only discloses melting. *See* PO Resp. 55–56. According to Patent Owner, “it is literally impossible for Maurer to achieve its fundamental purpose of blackening the core while also forming the kind of ‘raised tactile feature’ that Petitioner incorrectly suggests would exist. *Id.* at 24 (citing Ex. Ex. 1005, 4:25–30). According further to Patent Owner, melting in Maurer’s process focuses the laser beam on the core, which “stands in stark contrast to the process that would be required to form the ‘raised tactile’ features suggested by Petitioner.” *Id.* Patent Owner explains that “the process suggested by Petitioner would require instead focusing the laser just below the top surface of the laminate layer of the card. *Id.* at 24 (citing Ex. 2010 ¶¶ 86–97).

As Petitioner persuasively explains, however, Patent Owner’s arguments rely on an improper characterization of Maurer and the combined teachings of Bernecker, Maurer, and Fry. *See* Reply 2–14; Ex. 1012 ¶¶ 30–

34. Patent Owner’s arguments also fail to recognize the knowledge of an artisan of ordinary skill reading Maurer and Fry. On one hand, Patent Owner’s arguments assume an artisan of ordinary skill reading the ’494 patent needs no explanation for how to form a raised tactile feature, and on the other hand, Patent Owner argues an artisan reading Maurer and Fry would be unable to combine the teachings to form a raised tactile feature.

For example, Patent Owner contends “[t]he innovative methods and identification articles described and claimed in the ’494 patent rely on the application of laser energy to create dimensional security features that are more difficult to reproduce than existing identification security technologies.” PO Resp. 8. However, nothing in the ’494 patent describes any difficulty in producing any of the features, and the ’494 patent provides no detail in the use of a laser for producing the raised OV features.

The ’494 patent states that “the foaming of the thermoplastic that can occur with some types of laser engraving can be adapted to provide an indicium having a tactile feel, which is a useful authenticator of a data carrier that also can be very difficult to counterfeit or alter.” *Id.* at 25 (quoting Ex. 1001, 4:26–31). But this relied-upon passage in the ’494 patent does not relate specifically to a *raised* tactile feel—as noted above, Patent Owner attributes a tactile feel in Maurer to a depression. So the passage suffers from the same or similar allegation by Patent Owner of a shortcoming in Maurer—it does not *explicitly* describe how to create the raised tactile feel features. Nowhere (with the exception of *non-original* claim 19 (*see* Ex. 1004, 57 (adding new claim 29, which issued as claim 19)))

does the '494 patent explicitly describe foaming as creating a raised ridge.²⁰ So at best, the '494 patent implies artisans of ordinary skill would have recognized that a raised ridge, such as what Maurer and Fry each disclose, requires some degree of plastic foaming via a laser. *See* Ex. 1012 ¶ 25 (“For example, when applying laser energy to a plastic substrate, a certain subset of molecules on the plastic substrate exposed to the laser may experience ‘melting,’ while others may experience ‘evaporation,’ or some combination of the two over time.”).

The '494 patent generally states an artisan of ordinary skill knew how to focus a laser to obtain different features: “As those skilled in the art will appreciate, the laser can be focused at a specific setting to produce holes of a predetermined diameter, depth and spacing.” Ex. 1001, 8:40–43. In the next sentence the '494 patent states “[t]his etching process creates a pattern that can be tactile or non-tactile,” directing the reader to Figure 6B, which does not depict a raised edge. Then, in the same column, the '494 patent refers to “an alternate embodiment” that generally involves “a tactile and/or non-OVD pattern by adjusting the hole depth and area location of the laser engraving,” and specifically points to Figure 6C, which involves “a tactile pattern with raised edges.” *See id.* at 8:48–52. But nothing in column 8 refers to foaming or evaporation, or otherwise describes how to create the

²⁰ No original claim recites anything related to a raised feature. Ex. 1004, 611–12 (original claims 1–14). In submitting “[n]ew” claims 29 and 30 during prosecution of the '494 patent, Patent Applicant failed to cite to any portion of the specification supporting them. *See id.* at 52–58 (Amendment Accompanying RCE).

raised tactile pattern in relation to Figure 6C, and it does not describe how to create a *raised* OV pattern. *See id.* at 8:26–54. As indicated above, this lack of specific description in the ’494 patent further tends to indicate further that an artisan of ordinary skill knew how to use a laser to form different features at the time of the invention, including OV (*see, e.g.* Bernecker) and raised (*see, e.g.*, Maurer, Fry) features.

In any event, Petitioner persuasively shows that Maurer teaches a raised tactile beaded groove, and Fry teaches a similar raised tactile beaded groove formed via small bubbles released during a laser groove forming process, using a process that an artisan of ordinary skill would have recognized as the same or similar to the laser groove forming process in Maurer. *See* Pet. 47–52; Ex. 1002 ¶¶ 53–54 (citing Ex. 1007, Fig. 2, 1:72–2:3, 2:39–61, 69–75, 3:19–24, 4:7–12), ¶¶ 101–07; *supra* Section II.C.1–2; Ex. 1005, Fig. 2; Ex. 1007, Fig. 2. Also, Fry suggests specifics about how to form a neat groove with adjacent beads, which would have aided Maurer’s ID card in forming grooves for reading information as Bernecker suggests, and/or providing a ready tactile feel via beads and grooves and providing authenticity. *See* Ex. 1007, Fig. 2, 2:69–75; Ex. 1005, Fig. 2; Ex. 1006, Figs. 1, 3.

As Dr. Tentzeris credibly explains, Maurer does not limit its teachings to melting, or otherwise limit its teachings to a process that occurs without at least some vaporization occurring based on the power of the laser. *See* Ex. 1012 ¶ 27 (“Maurer’s disclosure does not refer to this ‘idealized’ form of melting that would exclude bringing *any* of the material to a gaseous state (i.e., idealized vaporization)”), ¶ 25 (“For example, when applying laser

energy to a plastic substrate, a certain subset of molecules on the plastic substrate exposed to the laser may experience ‘melting,’ while others may experience ‘evaporation,’ or some combination of the two over time.”). Dr. Tentzeris cites Dr. Cairns’ testimony to support the notion that melting need not be an idealized melting that excludes some vaporization: Dr. Cairns testifies “[t]his [raised feature] process involves *briefly heating the plastic substrate to just above its vaporization temperature*, and then allowing it too [sic] cool.” Ex. 1012 ¶ 29 (quoting Ex. 2010 ¶ 47) (emphasis added by Dr. Tentzeris). Logically, as Dr. Tentzeris testifies, the laser melts some of the plastic and evaporates other portions, depending on the hot spot. Dr. Cairns’ testimony assumes the whole plastic region hit by the laser assumes the same uniform temperature throughout and the plastic in the laser beam either melts or vaporizes, but not both.

Maurer states “[i]t is known in principle (German patent specification No. 1,499,422) to use the energy of laser beams *to evaporate or even burn* materials which absorb this energy *to a greater or lesser degree*.” Ex. 1005, 3:57–60 (emphases added). In context, Maurer’s disclosed process builds on the German patent’s process by forming a relief above the printed line of information, and Maurer does not specify its process excludes the evaporation described in the German patent that Maurer improves upon. See Ex. 1005, 3:56–58, 6:14–23. Bernecker similarly discloses partial evaporation, but the evaporation does not result in raised ridges. See Ex. 1006, 3:15–17 (“the plastic material is evaporated” to create notches), 4:3–10 (disclosing partial decomposition to create notches without color changes in the plastic).

Fry specifically teaches using a laser “beam . . . sufficient to *degrade or melt the thermoplastic*” (Ex. 1007, 1:70–72 (emphasis added)) in order to “*form[] a groove or score in the thermoplastic having a bead* that has been formed during the operation bordering the groove” (*id.* at 2:1–3). *See also, e.g.*, Ex. 1007, 1:27–45 (describing “well known . . . different response mechanisms to temperature increase” of plastic, including “melting, evaporation and decomposition [that] shall be discussed as degradation-type reactions”). So for short-hand purposes (unless otherwise making a distinction), Fry groups melting, evaporation, and decomposition together as “degradation-type reactions.” As Dr. Tentzeris testifies, melting and evaporation occur together in Fry’s and Maurer’s process—because melting by itself only occurs in an idealized world. *See, e.g.*, Ex. 1012 ¶ 27 (“I also made it clear that how a person of skill in the art would view the term melting in *Maurer* differs from how a 5th grade student first learning about melting would understand the term.” (citing Ex. 2008, 69:16–70:15)).

Furthermore, contrary to Patent Owner’s arguments restricting Fry to teaching laser ablation (vaporization/evaporation) by focusing a beam only on a surface of plastic, Fry explains that “heat is generated by absorption of the beam *within the material*. This means that the initial hot spot in plastics irradiated by the laser beam is *within the material and not on the surface*.” *Id.* at 1:51–53 (emphasis added); *see also* Ex. 1012 ¶ 34 (“A person of skill in the art would have understood that whether the laser applies any energy to the core depends, as explained in *Maurer*, *Fry*, and even the ’494 patent, on the absorptivity of the laminate and core material.”). And as Petitioner notes, Fry’s claim 1 specifically recites “generating a groove in a

thermoplastic, substrate material” using a “beam of laser light . . . of such intensity that said beam *does not cause substantial vaporization.*” Ex. 1007, 5:7–13 (emphasis added); see Reply 12 n.5. Emphasizing the point about absorption of heat inside the plastic, Fry teaches that “plastics are not strong absorbers of the laser light, because if they were, *most of the light would be absorbed at or near the surface and little light would penetrate into the substrate.*” *Id.* at 3:20–23 (emphasis added).

Patent Owner contends

the process suggested by Petitioner would require instead focusing the laser just below the top surface of the laminate layer of the card. . . . Focusing the laser in this way is necessary to create the microchannel—and possibly attendant raised edges—that Petitioner advocates would exist. *Id.*

PO Resp. 24 (citing Ex. 2010 ¶¶ 86–97). As noted above, Fry teaches “the initial hot spot in plastics irradiated by the laser beam is *within the material and not on the surface*” (Ex. 1007, 1:51–53 (emphasis added)), and Fry also teaches “plastics are not strong absorbers of the laser light,” so that most of the laser light *penetrates* into the plastic (see Ex. 1007, 3:20–23). Fry does not specify how deep the laser energy penetrates into the plastic. Fry suggests the energy could reach the white paper core layer of Maurer—especially because sufficient energy can cut all the way through the plastic in Fry—i.e., cutting through it by focusing the laser “on any given spot on the material 12, for too long a time.” See Ex. 1007, 2:29–38; Ex. 1005, 4:37–42, 6:14–16, 6:59–60 (burning white paper core). Furthermore, Bernecker provides evidence that an artisan of ordinary skill knew how to

adjust a laser focus to obtain optimal results, including halftone images and evaporation of plastic material. *See* Ex. 1007, 3:64–4:18.

Patent Owner cites Maurer '754 to show grooves (i.e., by themselves, without raised portions) can be felt manually (*see* PO Resp. 26 (citing Ex. 2004, Fig. 2)), and Dr. Cairns cites it as “consistent” with his “opinions” (Ex. 2010 ¶ 100), but Maurer’s Figure 2 also shows that cutting some plastics creates microbubbles 14, 15 *prior to* forming channel 19, depending on the chemical make-up of the layer (e.g., a PVC layer from ALKOR) even at low energy doses. *See* Ex. 2004, 4:2–39 (ALKOR PVC layer description), 2:64–3:17 (“When the dosage of laser energy is small, microscopically fine gas bubbles and black, microscopically small points presumably consisting of elementary carbon, first arise locally in the dye When the laser energy is increased, the gas formation and blackening in the laser transformable film also increase until, at a certain laser energy depending on the properties of the film, a blackened channel consisting of more or less cohesive gas bubbles that are clearly defined locally is formed in the film. When the leaser energy is increased further, the channels break open so that a blackened groove which opens on the card surface is formed, on the edge and surface of which other color reactions are observed which may modify the overall color effect.”), 5:10–40 (describing the successive process of gas formation to groove formation to blackening), Fig. 2.

