

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HID GLOBAL CORPORATION,
Petitioner,

v.

MORPHOTRUST USA, LLC,
Patent Owner.

Case IPR2017-01940
Patent 7,661,600 B2

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

MARGOLIES, *Administrative Patent Judge*.

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

I. INTRODUCTION

In this *inter partes* review, instituted pursuant to 35 U.S.C. § 314, HID Global Corporation (“Petitioner”) challenges the patentability of claims 1–8 of U.S. Patent No. 7,661,600 B2 (Ex. 1001, “the ’600 patent”), owned by MorphoTrust USA, LLC. (“Patent Owner”). We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed below, Petitioner has shown by a preponderance of the evidence that claims 1–8 of the ’600 patent are unpatentable.

A. Procedural History

Petitioner filed a Petition for *inter partes* review of claims 1–8 of the ’600 patent. Paper 1 (“Pet.”). Patent Owner filed a Preliminary Response. Paper 10 (“Prelim. Resp.”). On March 16, 2018, we instituted an *inter partes* review of claims 1–8 of the ’600 patent on the following grounds:

References	Basis	Challenged Claims
Maurer ¹ and Bernecker ²	35 U.S.C. § 103(a) ³	1 and 2
Maurer, Bernecker, and Gunn ⁴	35 U.S.C. § 103(a)	3 and 4
Maurer, Bernecker, and Fry ⁵	35 U.S.C. § 103(a)	5–8

¹ Maurer et al., U.S. Patent No. 4,544,181, issued Oct. 1, 1985 (Ex. 1005).

² Bernecker, U.S. Patent No. 5,958,528, issued Sept. 28, 1999 (Ex. 1006).

³ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), revised 35 U.S.C. § 103, effective March 16, 2013. Because the challenged patent was filed before March 16, 2013, we refer to the pre-AIA version of § 103 in this Decision.

⁴ Gunn et al., U.S. Patent No. 6,066,594, issued May 23, 2000 (Ex. 1008).

⁵ Fry, U.S. Patent No. 3,626,143, issued Dec. 7, 1971 (Ex. 1007).

Paper 11 (“Inst. Dec.”), 30.

Subsequent to institution, Patent Owner filed a Patent Owner Response (Paper 20, “PO Resp.”), to which Petitioner filed a Reply (Paper 23, “Reply”). Petitioner relies on the Declaration of Emmanouil M. Tentzeris, Ph.D. (Ex. 1002) and the Reply Declaration of Emmanouil M. Tentzeris, Ph.D. (Ex. 1015). Patent Owner relies on the Declaration of Darran R. Cairns, Ph.D. (Ex. 2009).

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

An oral hearing was held on November 15, 2018, and a transcript of the hearing has been entered into the record. Paper 39 (“Tr.”).

B. Related Matters

The parties identify the following pending matters, which may affect, or be affected by, a decision in this proceeding: *MorphoTrust USA, LLC v. United States of America*, Case No. 1:16-cv-00227 (Fed. Cl.) and *MorphoTrust USA, LLC v. CBN Secure Techs., Inc.*, Case No. 1-16-cv-00323 (E.D. Va.). Pet. 53; Paper 8, 2; *see* 37 C.F.R. § 42.8(b)(2).

Claims of a patent related to the ’600 patent are at issue in IPR2017-01941, for which a final written decision is being issued concurrently with this Decision, and also were at issue in IPR2017-01938 and IPR2017-01939, for which final written decisions have issued.