In any event, Fry’s and Bernecker’s laser grooving processes, Maurer’s process operates to cut a groove into the top layer of plastic. *See* Ex. 1005, Fig. 2 (groove in top layer 10); Ex. 1007, Fig 2 (groove in layer 12), 3:69–74 (describing a metal backing plate for use in the grooving

process that “is not especially dependent upon the backup plate”); Ex. 1006, [57] (noting the “invention relates to a data carrier . . . with at least one plastic layer having first diffusely light-scattering properties”), 3:49–62 (integrating the invention with known data carriers “already inscribed in color contrast by a laser . . . such as photo, name, signature, etc.”), 3:64–67 (using “the same laser” for color and colorless processing), Fig. 3 (etched OV features). Even though Maurer’s process provides laser energy to the paper core, like Fry and Bernecker, Maurer does not cut all the way through the top layer—rather, Maurer’s process cuts partly through the top layer and the laser energy still darkens/blackens the “white paper” core. *See* Ex. 1005, 4:25–30, 6:14–23, 6:59–60.

In other words, some of the energy from the laser in Maurer’s process burns indicia into the white paper core as part of the layer melts near the core. *See id.* In addition to melting, some evaporation occurs in hotter regions of the plastic to create the raised features, as both experts agree foaming/evaporation must occur to create raised features. *See* Ex. 1012 ¶¶ 25–29; Ex. 2010 ¶¶ 89 & n.6 (testifying “creation of a feature like the one Petitioner argues is depicted in Figure 2 can only be made using the more aggressive vaporization” and stating “I understand that . . . Dr. Tentzeris[] agrees with me on this point.” (citing Ex. 2008, 188:23–189:7)). Bernecker specifically notes one can use “the same laser” to produce colorless and color engraving, by adjusting the focus and power of the laser, creating “notches” when the “material in the radiation-exposed areas is melted and partly decomposed” [i.e., partly evaporated]. *See* Ex. 1006, 3:64–4:10.

Dr. Cairns and Dr. Tentzeris agree that what occurs in the plastic depends on several factors. For example, Dr. Cairns testifies that

[w]hether a specific area of a plastic substrate is heated, melted, or vaporized is dependent on calibration of the various laser- and substrate-processing variables identified above. The most important of these variables are the power of the laser, the speed with which the laser is moving, and the depth within the substrate at which the laser is focused.

Ex. 2010 ¶ 35; *accord id.* at 31–33 (citing other factors).

But the record does not support Dr. Cairns’ conclusion that melting occurs to the exclusion of vaporization in Maurer’s process. *See* Ex. 1012 ¶ 27 (“A person of skill in the art would not think that these processes are ‘mutually exclusive’ of each other, as Idemia and Dr. Cairns assert.”). As noted above, Bernecker verifies “melt[ing]” occurs with “part[] decompos[ition]” (i.e., evaporation) to create “notches without color changes.” *See* Ex. 1006, 4:7–10.

Similarly, Fry discusses two mechanisms for bubble creation (i.e., partial evaporation): 1) “the release of entrained gases or water vapor from the plastics in the molten region,” and 2) “the internal temperature of the plastics may exceed the point at which the material degrades, and thereby result in the formation of small gaseous molecules.” Ex. 1007, 4:42–48 (emphasis added). Dr. Cairns and Dr. Tentzeris focus on the second mechanism, agreeing that at least some evaporation must occur to create a raised ridge and foaming. Ex. 1012 ¶ 29; Ex. 2010 ¶ 47. (But as noted above, Bernecker discloses that evaporation occurs without necessarily create a raised ridge or discoloration, even if it creates depressions. *See* Ex. 1007, 3:15–17).

Regarding the second mechanism, Fry states “[i]n polyethylene, bubble formation occurs *before the formation of the groove* and not thereafter.” *Id.* at 4:52–53 (emphasis added). Fry adds that in other plastics, “bubble formation occurs throughout the grooving or scoring process.” *Id.* at 4:62–63. (Above a certain laser power threshold, bubbling or gas formation also occurs in the Maurer ’754 process as noted above, although Maurer ’754 employs a specific layer—ALKOR PVC layer. *See* Ex. 2006, Abstract, 2:57–3:17, 4:39–44, 5:10–40.) In Fry’s process, gas bubbles occur after “the material is sufficiently hot” and some bubbles “collapse in the groove center because that region is hottest and *molten* for the longest period of time.” Ex. 1007, 4:58–62 (emphasis added). The word “molten” means “[m]ade liquid by heat: MELTED.”²¹ So Fry shows that some bubbles arise from the *molten* plastic during the process of groove formation. Fry and Maurer disclose similar plastics. Ex. 1005: 6:57–58 (“The cover sheets preferably consist of plastics, e.g. PVC”); Ex. 1007, 3:1–12 (Table I, listing polyvinyl chloride and other plastics).

As indicated above, claim 1 of Fry corroborates the understanding that only some vaporization occurs. It recites using a “laser beam . . . of such intensity that said beam *does not cause substantial vaporization*,” with “such intensity causing bubbles to evolve from the degraded portion . . . to accumulate along the sides of the groove.” So Fry involves some

²¹ WEBSTER’S II NEW RIVERSIDE DICTIONARY 763 (1984) (Ex. 3004).

vaporization arising from the molten material to create raised ridges—i.e., not substantial vaporization.

Supporting the testimony of both experts, Fry discloses that bead formation and the size of the bubbles largely results from different factors, including, for example, the velocity of the beam and the type of material, which ultimately controls “the energy density in the laser beam” on the plastic, which in turn dictates the result of vaporization, melting, and bubble formation. *See* Ex. 1007, 4:15–17 (“Thus, if the relative velocity is too high, a bead results rather than a groove.”). Dr. Cairns refers to creating ridges via microbubbles as “routinely referred to in the art as foaming,” suggesting an artisan of ordinary skill readily knew how to foam plastics to create ridges. *See* Ex. 2010 ¶¶ 47–50.

According to Dr. Tentzeris,

Fry explained that the characteristics of its groove depend primarily on (1) the energy of the laser (Ex. 1007 at Table I, II), and (2) the absorptivity of the material (*id.* at Table I). *Id.* at 1:49–50 (“heat is generated by absorption of the beam within the material”). *Fry* also discusses other factors, including the thermal conductivity and diffusivity of the plastic (*id.* at 3:31–42), but it does not specify that the focal point of the laser must be on a specific point in the laminate.

Ex. 1012 ¶ 33 (noting Fry does set a focusing the laser “to a spot about 3/16 inches wide” on the surface of a plastic layer in one embodiment (citing Ex. 1007, 2:62–65)).

Petitioner and the evidence of record show that an artisan of ordinary skill would have been able to adjust laser power and focus in order to melt or evaporate plastic in a card such as that of Maurer as modified by Bernecker

to ensure the desired result of a card having multiple features: printing, laminating, voids, raised features, OV features, and raised OV features. *See, e.g.*, Pet. 10 (discussing level of skill and background art); *supra* Sections II.C.1–3; Ex. 1005, 6:26–28 (“laser does not have to cause a blackening or destruction of the core”), 8:25–32 (“technology is already known” for providing “inseparable” photographs on the core with “many shades of gray” “‘burned’ into the paper core,” and “the density of the laser beam intensity must be reduced appropriately” for other color processes); Ex. 1006, 2:60–63 (“[t]he laser, its power, and the plastic material must be coordinated with one another”), 4:50–60 (disclosing color 4 and non-color 3 personalization data features using the same or different laser); Ex. 1006, 3:60–65 (coordinating laser power with plastic), 3:13–17 (vaporization), 3:64–4:18 (varying laser power and focus creates variations including burning to halftone images to colorless notches in the plastic).

Maurer does not support Patent Owner’s assertion that Maurer’s process requires focusing the laser on the white paper core. *See* PO Resp. 25; Ex. 2010 ¶¶ 69–70; Ex. 1012 ¶¶ 32–33. Regardless, Maurer’s paper core must get hot enough to burn information into it. Ex. 1005, 6:14–16. Maurer’s process, even when modified by Fry and Bernecker, does not preclude, and requires, some evaporation of the molten plastic, in order to form the beads. Ex. 1012 ¶ 29; Ex. 2010 ¶ 47; Ex. 2008 188:22–89:7.

Dr. Cairns bases his assertion that Maurer must focus the laser beam on the card core as follows: “This internal and localized focus of the laser energy is described in Maurer at 4:37–42 (‘Since the sites treated with the laser beam are located inside the card, so to speak, owing to the localized

burning of the core . . .”). Ex. 2010 ¶ 69 n.2 (quoting Ex. 1005, 4:37–42). But this quoted passage does not state the laser focuses on the paper core. Rather, the passage refers generally to treating sites “inside the card,” suggesting localized burning of the core as the laser light passes through the plastic, even with a laser focus in the plastic, and the white paper core traps the laser energy (including conducted heat) as it must to burn the paper core. See Ex. 1012 ¶ 34 (“A person of skill in the art would have further understood that a laser does not abruptly stop supplying energy past the focal point.”); Ex. 1005, 4:38–40 (“localized burning of the core”), 6:14–16 (white paper core must be hot enough to burn indicia into it).

Dr. Cairns contends when Maurer’s process focuses on the card core, “gravity . . . forces the liquefied material to sink downwardly, filling any space between the laminate and card core as well as cavities and/or fibers in the card core itself that can accommodate additional material.” Ex. 2010 ¶ 74. Dr. Cairns also contends “[h]eat from the laser energy blackening the core would radiate outwardly from the site of laser focus and melt a radial area surrounding the now blackened core.” *Id.* ¶ 72. But as noted, Maurer does not state it focuses the laser on the card core, and Maurer’s process already provides “pressure and heat” to “hot–laminate[]” the paper core to the outer plastic layers, prior to applying the laser. See Ex. 1007, 6:60–63. Maurer describes further adhesion due to melting as Dr. Cairns testifies, but Maurer does not describe any groove creation as a result of “gravity” making the plastic sink into the paper pores. So Maurer does not support Dr. Cairns’ theory.

Expounding on his unsupported theory, Dr. Cairns explains “evaporation by focusing the laser at the core would fail because the increased laser energy required to form the microchannel (beyond the mere melting energy ordinarily required by Maurer) would result in the eradication of the entire laminate layer above the card core.” Ex. 2010 ¶ 98. Dr. Cairns does not cite anything to support this latter hypothesis. *See id.* ¶¶ 98–99. As indicated above, Dr. Cairns does state his “opinions regarding the actual disclosure of Maurer are consistent with the disclosure in another of the same inventor’s patents filed in the same period,” namely Maurer ’754. *Id.* ¶ 100 (citing Ex. 2004), Fig. 2). Dr. Cairns does not state unequivocally that Maurer ’754 supports the latter hypothesis. *See id.* In any event, as discussed above, Maurer ’754 discloses bubble formation (without forming beads) creates blackening using a different material (ALKOR PVC). *See* Ex. 2004, Abstract, 2:57–3:17, 4:39–44, 5:10–40.²² If anything, Maurer ’754 suggests focusing a laser above the core, because the process results in heating the plastic first to create bubbles before forming the groove.²³ *See* Ex. 2006, 5:10–41, Fig. 2 (showing bubbles 15 and black points 14 “first

²² Maurer ’754 specifically notes ALKOR PVC exhibits different properties than other conventional PVC materials employed for laminating cards. *See* Ex. 2004, 4:39–48 (noting ALKOR PVC has a “linear absorption coefficient $K \dots$ at a wavelength of 1064 nm is approx. 15 times greater than a hard PVC film conventionally used in laminating technology”).

²³ Maurer ’754 states “[i]t is only essential that [laser transformable cover films] are absorb[er] in the wave range of the recording laser and are at least transparent enough in the visual spectral range so that information or patterns underneath the cover films remain recognizable through the latter.” Ex. 2004, 6:20–24.

form[ed]” before groove 19 and discolored areas 20). And Bernecker discloses plastic evaporation without discoloration or raised beads. *See* Ex. 1007, 3:13–17, 3:64–4:18.

Maurer shows that the card paper core can be inscribed (burned), for example, to create a gray scale mosaic photograph, without altering the plastic layer above it. *See* Ex. 1005, 4:38–42 (adjusting laser to adjust extent of burning), 6:18–23 (melting depends on energy of laser beam) 6:60–62 (hot lamination); 8:16–26 (making “inseparable” gray scale mosaic photograph from core based on prior art methods). Dr. Cairns acknowledges that Maurer’s paper core can be inscribed (burned) concurrently with melting the plastic layer above it. *See* Ex. 1012 ¶¶ 79, 88, 98. But nothing in the record, and nothing cited by Dr. Cairns, suggests the whole laminate layer above the core must be eradicated above the paper core when blackening the core while melting the layer above as some of the layer also vaporizes, as Maurer and Fry suggest. Ex. 1012 ¶¶ 26–32. Dr. Cairns does not persuasively rebut or challenge Dr. Tentzeris’s credible testimony, which the record supports, that some plastic vaporization necessarily occurs during non-idealized melting, given sufficient energy within the localized molten plastic (as Fry and Maurer’ 754 each show). *See id.* Dr. Cairns’ testimony supports Dr. Tentzeris to a certain extent, because Dr. Cairns refers to a process “[in] addition to the two [melting and vaporizing] processes,”—*“briefly heating the plastic substrate to just above its vaporization temperature, and then allowing it to[o] [sic] cool.* With such a process, microbubbles are allowed to form in the plastic substrate and are then trapped when the material cools.” Ex. 2010 ¶ 47 (emphasis added). As

noted above, Dr. Cairns refers to this as “routinely referred to in the art as foaming.” *Id.* ¶ 50.

Dr. Cairns cites to an article that describes the “fabrication of microfluidic devices for chemical and biomedical analysis” (Ex. 2012, 1) and concludes “[l]ow-power CO2 laser direct-writing ablation was successfully used to micromachine a microchannel on the polycarbonate substrate in this work” (*id.* (“the 2009 Micromachining Article”) at 4).²⁴ The 2009 Micromachining Article does not support Dr. Cairns, as the article shows a molten region existing underneath what Dr. Maurer refers to as a vaporization region. *See* Ex. 2010 ¶¶ 38–39 (discussing Ex. 2012 for a polycarbonate layer).²⁵ Also, Dr. Cairns states that in 2009 Micromachining Article, “[t]he depth of the microchannel that is formed in the substrate depends on, among other things, the depth to which the laser is focused within the substrate.” *Id.* ¶ 41; *see also id.* ¶ 39 (“Due to the efficient

²⁴ Although this article forms a primary basis for Dr. Cairns’ testimony, Patent Owner does not cite it. *See* Ex. 2010 ¶¶ 37–40 (discussing Ex. 2012); PO Resp. 25 n.4 (citing Ex. 2010 ¶¶ 37–40 (discussing Ex. 2012)).

²⁵ We assume without deciding that the 2009 Micromachining Article may shed some light on the laser process at issue here, even though no evidences shows that this article, published in 2009, indicates the knowledge of a skilled artisan at the time of the invention (i.e., 2001). Also, polycarbonate, the subject of the 2009 Micromachining Article, probably behaves somewhat differently than other plastics, as Maurer ’754 indicates with respect to another material (i.e., ALCOR PVC). *Accord* Ex. 2010 ¶ 32 (noting the “doping” of the material plays a role). For example, in Exhibit 2012, Figure 2 shows that the whole groove is scorched (and it does not show a prominent bead, if any), whereas Fry discloses a “generally neat and regular [groove], when accompanied by the bead.” Ex. 1007, 3:62–63.

absorption of laser energy by the polycarbonate material at the focal point, and the extreme temperature drop off at distances away from the focal point, decomposed material is quickly vaporized and ejected from the area of laser focus while the area immediately surrounding that area of focus remains solid—having *not even been heated to its melting point.*”).²⁶ But the 2009 Micromachining Article directly contradicts Dr. Cairns about the depth of the laser focal point. The laser described in the 2009 Micromachining Article focuses *on the surface of the material—and that laser ablates and melts some material under the surface under that focal point.* See Ex. 2012, 2 (“The Gaussian laser beam with diameter of 85 μm was *focused on the surface of the sample* using a reflecting mirror and a focusing lens with focal length of 65mm.” (emphasis added)), Fig. 2 (showing an ablation region and molten material thereunder); *see also* Ex. 2012 ¶ 38 (reproducing Figure 2 to show an ablated region with molten material thereunder). The 2009 Micromachining Article describes a similar relationship between power and laser velocity that Fry describes, with a higher power and slower velocity creating a wider channel “and the birth of a molten pool.” *Id.* at 3; Ex. 1007,

²⁶ Dr. Cairns provides an equation relating thermal diffusivity, temperature, and time, as a function of distance from a laser focal point, but provides no quantifiable data to support his point that the temperature of plastic “drops of quickly . . . from the focal point.” See Ex. 2012 ¶¶ 36–37. The equation cited by Dr. Cairns also does not account for “thermal conductivity” and the fact that heat transfer occurs in a *molten* plastic substance in Maurer and Fry. See *id.*; Ex. 1007, 3:32–40 (describing “the thermal conductivity and diffusivity of the plastics” as important factors “pertinent in the scoring of plastics”).

2:38–45, 4:6–51. So similar to Fry (albeit with a different material creating different results such as scorching), the 2009 Micromachining Article describes creating a molten pool as the laser ablate[s] some of the material and leaves some molten material (and other non-melted material). *See* Ex. 2012, 3, Fig. 2.

Regardless of the focal point, and contrary to Dr. Cairns’ testimony, Fry and the 2009 Micromachining Article each show laser energy propagating beyond the laser focal point. *See, e.g.*, Ex. 2012, Fig. 2; Ex. 1007, 1:49–52 (“[H]eat is generated by absorption of the beam within the material. This means that the initial hot spot in plastics irradiated by the laser beam is within the material and not on the surface.”). This implies, as found above, that the white paper core in Maurer traps the laser energy going through the plastic so that it accumulates sufficient energy to burn regardless of whether the plastic material above melts, or melts and partially vaporizes to form the raised ridges depicted at Figure 2 of Maurer.

Petitioner and Dr. Tentzeris show persuasively, given the similarities of creating a void with a tactile feel using a laser on plastics as disclosed in Fry and Maurer, that it would have been obvious in view of Fry to ensure the raised feature in Maurer provide a predictable tactile feel as suggested by the specifics regarding Fry’s “neat and regular” groove and bead structure (Ex. 1006, 3:62–63). *See* Ex. 1002 ¶¶ 106–112, 126, 185–88; Pet. 55 (arguing foaming would have been obvious). Dr. Cairns refers to creating ridges via microbubbles as “routinely referred to in the art as foaming,” suggesting an artisan of ordinary skill readily knew how to foam plastics to create the ridges described in Fry and Maurer. *See* Ex. 2010 ¶¶ 47–50.

In summary, using Fry's process in conjunction with Maurer's similar process involves applying a laser, which the plastic absorbs at some point below the surface, so that some of the plastic material in the groove becomes molten and degrades to form a groove, releasing bubbles to form a bead during the grooving process as Fry teaches, and at the same time, blackens the core material for printing due to heat absorption to the core layer. Contrary to Patent Owner's arguments, Fry, Bernecker, and Maurer do not employ incompatible processes. Fry does not teach that the whole thickness of the region forming the groove and hit by the laser vaporizes. Rather, Fry teaches the region goes into a molten state, similar to Maurer and Bernecker. *See* Ex. 1012 ¶ 22 ("the complex processes of melting and evaporation were not mutually exclusive" and "a person of skill in the art reviewing the prior art would have understood blackening the core while creating raised features was possible, at least because *Maurer* discloses such a process"), ¶ 25 ("melting is a complicated process with complex chemical characteristics that involves some form of evaporation" and "when applying laser energy to a plastic substrate, a certain subset of molecules on the plastic substrate exposed to the laser may experience 'melting,' while others may experience 'evaporation,' or some combination of the two over time"), ¶ 34 ("A person of skill in the art would have further understood that a laser does not abruptly stop supplying energy past the focal point," "Idemia's assertion is also not consistent with physics," and "[i]n order for the laser to apply no energy to the core, the intervening material (i.e., the material above the core, between the laser source and the core) must absorb all of the laser energy.").

Fry explains that "heat is generated by absorption of the beam within

the material. This means that the initial hot spot in plastics irradiated by the laser beam is within the material and not on the surface.” Ex. 1007, 1:49–53. In similar fashion, Maurer generally describes “the sites treated with the laser beam are located inside the card”—i.e., not necessarily focusing the laser on the card core. *See* Ex. 1005, 4:37–38. Bernecker generally teaches skilled artisans knew how to vary the focus and power to obtain desired results, including evaporation, and melting with some evaporation. *See* Ex. 1006, 3:15, 3:64–4:10. So given that Fry, Bernecker, and Maurer disclose cutting grooves in the same type of plastic material generally used for plastic ID cards (e.g., PVC), the hot spot in each would be the same or similar based on the plastic’s absorptivity, thermal conductivity, and diffusivity. *See* Ex. 1012 ¶¶ 32–33 (testifying Maurer does not specify a focal point and listing other more controlling factors disclosed by Fry and Maurer including absorptivity of the plastic, card core coating, and laser power (citing Ex. 1007, 1:49–50, 2:62–65, 3:31–42)).

Fry’s “neat and regular” clear groove with beads would have presented a ready tactile feel and visible indication of authenticity, results which Maurer suggest as beneficial for ID cards. *See* Ex. 1005, 4:19–55. Bernecker suggests a colorless feature would have provided additional benefits of ready information comparison and authenticity by creating an OV feature for non-parallel clear surfaces, including the raised non-parallel surfaces of Fry or Maurer. *See* Ex. 1007, [57], 3:13–26, 4:40–49, Figs. 1–3. Dr. Cairns does not address the teachings in Fry, Maurer, and Bernecker showing that artisans of ordinary skill in the art knew how to employ a laser to obtain the desired effect. Nevertheless, Dr. Cairns acknowledges creating

ridges via microbubbles was “routinely referred to in the art as foaming,” suggesting an artisan of ordinary skill readily knew how to foam plastics to create ridges. See Ex. 2010 ¶¶ 47–50. Dr. Cairns also recognizes that vaporization requires “further energy” than melting, so melting occurs in regions prior to vaporization as Fry teaches. See Ex. 2001 ¶ 51; Ex. 1007.

g. The “V” Feature

Grouping claims 6, 9–12, and 17 together, Patent Owner contends “Petitioner’s cited references fail to teach the creation of voids having a ‘V’ cross section.” PO Resp. 56. To the contrary, as the panel initially found in the Institution Decision, Bernecker discloses the feature as “notches without color changes of the plastic.” Ex. 1006, 4:9–10; Inst. Dec. 27 n.7. As noted above (*supra* note 10) and in the Institution Decision, the term “notch” means “[a] V-shaped cut.” Ex. 3001; Inst. Dec. 27 n.7. Patent Owner does not address this or counter the evidence. See PO Resp. 56–59. We maintain our finding concerning this evidence.

In addition, Bernecker depicts the notches as generally V-shaped at Figure 3. The ’494 patent does not describe any special feature related to a V-shaped groove. To the contrary, the ’494 patent specifically states

throughout this application, laser engraved indicia, information, identification documents data, etc., *may be shown as having a particular cross sectional shape (e.g., rectangular) but that is provided by way of example and illustration only and is not limiting, nor is the shape intended necessarily to represent the actual resultant cross sectional shape that occurs during laser engraving or manufacturing of identification documents.*

Ex. 1001, 5:9–17 (emphasis added).