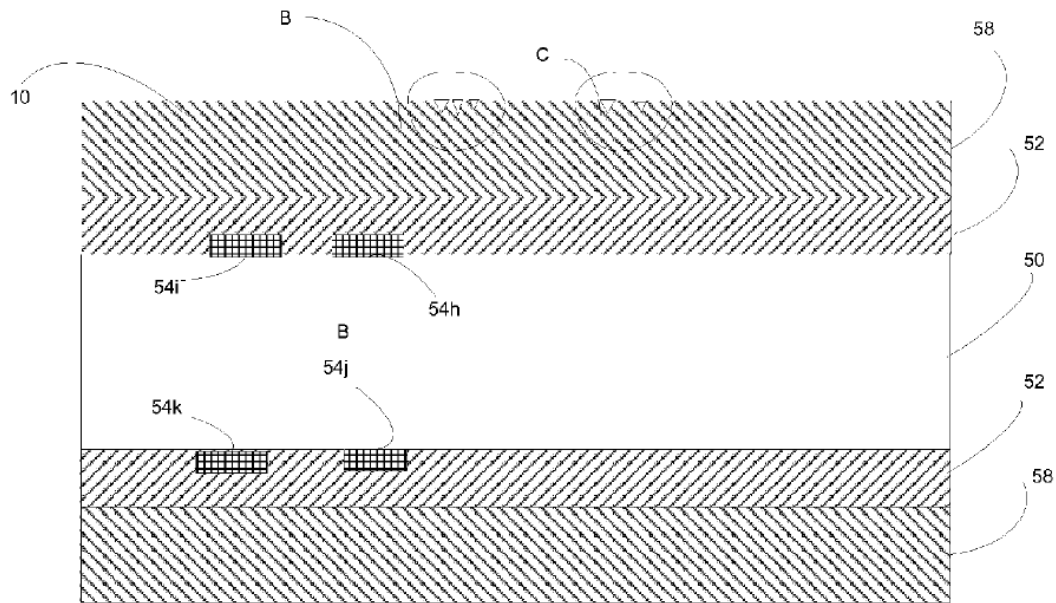
C. The ’600 Patent

The ’600 patent is directed to “[i]dentification documents employing laser-etched or –engraved features” in which “[t]actile effects produced by the laser-processed features may be felt by touch, helping confirm the authenticity of such documents.” Ex. 1001, Abstract. The ’600 patent states

that a goal of producing a secure identification document is “to endow the card with unique, personalized features that are not easily reproduced by conventional means.” *Id.* at 6:60–64.

The ’600 patent states that “laser etching helps to provide unique personalized features, in that the finished ID document can be uniquely altered and personalized at the same time.” *Id.* at 6:65–7:1. According to the patent, “the effect produced by laser etching can be identified easily by a person . . . because the laser etching produces a visual effect and/or a tactile effect.” *Id.* at 7:1–4. The ’600 patent states that “the laser removes material from the surface of the card and may (optionally) create a pattern that can be felt by touch” and that “[t]his tactile property may be used to further verify the authenticity of the card.” *Id.* at 7:13–16.

The ’600 patent states that a pattern laser etched into the surface of an identification document can include “a sequence of small holes, ridges, slits, etc. that form the desired text or design.” *Id.* at 7:35–37. Figures 5A and 5B of the ’600 patent illustrate examples of holes (in Figure 5A) and ridges (in Figure 5B) “that a laser can etch into the surface of a substrate.” *Id.* at 7:37–41. Figure 6A, below, shows a cross-section of identification document 10 (shown in Figure 1) and an exemplary pattern of engraving:

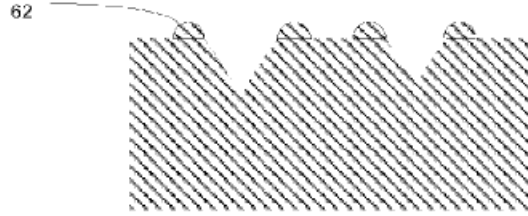


(A)

Id. at 7:41–43. As shown in Figure 6A above, information 54h–54k is formed in layer 52 “that is disposed between an overlamine 58 and the core layer 50.” *Id.* at 7:43–45. According to the ’600 patent, information 54h–54k “can be formed by any known means, including, many different types of conventional printing and also laser marking.” *Id.* at 7:45–47.

The ’600 patent states that a laser etching process “creates 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 7:50–53. The patent states that “our technology is used to create a tactile . . . pattern by adjusting the hole depth and area location of the laser engraving.” *Id.* at 7:56–58.

Figure 6C of the ’600 patent is shown below:



According to the '600 patent, Figure 6C above is an enlarged view of section C of Figure 6A, “showing a tactile pattern with raised edges 62.” *Id.* at 7:58–60.

The '600 patent states that “[b]ecause the imparted laser pattern can lie below the document’s surface, there is little or no impact on wear during the document’s useful life.” *Id.* at 7:63–65.

The '600 patent also explains that the identification document may include (i) “[p]ersonalized data,” which can include “data that is unique to a specific cardholder,” such as biometric information and image information, and data that is “personal to a specific cardholder but not necessarily unique to that cardholder,” such as birthdate (*id.* at 5:6–18), and (ii) “invariant data (i.e., data common to a large number of cards, for example the name of an employer)” (*id.* at 2:48–54).