Even if Patent Owner’s claim construction applies, and the V-shape must generally begin at two flat sides (*see supra* Section II.A), Bernecker at least suggests such a shape because Bernecker describes a notch and generally depicts a V-shape as found above. *See* Reply 21–22 (citing Ex. 1006, 4:9; annotating Figs. 2, 3). The ’494 patent reveals nothing special about the shape as requiring the “V” to begin at two flat sides either structurally or functionally.

h. Summary

In summary, Petitioner makes a detailed showing supported by rational underpinning regarding the challenged claims. *See* Pet. 17–63. Petitioner shows by a preponderance of evidence that the combination of Maurer, Bernecker, and Fry would have rendered obvious the subject matter of claims 1–14, 19 and 20 and adding Gunn to that combination would have rendered obvious the subject matter of claims 15–18. *Id.* Patent Owner’s arguments do not undermine Petitioner’s showing.

8. Weight of Dr. Tentzeris’s Testimony

Patent Owner contends “Dr. Tentzeris’s testimony is not credible and provides no assistance to the Board’s obviousness analysis.” PO Resp. 59. First, Patent Owner contends Dr. Tentzeris “refused to admit that the figures in Maurer are cartoons or imprecise renderings drawn by an artist.” *Id.* at 59–60. But Patent Owner’s citations reveal that Dr. Tentzeris acknowledged that the “dimensions could be different, could be larger or smaller but the fundamental teachings [about elevated features and discoloration] . . . leads to formation of structures similar Fig. 2.” *See id.* at 60 (quoting Ex. 2008, 161:24–162:24). Patent Owner’s similar arguments about other figures that

Patent Owner characterizes as “cartoons” fail to show a lack of credibility. The figures need not be dimensioned perfectly or represent “photographs or scanning electron microscope cross-sections” to lend insight, as discussed above. *See id.*

Second, Patent Owner alleges that Dr. Tentzeris’ experience with lasers does not relate to the field of invention. *Id.* Petitioner persuasively responds that Patent Owner “ignores the portions of Dr. Tentzeris’ deposition where he explained both his education relating to the field of invention (*e.g.*, Ex. 2008, 19:1–20:18) and practical experience in actually experimenting within the field (*id.* 20:19–27:12).” Reply 24.

Third, Patent Owner contends Dr. Tentzeris “brush[ed] aside” dimensions in Fry and “refused to accept—much less deal with—the import of the plain language of Fry that contradicted his conclusions.” *Id.* at 60. As noted above, Fry’s teachings generally evince the mechanisms of laser grooving in plastics, and Dr. Tentzeris, like Dr. Cairns, relied upon those teachings. Dr. Tentzeris credibly supported his testimony by citing to Fry where applicable and aided the panel in understanding the technology, as discussed above.

Fourth, Patent Owner contends Dr. Tentzeris refused to acknowledge that Bernecker “used the term ‘microrelief’ to reference features below the top surface of the card.” *Id.* at 62 (citing Ex. 2008, 121:24–123:4, 129:16–132:16). The cited deposition passages does not appear to show a direct question posed about a “microrelief.” *See* Ex. 2008, 121:24–123:4, 129:16–132:16. In any case, as Petitioner points out, Dr. Tentzeris stated that

Bernecker discloses “a microrelief” and “notches or depressions on the surface.” Reply 25 (citing Ex. 2008, 122:25–123:4).

Finally, Patent Owner makes a number of other arguments, including that Dr. Tentzeris demonstrated a lack of understanding of the technology, improperly analyzed the prior art and claims, did not identify the claim construction he employed, gave unresponsive testimony, and used notes during his deposition. See PO Resp. 54–56. As one specific example, Patent Owner faults Dr. Tentzeris for “form[ing] no opinion about exact meanings” of “subjective” terms, and instead provided “examples” of “foaming,” “tactile feature,” “tactile effect,” and “OVD.” See PO Resp. 54 (citing Ex. 2008, 34:4–37:19, 86:25–88:2, 88:16–89:4, 95:15–23, 98:2–17, 135:11–138:8).

A fair reading of Dr. Tentzeris’s deposition testimony shows that he generally responded to Patent Owner’s questions, even though he used notes, and he also provided useful insight to the panel in his declaration testimony. As one example referenced by Patent Owner, during his deposition, Dr. Tentzeris stated as to a “foamed laminate material . . . Fry explained that the process of grooving or scoring thermoplastic results in small bubbles that can be seen during microscopic examination as written in Fry . . . column 3, lines 63 and 68.” Ex. 2008, 34:19–34. So Dr. Tentzeris informs that foaming includes “small bubbles” creating during a scoring process. This constitutes a reasonable example of foaming that Patent Owner does not challenge and it also serves to define the meaning of the term—i.e., foaming includes small bubbles. Dr. Tentzeris provided similar responses to shed light on the meaning of the other terms, at the same time,

explaining where he found the terms in the prior art. *See, e.g., id.* at 94:15–96:16 (tactile feel), 123:16–25 (describing a notch by referring to Fry), 134–136 (describing methodology of using the prior art, and referring to the ’494 as an example patent for an optically variable device). Patent Owner does not contend the examples it cites show that Dr. Tentzeris incorrectly characterized any terms under discussion, let alone any terms at issue in the trial. In order to aid the panel’s understanding, Dr. Tentzeris need not provide an “exact meaning” to subjective or other terms, especially terms not in dispute.

Accordingly, we afford Dr. Tentzeris’s testimony its due weight, and determine it to be credible, having considered it in light of Dr. Cairns’ testimony and the prior art and arguments presented as set forth in the Final Decision.

9. Summary

For the foregoing reasons, Petitioner has shown, by a preponderance of the evidence, that the subject matter of (i) claims 1–14, 19, and 20 would have been obviousness over Maurer, Fry, and Bernecker, (ii) claims 15–18 would have been obviousness over Maurer, Fry, Bernecker, and Gunn.

III. PATENT OWNER’S CONTINGENT MOTION TO AMEND

As discussed above, Petitioner has demonstrated by a preponderance of the evidence that claims 1–20 are unpatentable. Accordingly, the contingency in Patent Owner’s Contingent Motion to Amend manifests. Paper 18 (“Mot.” or “Motion”). The Motion seeks to replace unpatentable claims 1–20 with substitute claims 21–40. Motion 4.

To support its Motion, Patent Owner relies on the Declaration of Darran R. Cairns, Ph.D., in Support of Patent Owner’s Contingent Motion to Amend.” Ex. 2011. Patent Owner also relies on the Cairns Declaration (Ex. 2010) it filed with its Patent Owner Response (addressed above and throughout this Final Written Decision).

Petitioner opposes the Motion in its Response in Opposition to Patent Owner’s Contingent Motion to Amend. Paper 24 (“Opp.” or “Opposition”). To support its Opposition, Petitioner provides the Declaration of Emmanouil M. Tentzeris Ph.D. in Support of Opposition to Motions to Amend U.S. Patent No. 7,207,494 (Ex. 1013).

Replying to the Opposition, Patent Owner filed a Reply in Support of its Contingent Motion to Amend. Paper 25 (“PO Reply” or “Patent Owner’s Reply”). Responding to Patent Owner’s Reply, Petitioner filed a Sur-Reply to Patent Owner’s Motion-to-Amend. Paper 32 (“Pet. Sur-Reply” or “Petitioner’s Sur-Reply”). For the reasons below, we deny the Motion.

A. The 37 C.F.R. § 42.121 and 35 U.S.C. § 316(d) Requirements

In an *inter partes* review, substitute claims must be proposed as a part of a motion to amend. 35 U.S.C. § 316(d). The Board must assess the patentability of proposed substitute claims “without placing the burden of persuasion on the patent owner.” *Aqua Prods., Inc. v. Matal*, 872 F.3d 1290, 1328 (Fed. Cir. 2017) (en banc). Patent Owner’s proposed substitute claims must meet the statutory requirements of 35 U.S.C. § 316(d) and the procedural requirements of 37 C.F.R. § 42.121. See “Guidance on Motions to Amend in view of Aqua Products” (Nov. 21, 2017) (https://www.uspto.gov/sites/default/files/documents/guidance_on_motions_

to_amend_11_2017.pdf) (“Guidance”).

Under the Guidance,

[i]n light of the *Aqua Products* decision, the Board will not place the burden of persuasion on a patent owner with respect to the patentability of substitute claims presented in a motion to amend. Rather, if a patent owner files a motion to amend (or has one pending) and that motion meets the requirements of 35 U.S.C. § 316(d) (i.e., proposes a reasonable number of substitute claims, and the substitute claims do not enlarge scope of the original claims of the patent or introduce new matter), the Board will proceed to determine whether the substitute claims are unpatentable by a preponderance of the evidence based on the entirety of the record, including any opposition made by the petitioner. Thus, for example, if the entirety of the evidence of record before the Board is in equipoise as to the unpatentability of one or more substitute claims, the Board will grant the motion to amend with respect to such claims, and the Office will issue a certificate incorporating those claims into the patent at issue.

Guidance 2.

The Guidance also states “a patent owner . . . must meet the requirements for a motion to amend under 37 C.F.R. § 42.121 That is, a motion to amend must set forth written description support . . . in relation to each substitute claim, and respond to grounds of unpatentability involved in the trial.” *Id.*

The Motion meets certain threshold requirements of 37 C.F.R. § 42.121. Particularly, the Motion seeks to add a reasonable number of substitute claims (one-for-one), replacing claims 1–20 with substitute claims 21–40, with each substitute claim responding reasonably to Petitioner’s grounds of obviousness involved in the trial. *See* Mot. 4, 23–25, App’x.

Petitioner generally alleges a failure of Patent Owner's duty of candor, citing Patent Owner's "failure to even acknowledge the contentions" of invalidity served "in the Court of Federal Claims." Opp. 11. In response, Patent Owner supplied the contentions as Exhibit 2014. See PO Reply 7–8. The allegation lacks sufficient context for the panel to address it.

*B. New Matter, 37 C.F.R. § 42.121, 35 U.S.C. § 316(d),
All Claims in General, Specifically Claims 23, 28, 34, 36, and 40*

The Guidance indicates Patent Owner's Motion must meet new matter/written description requirements. See Guidance 2.; 37 C.F.R. § 42.121(a)(2) ("A motion to amend may be denied where . . . (ii) The amendment seeks to enlarge the scope of the claims of the patent or introduce new subject matter."); 35 U.S.C. § 316(d)(3) ("An amendment . . . may not enlarge the scope of the claims of the patent or introduce new matter.").

Petitioner generally argues Patent Owner's "citation to its expert's report" and "string citations" to the original patent application fail to provide written description report. See Opp. 5–6. Patent Owner's citations appear reasonable and absent a specific shortcoming alleged by Petitioner, satisfy Patent Owner's burden of production with respect to new matter/written description support for all of the claims.

Claims 23, 28, and 36, respectively depend from independent claims 21, 25 and 35, and require one or more raised features to have "a height above the nominal top surface level that is at least 30% of a thickness of the outer laminate layer before . . . laser processing." Independent claim 40

recites a similar limitation. In claim 40, the “tactile raised feature” must be “adjacent said void pattern.”

In addition, with the exception of substitute claim 40, the substitute claims recite a “raised feature” with an OVD quality. Patent Owner agrees with this summary, asserting that “[i]n all the claims (except for claim 40), this raised feature must also have an optically variable quality (e.g., not visible when viewed straight on, resists photocopying).” Mot. 24.

To address the new matter/written description requirement, Patent Owner asserts that the original ’494 patent application (Ex. 1004) incorporates by reference U.S. Patent No. 5,005,872 (Ex. 2009 (the ’872 patent))), which states the following relevant to the 30 % limitation in the substitute claims:

In the present invention this increase in volume arising from gas bubbles is exploited selectivity to produce characters which are distinct from their surroundings not only in terms of their color but also in terms of their relief height. As tests have shown, plastic material such as PVC can increase its volume by 30% and more due to the action of a laser beams even without additional foaming agents, and without substantial loss of strength in the film in these areas.

See Motion 9, 21–22 (quoting Ex. 2009, 2:66–3:6, citing Ex. 1004, 600).

Petitioner contends the “’872 patent merely discloses that PVC *can be foamed* to increase volume/height by 30%. See Ex. 2009, 2:66–3:6, 6:14–16. It does not convey to a person of ordinary skill in the art that the *particular security feature* of the ’494 patent had a specific height.” Opp. 7 (citing Ex. 2009, 2:66–3:6, 6:14–16; Ex. 1013 ¶ 22). Petitioner also points out the substitute claims “require *invisible raised features* when viewed

straight on (e.g., substitute claim 23).” *Id.* (emphasis added). In contrast, Petitioner notes “[t]he ’872 patent further specifies that its raised features include *color* changes that ‘are distinct from their surroundings.’” *Id.* at 6 (citing Ex. 2009, 2:67–3:1) (emphasis added).

In response, Patent Owner contends

[t]he ’872 patent—which was specifically selected to be incorporated by reference—demonstrates that the inventors were aware that laser processing of polycarbonate laminate layers, such as PVC, could result in raised features that extend above the top surface level by a height of at least 30% of the thickness of the laminate layer before laser processing. Ex. 2009 at 3:2–6, 6:14–16. The inventors expressly taught that the etched features should be both prominent and optically variable

PO Reply 5.

Initially, this response appears to intermingle PVC (polyvinyl chloride) with polycarbonate, a relatively harmless error with respect to the issue at hand. In any event, Patent Owner does not provide the requisite written description support for claims 23, 28, 36, and 40 in its Motion. As indicated above, the phrase “at least 30% of a thickness of the laminate layer,” as recited in the substitute claims at issue here, lacks an upper bound for thickness that the ’872 patent does not support. At the cited passage, the ’872 patent states “plastic material such as PVC can increase its volume by 30% *and more* due to the action of a laser beam even without additional foaming agents, and without a substantial loss of strength in the film in those areas.” Ex. 2009, 2:66–3:6 (emphasis added). This passage does not quantify “and more.” However, elsewhere, the ’872 patent indicates the extent of the “more.” For example, the ’872 patent states a “transparent

cover film with a total thickness of 250 to 350 μ can be expanded by appropriate laser action to a thickness of 350 or 450 μ . Due to the local limitation of the ‘foaming’ area, an increase in volume of about 30% is reflected more or less directly in a corresponding change in thickness.” *Id.* at 6:11–16. The ratio of 350/250 represents a thickness/volume increase of 40%, whereas the ratio of 450/350 represents a thickness/volume increase of 28%.

Accordingly, Patent Owner fails to show that the inventors were in possession of the full scope of claims 23, 28, 36, and 40—a ridge extending from a layer that exceeds 30% (e.g., 100%) of the original thickness of the layer after laser processing, which claims 23, 28, 36, and 40 cover. *See In re Wertheim*, 541 F.2d 257, 263–64 (CCPA 1976) (The PTO “satisfied its burden” of showing specification with disclosed range of 25%–60% and examples within that range does not provide descriptive support for new claim limitation of “at least 35%” “[b]y pointing to the fact that claim 1 reads on embodiments outside the scope of the description.”).

Per the discussion above Sections II.C.5, C7, the parties’ arguments show they agree that the recited OV raised limitation (including the recited limitation “not visible when viewed straight on”) requires a colorless and/or contrastless raised feature. *See, e.g.*, Ex. 1006, 2:53–65, 3:35–37, 3:57–58, 4:6–10, 5:9–10; PO Resp. 3 (alleging prior art “markings were made by discoloring the surface of the card stock” “[u]like . . . the invention described in the ’494 patent”). Patent Owner, however, also fails to show that the inventors were in possession of a colorless or contrastless raised feature that extends above the top surface level by a height of at least 30% of

the thickness of the laminate layer before laser processing, as claims 23, 28, and 36 cover. *See id.*

With further respect to color of plastics as described in the '872 patent (*see* Opp. 6–7), by “appropriately optimizing the material parameters and method parameters (plastic material, layer structure, layer thickness, laser intensity, beam control, etc.),” the disclosed process creates characters in plastic material “which are distinct . . . in terms of their color.” *Id.* at 2:68–3:17. Independent claim 21 recites “raised features extending above a nominal top surface of the first laminate to form reflecting surfaces that are not parallel to the nominal to surface of the first laminate and are not visible when viewed straight on.” Dependent claim 23 recites “at least one of the raised features has a height above the nominal top surface of the first laminate that is at least 30% of a thickness of the first laminate before said laser etching.” Claims 28 and 36 recite a similar “not visible” requirement.

In contrast to the “not visible” requirement for claims 23, 28, and 36, the '872 patent indicates the raised (plateau) feature will be plastic “characters which are distinct from their surroundings not only in terms of their color but also in terms of their relief height”—i.e., visible in contrast with its surroundings, as Petitioner argues. *See* Ex. 2009, 2:67–3:2; Opp. 6–7 (citing Ex. 2009, 2:67–3:1). Given these differences, Petitioner shows persuasively that the inventors of the '494 patent were not in possession of the breadth of subject matter covered by claims 23, 28, and 36.

The inventors did not have possession of the “at least 30%” limitation through the '872 patent for another reason. In incorporating five different patents in their entirety, including the '872 patent, the specification states the

five patents “describe various implementations for using a laser to print information.” Ex. 1004, 600. These “implementations for using a laser” point to no result thereof, such as a thickness limitation or range thereof. Nothing else in the ’494 patent describes a thickness limitation as important to obtaining a combined OV tactile ridge. So “the specification does not clearly disclose to the skilled artisan that the inventors . . . considered the [ridge range] to be part of their invention.” *See Purdue Pharma L.P. v. Faulding Inc.*, 230 F.3d 1320, 1328 (Fed. Cir. 2000). Without requiring adequate guideposts somewhere in the specification describing the importance of a limitation incorporated by reference therein, the specification conceivably could incorporate by reference every prior art patent and then the patentee later could argue its invention includes all the subject matter therein.

Accordingly, for the reasons noted above, Petitioner shows by a preponderance of evidence that Patent Owner’s Motion does not satisfy the regulatory and statutory written description requirements for substitute claims 23, 28, 34, 36, and 40, which consequently recite impermissible new matter.

*C. Broadening, 37 C.F.R. § 42.121, 35 U.S.C. § 316(d),
Claims 21, 25, 28, and 36*

Patent Owner’s Motion must not introduce substitute claims that enlarge the scope of the claims of the patent. *See* Guidance 2; 37 C.F.R. § 42.121(a)(2) (“A motion to amend may be denied where . . . (ii) The amendment seeks to enlarge the scope of the claims of the patent or introduce new subject matter.”); 35 U.S.C. § 316(d)(3) (“An amendment . . .

may not enlarge the scope of the claims of the patent or introduce new matter.”); *Lectrosonics, Inc. v Zaxcom, Inc.*, Case IPR2018-01129, 01130 (PTAB February 25, 2019) (Paper 15) (comparing substitute claims to issued claims for broadening analysis) (precedential). Patent Owner contends the substitute claims narrow the issued claims by adding limitations thereto. Motion 4–5. Petitioner argues that the Motion does not satisfy the burden of production of showing that the substitute claims 21, 25, 28, and 36 do not enlarge the scope of the issued claims 1, 5, 8, and 16. See Opp. 4 (“Idemia neither addresses the removed language nor provides any evidence or reasoning to meet its burden of production.”).

By presenting facially narrowing limitations with respect to at least issued claims 1 and 5, which appear to be the broadest issued claims with respect to the narrowing limitations, the Motion meets the burden of production as to claims 21, 25, 28, and 36. The record shows claims 25, 28 and 36 do not broaden claims of the patent.

Regarding substitute claim 21, Petitioner alleges that with respect to claim 1, claim 21 “removes ‘top surface of the identification document’ and ‘wherein the pattern includes visual properties, and wherein the visual properties comprise a characteristic of . . . being’ from the claim, broadening the scope of claim 1 in at least two respects.” Opp. 4. Regarding one alleged broadening aspect, Petitioner explains claim 21 does not prohibit additional layers, so that claim 21, which recites “[a] method of producing a security feature in an identification document comprising . . . providing a core . . . [and] laminating a first laminate,” does not require providing the pattern in a topmost layer of the identification document. See *id.*

In contrast, original claim 1 requires the “laser etching a pattern into the top surface of the identification document.” Accordingly, Petitioner shows that substitute claim 21 impermissibly broadens challenged claim 1, because it does not require a pattern in the top surface of the identification document.

Alleging a second broadening aspect, Petitioner also contends that claim 21 “no longer require the entire pattern to be invisible when viewed straight on.” With respect to claim 5, which appears, in most respects, to be the broadest issued claim in relation to the substitute claims, Petitioner’s argument has merit.

Claim 5 follows: “An identification document, including a core and at least one outer laminate layer, wherein a top surface of the outer laminate layer is laser-processed to form a pattern, the pattern being essentially not visible when viewed straight-on.”

So claim 5 requires the entire pattern to “be[] essentially not visible when viewed straight-on,” And as Petitioner argues, claim 21 does not require the entire pattern to “be[] essentially not visible when viewed straight-on,” Claim 21 recites “etching a pattern of raised features into the first laminate, said raised features extending above a nominal top surface of the first laminate to form reflecting surfaces that are not parallel to the nominal top surface of the first laminate and are not visible when viewed straight on.” So the pattern of claim 21 may include reflecting surfaces that are visible when viewed straight on.

Patent Owner responds that challenged claim 1 “necessarily involved laser etching the first laminate in contact with the top surface.” PO Reply 2.

This argument lacks merit, because claim 1 does not necessarily involve laser etching the first laminate. Patent Owner’s argument does not address the limitation in claim 1 that necessarily requires “laser etching a pattern into the top surface of the identification document”—a feature claim 21 does not require. *See* Pet. Reply 5.

Patent Owner also responds that “Petitioner points to no disclosure in the ’494 patent in which a surface other than the laminate layer is laser etched.” PO Reply 2. This argument only alleges that Petitioner did not point to how the ’494 patent supports the full scope of claim 1, an unnecessary showing given the plain language of claim 1. In any event, the ’494 patent refers to marking “any layer . . . to virtually any product.” Ex. 1001, 9:37–39.

Regarding substitute claim 25, Petitioner alleges it impermissibly broadens claim 5 because it “removes the language ‘wherein the top surface of the outer laminate layer is laser-processed to form a pattern, the pattern being.’ . . . As a result, claim 25 no longer requires the *entire pattern* resulting from the laser-processing to be essentially not visible when viewed straight on, instead merely requiring that for the *raised features*.” Opp. 4.

Petitioner’s argument is not persuasive. Claim 5 recites “the outer laminate layer is laser-processed to form a pattern, the pattern being essentially not visible when viewed straight-on.” Even though claim 25 does not explicitly require the whole “pattern” to be “essentially not visible when viewed straight-on” and challenged claim 5 does as Petitioner argues, substitute claim 25 narrows the “pattern” of claim 5 such that only “raised features form a pattern” and the “raised features [that form the pattern] are

essentially not visible when viewed straight-on.” In addition, claim 25 requires “raised features of foamed laminate material.” So claim 25 at least implicitly requires a pattern of raised features of foamed laminate material to be essentially not visible when viewed straight-on.

Petitioner contends substitute claim 28 impermissibly broadens claim 8, because it removes the limitation that requires the laser processing to “define[] an optically variable device.” Opp. 5. Petitioner explains that although claim 25, from which claim 28 depends, “still requires raised features that are essentially not visible when viewed straight-on, . . . claim [25] permits the features to be always non-visible.” *Id.* Nevertheless, having determined claim 25 does not impermissibly broaden original claim 5, as claim 28 depends from claim 25, claim 28 does not impermissibly broaden claim 5. Consequently, Petitioner does not provide a persuasive argument showing that substitute claim 28 constitutes improper broadening.

Finally, Petitioner contends substitute claim 36 impermissibly broadens claim 16. Opp. 5. Patent Owner contends Petitioner does not challenge claim 35, from which claim 36 depends. *See* PO Reply 3. Patent Owner also contends substitute claim 35 narrows challenged claim 15 and claim 36 depends from claim 35, so “[c]laim 36 does not broaden the scope of the ’494 patent.” *Id.* As Patent Owner’s argues, claim 36 does not impermissibly broadens claim 15.

Based on the foregoing discussion, the Motion includes improper broadening of substitute claim 21, but does not include improper broadening of substitute claims 25, 28, and 36.

*D. Indefiniteness, 35 U.S.C. § 112 ¶ 2,
Claims 21–23 and 35*

Petitioner contends substitute claims 21, 22, and 35 are indefinite under 35 U.S.C. § 112 ¶ 2. Opp. 10–11. According to Petitioner,

[c]laim 21 recites “said raised features extending above a nominal top surface of the first laminate to form reflecting surfaces that are not parallel to the nominal top surface of the first laminate and are not visible when viewed straight on,” which is ambiguous as to whether invisibility applies to the raised features or merely the reflecting surfaces (permitting other portions of the raised features to be visible).

Id. (citing Ex. 1013 ¶¶ 24–25). According to Patent Owner, the phrase “starting with ‘that’” modifies “the reflecting surfaces,” so claim 21 is not indefinite. *See* PO Reply 7. Petitioner contends that in the same paper, Patent Owner contradicts itself, by arguing “[i]t is this pattern of ‘said raised features’ that must be ‘not visible when viewed straight on.’ No broadening resulted here.” Pet. Sur-Reply 6 (citing and quoting PO Reply 2). Petitioner contends “Idemia’s own inability to determine what portion of the claim is modified by ‘not visible when viewed straight on’ confirms claim 21 is indefinite.” *Id.*

Patent Owner’s unclear arguments do not help Patent Owner, but the record supports the former argument by Patent Owner. Claim 21 limits “the reflecting surfaces” by reciting the “reflecting surfaces that are not parallel to the nominal top surface of the first laminate and are not visible when viewed straight on.” We agree with Patent Owner that “that” clearly modifies “the reflecting surfaces” and therefore “not visible when viewed

straight on” refers to the reflecting surfaces. Accordingly, Petitioner does not show substitute claim 21 is indefinite.

Petitioner contends claim 22 is indefinite because the term “visual properties” lacks antecedence basis. Opp. 10. Petitioner’s showing is persuasive. Claim 22 depends from claim 21 and claim 22 does not indicate in sufficiently clear manner what constitutes the recited “visual properties.” The “visual properties” could refer to visual properties inherent in “pattern,” the “raised features,” the “reflecting surfaces,” or the “identification document” of claim 21. These alternative readings render the claim indefinite because the scope of the claim cannot be ascertained. *See Ex parte McAward*, Appeal 2015-006416, 2017 WL 3669566, at *5 (PTAB Aug. 25, 2017) (precedential). Patent Owner submits claim 22 requires a “minor adjustment” to clarify it (PO Reply 7), but because the amended claim scope may have impacted Petitioner’s obviousness challenge and thereby would have required further briefing by both parties without a showing of good cause, the panel denied Patent Owner’s request to submit another substitute claim to replace substitute claim 22 at that late stage of the proceeding. *See* Paper 27; Ex. 3003 (Patent Owner argues claim 22 contains “a typographical error in the language . . . causing an antecedent basis issue.”). Claim 23 depends from claim 22 and is indefinite due to the dependency.

Claim 35 recites “wherein a top surface of the outer laminate layer is laser-processed . . . to define an optically variable device comprising reflecting surfaces that are not parallel to the nominal top surface level of the outer laminate layer and that is essentially not visible when viewed straight

on.” Petitioner contends “claim 35 is indefinite as to what must be ‘essentially not visible when viewed straight on.’ . . . While the ‘and that’ appears to indicate that invisibility applies to the reflecting surfaces, the use of the singular ‘that is’ appears to suggest that invisibility applies to the entire raised feature.” Opp. 11. Petitioner’s argument is not persuasive. Claim 35 employs the singular “is.” Patent Owner argues “the singular verb ‘is’ . . . modifies the singular noun ‘optically variable device.’” PO Reply 7. So claim 35 specifies that “an optically variable device . . . is essentially not visible when viewed straight on.” Petitioner does not contend the term “optically variable device,” which several of the challenged claims recite, is indefinite.

Based on the foregoing discussion, Petitioner shows substitute claims 22 and 23 are indefinite by a preponderance of evidence. The record does not show that substitute claims 21 and 35 are indefinite.

E. Analysis of the Alleged Obviousness of the Substitute Claims

Patent Owner does not bear the burden of showing the subject matter of the proposed substitute claims would have been obvious. *See Aqua Prods.*, 872 F.3d at 1327; Guidance 2. For the reasons explained below, Petitioner shows by a preponderance of the evidence that the proposed substitute claims would have been obvious.

With the exception of substitute claim 40, the substitute claims recite a “raised feature” with an OV quality. *See* Mot. App’x. As noted above, Patent Owner agrees with this characterization, asserting that “[i]n all the claims (except for claim 40), this raised feature must also have an optically

variable quality (*e.g.*, not visible when viewed straight on, resists photocopying).” *Id.* at 24.

Substitute claim 21 follows:

21. (Substitute for claim 1, if found unpatentable) A method of producing a security feature in an identification document comprising:

providing a core including a top surface and a bottom surface;

laminating a first laminate in contact with the top surface; and

laminating a second laminate in contact with the bottom surface, the laminated core comprising the identification document, the identification document having a top side and a bottom side respectively corresponding to the core’s top and bottom side, the top side having a top surface; and

laser etching a pattern of raised features into the [[top surface of the identification document]] first laminate, said raised features extending above a nominal top surface of the first laminate to form reflecting surfaces that are not parallel to the nominal top surface of the first laminate and are [[; wherein the pattern includes visual properties, and wherein the visual properties comprise a characteristic of]] not [[being]] visible when viewed straight on.

Id. at App’x i (underlining representing additions to claim 1, double brackets representing deletions).

In responding to Petitioner’s grounds of obviousness set forth in the trial, *see* 37 C.F.R. § 42.121, Patent Owner contends “there is no ‘clear tactile relief’ taught in Maurer,” so “a skilled artisan would not have been motivated to use such a feature.” Mot. 24 (citing Ex. 2010 ¶¶ 102–103,

120).²⁷ Patent Owner also contends “the tactile portion taught in Maurer does not extend above the top surface of the document, much less a raised feature having the combination of attributes required by the substitute claims.” *Id.* (citing Ex. 2010 ¶¶ 84–86, 104). Finally, Patent Owner contends the combination lacks a “rational basis for concluding” an artisan of ordinary skill would have combined Bernecker and Maurer. *See id.* According to Patent Owner, “the claimed combination would not simply require adding an additional security feature to Maurer, but to destroy two of the security features touted in Maurer to replace them with a single other feature (from Bernecker).” *Id.* at 25 (citing Ex. 2010 ¶¶ 121–124).

Petitioner responds that “*Maurer*, *Bernecker*, and *Fry* collectively render obvious a combined security feature with both (1) a tactile/raised relief and (2) optical variability for the relief.” Opp. 9. As discussed further below, Petitioner persuasively shows several motivations for combining the features, including to enhance security by adding a combined feature to Maurer’s card and providing optical variability for additional security. *See id.* at 12–13 (citing Ex. 1002 ¶¶ 129–143, Ex. 1013 ¶¶ 27–48). As Petitioner persuasively contends, Patent Owner’s arguments largely rely on materially the same evidence and arguments Patent Owner relies upon with respect to challenged claims 1–20. *See id.* at 8–9; note 13 (Patent Owner emphasizing during the Oral Hearing that “what we’re talking about here with respect to

²⁷ As noted, Patent Owner does not have the burden of showing the unobviousness of its substitute claims, but per 37 C.F.R. § 42.121(a)(2)(i), Patent Owner’s Motion “must respond to a ground of unpatentability involved in the trial.”

the amendments is by and large these very same features of claim 7, the only difference being some of the claims also have the 30 percent thickness” (Tr. 134:10–14)).

As noted above, the parties agree, with the exception of substitute claim 40, the substitute claims recite a “raised feature” with an OV quality. See Mot. App’x. (claim 21 (above); claim 24 (“wherein the pattern of ridges comprises an Optically Variable Device”); claim 25 (“the raised features are essentially not visible when viewed straight-on”); claim 29 (“wherein said ridges comprise an optically variable quality”); claim 33 (“wherein the raised feature comprises an optically variable quality”); claim 35 (“a raised tactile feature extending above a nominal top surface level of said outer laminate layer, and to define an optically variable device comprising reflecting surfaces that are not parallel to the nominal top surface level of the outer laminate layer and that is essentially not visible when viewed straight on”)).

Claim 39 recites “wherein neither the void pattern nor the raised features can be photocopied.” Claim 35 additionally recites a bar code feature, in addition to a raised OV feature, and claims 36–38 depend therefrom. In addition to the raised OV feature, or raised feature, claims 23, 28, 34, 36, and 40 also recite the “at least 30%” thickness limitation for the raised feature as discussed above in Section III.B. Mot. App’x.

Claim 22 depends from claim 21 and recites “wherein the visual properties comprise a characteristic of resisting image capture by photocopying.” Claims 26 and 37 respectively depend from claims 25 and 35 and recite a “void having a ‘V’ cross section.” Claims 27 and 31

respectively depend from claims 25 and 29 and recite “wherein said raised features provide a tactile effect” and “wherein said raised ridges provide a tactile effect.” Claim 30 depends from claim 29 and recites “said ‘V’ cross section is defined by two intersecting surfaces, neither of which is parallel to the top surface of the outer laminate.” Claim 32 depends from claim 29 and recites “wherein said laser processing also defines an optically variable device.” Claim 38 depends from claim 35 and further recites wherein said raised tactile feature resists image capture by photocopying. Mot. App’x.

Petitioner persuasively addresses the particular limitations of each substitute claim. Opp. 11–24. As Petitioner summarizes, “Idemia rewrites claims 1, 2, 4–7, 9–13, 15, and 17–19 to require a single security feature including *both* (1) a raised feature (tactile/raised relief) and (2) a visual feature tied to the raised feature. As explained in the petition, *Maurer*, *Bernecker*, and *Fry* (and optionally *Gunn*) render obvious such a combined security feature.” *Id.* at 12 (Petition, 17–25; Ex. 1002, ¶¶ 129–43; Ex. 1013, ¶¶ 27–48.). Following its Petition showing, Petitioner persuasively relies on Maurer’s method of producing a laminated card to teach the claimed method of producing the identification document’s core and the first and second laminates, as set forth in the substitute claims. *See* Opp. 13–15 (citing Ex. 1013 ¶¶ 49–52; Ex. 1002 ¶¶ 144–147; Ex. 1005, Abstract; Ex. 1006, Abstract, 4:37–52).

As it does in the Petition, to address the added security features of the substitute claims, Petitioner relies on a “combined security feature” according to the combined teachings of Maurer, Bernecker, and Fry. As an example, with respect to claim 21, Petitioner persuasively states as follows:

Maurer, Bernecker, and Fry also render obvious “laser etching a pattern of raised features into the first laminate, said raised features extending above a nominal top surface of the first laminate to form reflecting surfaces that are not parallel to the nominal top surface of the first laminate and are not visible when viewed straight on.” Ex. 1013, ¶¶53–56. As explained above in Section VII.A and in the petition, the combined security feature is formed through laser-engraving a pattern and includes raised features. Ex. 1002, ¶¶133–34. Furthermore, the combined security feature would be implemented in a contrastless manner, as taught by *Bernecker*, to give rise to areas with “*different light scattering properties*” (Ex. 1006, 2:16–20, 53–56) resulting in a combined security feature that is not visible when viewed straight on. *Id.* Moreover, because the combined security feature includes raised features, it would include reflecting surfaces that are not parallel to the top surface of the card. Ex. 1013, ¶¶54–55. For example, the raised relief structure of *Maurer* includes reflecting surfaces, both above and below the top surface, that are not parallel to the top surface of the card. *Id.*; Ex. 1005, Fig. 2.

Id. at 14.

Addressing the specific added features of each substitute claim, Petitioner persuasively contends the raised OV feature of the substitute claims reads on the “combined security feature” rendered obvious by the collective teachings of *Maurer, Bernecker, and Fry* (as supplemented by *Gunn* and the ’872 patent respectively to address a bar code limitation and the “at least 30%” thickness limitation as recited in some of the substitute claims). *See id.* at 11–25. For example, addressing claim 25, Petitioner persuasively explains as follows:

As explained above in Section VII.A and the petition, a POSITA would have found it obvious to implement combined security feature that includes both raised features and that is essentially

not visible when viewed straight on. Implementing such a feature using the implementation details in *Fry* would result in the features comprising foamed laminate material formed by laser processing. Ex. 1013, ¶¶66–67; Ex. 1007, 4:60–64, 4:32–34. And, as explained above for substitute claim 21, the combined security feature would also include reflecting surfaces not parallel to the top surface of the outer laminate, owing to the existence of raised features and *Bernecker*’s teaching of implementing the laser processing in a colorless manner to give rise to areas with *different light scattering properties*. *Supra*, Section VII.A.1; Ex. 1013, ¶¶68–69.

Id. at 16–17. Claim 24 recites similar limitations, adding a pattern of ridges having OV features. Petitioner persuasively explains that Maurer’s ridges as part of the combined security feature would be optically variable. *See id.* at 15–16 (citing Opp. Section VII.A; Petition; Ex. 1013 ¶¶ 62–63; Ex. 1005, Fig. 2; Ex. 1007, Fig. 1). As Petitioner relies on the combined security feature per its showing in the Petition and Section VII.A of the Opposition, the motivation cited in Section VII.A and in claims 21, 24, and 29 applies for each of the similar limitations of the substitute claims.

As another example, addressing claim 39, Petitioner persuasively maintains *Fry* suggests foaming material to create raised edges, Maurer teaches raised features with a void pattern in a laminated card, and *Bernecker* suggests making void and raised features in a “contrastless manner” (e.g., not in registration with underlying printed material), so that the combined security feature will be “neither manipulable nor copiable,” thereby aiding in verifying the authenticity. *See id.* at 22–23 (citing Ex. 1013 ¶¶ 105–112; Ex. 1006, 2:9–13; Ex. 1005, Fig. 2 (void pattern/raised features); Ex. 1007, Fig. 2 (same)). Claim 29 recites limitations similar to

those of claim 39. *See* Mot. App'x. Petitioner's showing persuasively shows the obviousness thereof. *See id.* at 18 (claim 29), 22–23 (claim 39).

Relying on Fry, Maurer, Bernecker, and the testimony of Dr. Tentzeris, Petitioner persuasively shows that the subject matter of substitute claim 22 (resists image capture by photocopying), claim 27 (tactile effect), claim 31 (tactile effect), claim 32 (OV feature), claim 33 (OV feature), claim 35 (OV feature), and claim 38 (tactile features resists image capture by photocopying) would have been obvious. *See id.* at 15, 18, 19–21, and 22 (collectively citing, *inter alia*, Opp. Section VII.A; Ex. 1002 ¶¶ 152, 169–172, 195–101; Ex. 1013 ¶¶ 43–48, 57, 75, 83–102, 104). As Petitioner persuasively explains in its Petition and Opposition, the recited tactile OV raised features resist image capture by virtue of being non-parallel, contrastless, and colorless with respect to the plastic laminate according to Bernecker's teachings as combined with Maurer and Fry. *See, e.g.*, Opp. at 12–18.

Addressing the bar code feature of independent substitute claim 35 (and dependent claims 36–38), Petitioner persuasively tracks its showing in reliance on the combined security feature as suggested by the teachings of Maurer, Bernecker, and Fry, and further persuasively combines the teachings of Gunn to reach the recited bar code limitation as a well-known ID feature in the art useful for aiding in authenticity. *See* Opp. 20–22 (citing, *inter alia*, Ex. 1002 ¶¶ 195–201; Ex. 1013 ¶¶ 43–48, 91–102; Opp. Section VII.A.2). Addressing the “V” cross section voids recited in claims 26, 29, 30, and 37, Petitioner persuasively relies on Bernecker's Figure 3 and related teachings to address that feature as part of Bernecker's OV

teachings. *See id.* at 17–19 (citing Ex. 1002 ¶¶ 159–162; Ex. 1013 ¶¶ 71–74, 76–82; Ex 1006, 2:22–25, 3:13–17; Ex. 1007, 4:6–12), 21–22 (citing Ex. 1013 ¶¶ 82, 74), 23 (citing Ex. 1013 ¶ 103; Opp. Section VII.A.5).

Addressing substitute claims 23, 28, 34, 36, and 40, Petitioner persuasively explains that Patent Owner admits that the 30% height limitation was known in the art, at least through the '872 patent. Opp. 23–24 (citing Ex. 2009, 2:66–3:6, 6:14–17). Petitioner also explains persuasively that it would have been obvious to increase the height of Maurer's tactile features as suggested by Bernecker's OV teachings and Fry's foaming process to ensure they could be felt easily, thereby enhancing authenticity. *See id.*

We adopt and incorporate by reference Petitioner's obviousness showing, summarized above, as persuasive. *See* Opp. 11–24. Patent Owner's arguments, addressed below, do not undermine that showing. For the reasons explained above in the Final Written Decision, Patent Owner's arguments are not persuasive.

As set forth in the Final Written Decision above, Maurer discloses a clear raised feature (as does Fry). *See supra* Sections II.C.7c., e. For example, regarding Patent Owner's argument that Maurer does not teach a clear tactile relief (Mot. 24), as noted above, Patent Owner characterizes Maurer as not disclosing its process "does not cause a blackening of the outer cover sheet." *See* Section II.C.7.c. (quoting PO Resp. 37). As also explained in the same section, this contention that Maurer's silence about a lack of blackening of the raised ridges and depression shows they must be blackened "misapprehends the law. Contrary to [Patent Owner's]

suggestion, a reference need not state a feature's absence in order to disclose a negative limitation.” *See also AC Techs.*, 912 at 1367 (citing *Sud-Chemie, Inc.*, 554 F.3d at 1004–05 (*AC Techs.* characterizing *Sud-Chemie* as “affirming finding that reference disclosed ‘uncoated’ film where it did not describe the film as coated and did not suggest necessity of coatings”)).

Furthermore, for the reasons explained above in this Final Written Decision, Fry and Maurer each teach clear raised tactile features, with Maurer disclosing a relief on a transparent cover sheet through which printed information is visible as Figure 2 of Maurer shows. *See supra* Section II.C.7.c.,e; Ex. 1005, 1:5–10 (describing the invention), 4:35–36 (“the inscription on the card core and on the cover sheet are of course in register”), 4:29–30 (“manual inspection by virtue of the . . . permanent relief-type structure on the cover sheet”), 9:8–11 (“the information on said transparent cover sheet is in relief and can be sensed by touch”); Ex. 1007, 3:62–63 (“The appearance of the groove is generally neat and regular, when accompanied by the bead.”).

Patent Owner cites to Dr. Cairns’ testimony for the proposition that adding Bernecker’s security feature as a colorless feature would have destroyed the principle of Maurer of providing blackened printed areas in register with depressions of the cover film. Mot. 25 (citing Ex. 2010 ¶¶ 121–124). According to Dr. Cairns, Bernecker’s additions would undermine a related fundamental purpose of Maurer—i.e., Maurer requires “personal data” “in the *interior* of said card after lamination of the card blank.” Ex. 2010 ¶ 122 (quoting Ex. 1005, 4:3–7 (emphasis by Patent Owner)). Dr. Cairns also contends Maurer’s teaching of concurrent marking

of the laminated cover layer in register with the underlying blackened printed information on the card core would have been destroyed by adding Bernecker's security feature. *See id.* ¶ 123.

Again, as set forth in the Final Written Decision, these arguments are not persuasive. *Supra* Section II.C.7. Patent Owner's Reply re-emphasizes that "Maurer exclusively teaches the creation of blackened inscriptions whereas Bernecker teaches avoiding discoloration." PO Reply 9 (citing Ex. 2010 ¶¶ 67–76, 101–103, 106). Patent Owner also repeats its argument that "Maurer does not teach a *colorless* laser engraving technique or a *colorless* security feature." *Id.* (citing Ex. 2010 ¶¶ 101–104, 118). Repeating other arguments, Patent Owner adds "Bernecker does not teach forming colorless laser engraved features *in register with* contrasting features," and "Bernecker teaches that the core should be left undisturbed and that laser processing should only affect the outer laminate layer of the card." *Id.* at 9–10 (citing Ex. 2010 ¶¶ 109, 118). Patent Owner again argues that "the dimensions involved in Fry would have been useless to a skilled artisan designing laser processing techniques for identification documents." *Id.* at 10 (citing Ex. 2010 ¶¶ 110–113, 132). Finally, Patent Owner contends, again, that motivation lacks to combine the references in light of Fry's "divergent field of endeavor" and Fry "discusses a scorched bead, contrary to Petitioner's suggestion that Fry's process would have created a raised feature that 'lacks discoloration.'" *Id.* (citing Ex. 2010 ¶¶ 110–113, 115, 131–134).

As indicated, these arguments, and all of Patent Owner's arguments, repackaging and restate arguments presented in Patent Owner's Response,

arguments the panel found unpersuasive. The arguments do not address Petitioner's persuasive showing that it would have been obvious to add Bernecker's OVD features to the cover of Maurer in a contrastless manner in order to provide a more secure card, even while retaining most if not all of Maurer's registration and lamination features. *See supra* Sections II.C.5, C7.

As an example, as set forth above in Section II.C.7.b in response to similar arguments by Patent Owner, the panel found the following:

In summary, Petitioner shows persuasively that the proposed combination suggests retaining Maurer's blackened areas at certain information portions of the laminated card. *See* Pet. 18–25. Petitioner also shows persuasively that it would have been obvious to add Bernecker's OV features to, or combine them with, Maurer's raised features, in order to create an OV pattern at colorless non-registered areas, thereby retaining Bernecker's OV feature, Maurer's tactile features at desired card portions, and Maurer's blackened core and lamination features at other areas. Bernecker suggests that Maurer's colorless raised features, provided at colorless background areas, would have provided an OV quality to raised features not parallel to the surface of the card. *See* Pet. 1–3, 17–25

Supra Section II.C.5.b. The panel also found that Maurer specifically discloses adding information without any registration on the upper laminate with the core and without burning the core. *Id.* (citing Ex. 1005, 6:25–28, 8:23–26, 8:47–52). And Maurer generally contemplates “*other features not shown here . . . provided by means of the laser beam.*” Ex. 1005, 7:1–2 (emphasis added). Bernecker provides such “other features,” in the form of colorless OVD features, produced by a laser, as both parties recognize. In addition, similar to Maurer, Bernecker contemplates retaining many known

card features (Ex. 1007, 3:49–60, 4:53–54), like those of Maurer, as the panel also found in the same section above:

Similar to Maurer, Bernecker specifically envisions “providing further security features,” including keeping some coloring processes on portions of the card, including “[p]ersonalization data 4 . . . preferably incorporated with a laser in the form of discolorations of the plastic material.” Ex. 1006, 4:53–54; accord 3:49–57. So nothing in the combined teachings precludes employing or combining the two features, even if the laser must focus on different parts of the card (i.e., in the core and on the surface). *See id.* at 4:3–10 (describing shifting the focus and power of the laser to obtain different results, including halftone imaging and colorless notches).

Supra Section II.C.5.b.

With the exception of claim 39, the substitute claims generally only require a pattern of *raised features* not to be visible when viewed straight on. *See, e.g.*, claim 21 (above); claim 24 (“wherein the pattern of ridges comprises an Optically Variable Device”); claim 25 (“the raised features are essentially not visible when viewed straight-on”); claim 29 (“wherein said ridges comprise an optically variable quality”); claim 33 (“wherein the raised feature comprises an optically variable quality”); claim 35 (“a raised tactile feature extending above a nominal top surface level of said outer laminate layer, and to define an optically variable device comprising reflecting surfaces that are not parallel to the nominal top surface level of the outer laminate layer and that is essentially not visible when viewed straight on”); claim 39 (wherein neither the void pattern nor the raised features can be photocopied). Even though claim 39 requires “wherein neither the void pattern nor the raised features can be photocopied,” it does not require that

the information underlying it (for example, Maurer's blackened printed information in register therewith) not to be able to be photocopied. Neither party explains how, even if Maurer's card includes visible blackened printing on the core in register with raised features on the cover, those *colorless raised features* and *colorless voids* would be visible or photocopyable. Perhaps Maurer's printed information renders the transparent depression and ridges in layer 10 visible when viewed straight-on. *See id.* at Fig. 2.²⁸

Nevertheless, assuming the contrast between the underlying blackened printed material and some of the colorless raised features in Maurer render those colorless raised features visible, as explained in the Final Written Decision and herein, Maurer and Bernecker each contemplate providing printed information without blackening it (e.g., photographs and other information) and without providing that information in register with laser formed ridges or depressions the top laminate, as discussed above. The substitute claims do not preclude Maurer's features of a raised tactile feature in register with blackened printed areas at some areas of the card, and in addition to that, at other card areas, a pattern of raised colorless OV tactile features not in register with any printed information, as the combination of Maurer, Bernecker, and Fry suggests, and as Petitioner sets forth in its

²⁸ As explained above, Maurer teaches the blackened information on the core in contrast with the white paper core "can be perceived visually through said transparent cover sheet." Ex. 1005, 1:9–10.

persuasive obviousness showing. In this way, contrary to Patent Owner's arguments, Maurer would retain the features Patent Owner contends Maurer must retain—i.e., the blackened core, registration with printed information, and lamination features—while adding the colorless, raised, non-registered, OV tactile features at adjacent or other card areas, as suggested by Bernecker and Maurer to be beneficial.

Patent Owner agrees that Maurer suggests tactile features (and Patent Owner's Preliminary Response admits that Maurer teaches some raised features as noted above). *See supra* Section II.C.7; Prelim. Resp. 24, 28 (admissions about raised undulations); Inst. Dec. 36–37 (noting admissions); Ex. 2001 ¶¶ 57–58 (testifying Maurer's process may form “gentle undulations” but not “sufficiently discrete” raised features). Providing tactile features suggests providing colorless tactile features as Bernecker suggests, because the purpose of *tactile* features suggests providing authenticity under conditions of limited visibility. Providing colorless raised features simply allows the features to be felt more readily. Bernecker provides an added bonus of providing OV visibility to the raised tactile features of Maurer and Fry—another authenticity feature that prevents photocopying. Ex. 1006, 2:53–56, 3:8–11, 3:49–62; Ex. 1013 ¶¶ 30–31.

As discussed above (Section II.C.7.e), the record does not support Patent Owner's allegation that Fry only teaches a raised “scorched” (i.e., blackened or burned) feature. *See* PO Reply 10; Ex. 1013 ¶¶ 34–37 (testifying Fry teaches colorless raised features and the combination renders them obvious, yielding predictable results of providing manual inspection and resistant to copying). Even if Fry does teach only blackened raised

features, as noted above, the '494 patent does not provide any specific insight as to how to create an unscorched raised bead. This suggests, as Dr. Tentzeris testifies and as Petitioner argues, that skilled artisans readily knew how to create a raised colorless bead. *See* Ex. 1002 ¶¶ 135–137 (noting the '494 patent “does not disclose any details about how to perform the laser engraving, indicating skilled artisans knew how to create raised tactile features with OV features”); Ex. 1013 ¶¶ 34–38; Opp. 12–13, 15–16; Ex. 1006, 4:1–18 (creating notches in “melted and partly decomposed” plastic areas without color changes by altering laser power); Ex. 1007, 3:62–65 (“groove is generally neat and regular, when accompanied by the bead” with “small bubbles in the beads”); Ex. 1005, 1:5–10 (“information can be perceived visually through said transparent cover”), Fig. 2.

Given that providing raised features simply allows the tactile features to be felt more readily (i.e., compared to mere notches that Patent Owner attributes to Maurer’s card as tactile), and given that Bernecker specifically teaches providing nonparallel notches as OV features to provide further authenticity, Petitioner persuasively shows that providing unscorched raised features (e.g., beads as Fry discloses, similar to Maurer’s ridges) would have been obvious in order to provide a card that would have been difficult to forge, would have provided an extra measure of authenticity, and would have been felt more easily than mere notches. *See* Opp. 12–16; Ex. 1013 ¶¶ 30–34. Fry provides implementation details to ensure neat and regular grooves with beads to further aid in providing authenticity and/or information as Maurer and Bernecker suggest. *See* Ex. 1005, 4:19–55, Fig. 2; Ex. 1006, 3:9–43, 4:53–59, 5:5–10, Figs. 1, 3; Ex. 1007, 2:69–75, Fig. 2.

Petitioner provides a number of persuasive reasons to add raised colorless tactile features without registration with blackened printing to Maurer's card. *See id.* at 12–13 (listing the “known use and benefits of tactility and optical variability for security,” and Bernecker's recognition that clear features provide useful security features, “recognition that visibility only at a glancing angle would benefit clear engravings with tactile features and vice versa,” and the “straightforward process of implementing such a feature”).

Dr. Tentzeris persuasively testifies that “*Bernecker* recognized that colorless laser engraving need not be disposed in register with printed information and is useful by itself as a security feature, separate from protected printed information or other security features.” Ex. 1013 ¶ 32. Relying on Maurer, Bernecker, and Fry, and the testimony of Dr. Tentzeris, Petitioner persuasively summarizes its position in the Petition in addressing the combined security feature of claim 21:

Maurer, Bernecker, and Fry also render obvious “laser etching a pattern of raised features into the first laminate, said raised features extending above a nominal top surface of the first laminate to form reflecting surfaces that are not parallel to the nominal top surface of the first laminate and are not visible when viewed straight on.” Ex. 1013, ¶¶53–56. As explained above in Section VII.A and in the petition, the combined security feature is formed through laser-engraving a pattern and includes raised features. Ex. 1002, ¶¶133–34. Furthermore, the combined security feature would be implemented in a contrastless manner, as taught by *Bernecker*, to give rise to areas with “*different light scattering properties*” (Ex. 1006, 2:16–20, 53–56) resulting in a combined security feature that is not visible when viewed

straight on. *Id.* Moreover, because the combined security feature includes raised features, it would include reflecting surfaces that are not parallel to the top surface of the card. Ex. 1013, ¶54–55. For example, the raised relief structure of *Maurer* includes reflecting surfaces, both above and below the top surface, that are not parallel to the top surface of the card. *Id.*; Ex. 1005, Fig. 2.

Opp. 14.

Patent Owner does not dispute that an artisan of ordinary skill knew how to create a raised tactile colorless OVD feature prior to the filing of the '494 patent. See PO Reply 9–10 (repeating arguments from its Motion, for example, arguing Maurer does not disclose a raised feature, alleging Fry teaches a scorched bead). Rather, Dr. Tentzeris admits the foaming process that creates ridges, described as a “third process” (Ex. 2010 ¶ 50) that “involves *briefly* heating the plastic substrate to just above its vaporization temperature” (*id.* ¶ 47), “*is routinely referred to in the art as foaming*” (*id.* ¶ 50 (emphasis added)). Dr. Tentzeris does not describe the “localized bump or ridge” created by the known foaming process as discolored or burned. See *id.* ¶ 48.

With respect to claims 27, 31, and 33–40, Patent Owner contends “Petitioner depends solely on Maurer for the raised tactile feature. But Maurer does not disclose such a feature.” PO Reply 10. Contrary to this argument, Maurer teaches a raised colorless feature even without Fry’s added teachings, as found above. See *supra* Section II.C.7.c.

Also, Petitioner does not rely solely on Maurer, but generally contends “*Maurer, Bernecker, and Fry* render obvious such a combined security feature.” Opp. 11–13 (referring to its showing in the Petition

rendering obvious the combined security feature of the substitute claims, relying on Maurer, Bernecker, Fry, and Gunn to address the combined security feature of the substitute claims), 17–24 (relying on the four references to address each claim and its general statement of motivation as to the combined security feature). As indicated above, Petitioner explains an artisan of ordinary skill would have turned to Fry, because Fry disclosed particular details including by foaming to create grooves in plastics. *See* Opp. 16–17 (citing 66–67; Ex. 1007, 4:60–64, 4:32–34), 24 (referring to Fry’s teachings as applicable to all the substitute claims as showing known methods); Ex. 1013 ¶¶ 34–35.

Based on a review of the record and as summarized above, we adopt Petitioner’s showing for each substitute claim as our own as persuasive. *See* Opp. 11–24. As Petitioner generally explains, the substitute claims merely combine well-known features of the prior art, including V-shaped grooves and raised OV tactile colorless features typically produced by foaming plastic to create non-parallel ridges relative to a plastic surface. *See id.* Petitioner articulates valid reasons supported by the record, showing that it would have been obvious to create raised OV features at colorless areas of Maurer’s card to enhance security by providing additional authenticity features, including avoiding copying and providing additional features rendering the card difficult to reproduce. *See id.* The ’494 patent does not provide a clear description of how to make raised OV features, indicating such features were well-known to artisans of ordinary skill at the time of the invention. *See* Ex. 1002 ¶¶ 137, 135–139 (testifying the combined security feature would have been obvious to enhance security based on the combined

teachings, and the '494 patent “does not disclose any details about how to perform the laser engraving,” indicating skilled artisans knew how to create raised tactile features with OV features).

Based on the foregoing discussion, Petitioner shows by a preponderance of evidence that substitute claims 21–36, 39, and 40 would have been obvious over the combination of Maurer, Bernecker, Fry, and claims 35–38 would have been obvious over that combination with Gunn. Opp. 11–24.

F. Summary of Contingent Motion to Amend

Petitioner shows by a preponderance the following: Substitute claims 23, 28, 34, 36, and 40 constitute new matter and fail to satisfy the written description requirements of 37 C.F.R. § 42.121(a)(2) and 35 U.S.C. § 316(d)(3); substitute claim 21 constitutes impermissible broadening under 37 C.F.R. § 42.121(a)(2) and 35 U.S.C. § 316(d)(3); substitute claims 22 and 23 are indefinite under 35 U.S.C. § 112 ¶ 2; and, substitute claims 21–36, 39, and 40 would have been obvious over the combination of Maurer, Bernecker, Fry, and claims 35–38 would have been obvious over that combination with Gunn.

Accordingly, we deny the Contingent Motion to Amend.

IV. CONCLUSION

Petitioner shows by a preponderance of evidence that 1–20 of the '494 patent are unpatentable. Petitioner shows by a preponderance of evidence that substitute claims 21–40 of the Contingent Motion to Amend are unpatentable.

V. ORDER

ORDERED that 1–20 of the '494 patent are unpatentable;

FURTHER ORDERED that pursuant to 35 U.S.C. § 318(b), upon expiration of the time for appeal of this Final Written Decision, or the termination of any such appeal, a certificate shall issue cancelling claims 1–20 of the '494 patent;

FURTHER ORDERED that Patent Owner's Motion to Amend is *denied*; and

FURTHER ORDERED that because this is a final written decision, 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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