D. Illustrative Claims

Among the challenged claims (claims 1–8) of the '600 patent, claims 1, 5, 7, and 8 are independent. The independent claims—which recite “voids,” “a tactile feature,” or “a void pattern” and “raised features”—are illustrative of the subject matter of the challenged claims and read as follows (with the foregoing features emphasized in italics):

1. An identity document comprising an outer top laminate layer and at least one interior layer, the document conveying both invariant and personalized information, the

personalized information particularly corresponding to a particular person to whom the document is issued, wherein at least some of the personalized information is defined by *voids that extend into, but not through, the laminate layer, said voids providing a feature that can be felt by touch.*

5. An identity document comprising at least one interior layer and a laminate layer, an outer surface of the laminate layer defining a top surface of the document, the document conveying both invariant and personalized information, the personalized information particularly corresponding to a particular person to whom the document is issued, wherein at least some of the personalized information is defined by laser-ablated *voids that extend through the top surface of the document*, and wherein at least some of said voids are defined by sidewalls that are angled obliquely, rather than perpendicularly, relative to said top surface.

7. A method of manufacturing an identification document for a person, comprising:

printing information, including invariant information, on a document core;

applying a laminate layer atop the printed core; and

laser-ablating the laminate layer to impart a tactile feature thereto, without ablating the document core, said tactile feature being personalized to correspond to said person.

8. An identification document comprising at least one layer of material, the top surface of the document including a *laser-formed void pattern* creating an indicia, the document characterized by *raised features that are also laser-formed*, said raised features comprising foamed 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.

Id. at 11:6–13, 11:20–12:5, 12:8–23.

II. DISCUSSION

A. *Principles of Law*

To prevail in its challenge to Patent Owner’s patent claims, Petitioner must demonstrate by a preponderance of the evidence that the claims are unpatentable. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). “In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–27 (Fed. Cir. 2008)) (discussing the burden of proof in *inter partes* review).

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time of the invention to a person having ordinary skill in the art. *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). “A determination of whether a patent claim is invalid as obvious under § 103 requires consideration of all four *Graham* factors, and it is error to reach a conclusion of obviousness until all those factors are considered.” *Apple Inc.*

v. Samsung Elecs. Co., 839 F.3d 1034, 1048 (Fed. Cir. 2016) (en banc) (citations omitted). “This requirement is in recognition of the fact that each of the *Graham* factors helps inform the ultimate obviousness determination.” *Id.*

B. Level of Ordinary Skill in the Art

In determining whether an invention would have been obvious at the time it was made, 35 U.S.C. § 103 requires us to resolve the level of ordinary skill in the pertinent art at the time of the invention. *Graham*, 383 U.S. at 17. “The importance of resolving the level of ordinary skill in the art lies in the necessity of maintaining objectivity in the obviousness inquiry.” *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991). The person of ordinary skill in the art is a hypothetical person who is presumed to have known the relevant art at the time of the invention. *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). Factors that may be considered in determining the level of ordinary skill in the art include, but are not limited to, the types of problems encountered in the art, the sophistication of the technology, and educational level of active workers in the field. *Id.* In a given case, one or more factors may predominate. *Id.* Generally, it is easier to establish obviousness under a higher level of ordinary skill in the art. *Innovation Toys, LLC v. MGA Entm’t, Inc.*, 637 F.3d 1314, 1323 (Fed. Cir. 2011) (“A less sophisticated level of skill generally favors a determination of nonobviousness . . . while a higher level of skill favors the reverse.”).

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. 7 (emphasis added) (citing Ex. 1002 ¶¶ 31–34). 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). We note that, 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.”

In our institution decision, we determined that Petitioner’s proposal without the “at least” qualifier for the educational background is consistent with the challenged patent and the asserted prior art and reflects the level of ordinary skill in the art. Inst. Dec. 9. Patent Owner agrees with our preliminary determination. PO Resp. 27. Dr. Cairns’ likewise has adopted that level of ordinary skill in the art. Ex. 2009 ¶ 27. The parties do not argue that any issue in this case turns on the difference between Petitioner’s proposal and that of Dr. Cairns.

Based on the full record, our assessment has not changed. We determine that one of ordinary skill in the art of the ’600 patent would have held 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.

C. Claim Construction

In an *inter partes* review filed before November 13, 2018, we construe claim terms in an unexpired patent according to their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs., LLC v. Lee*, 136

S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard). Consistent with the broadest reasonable construction, claim terms are presumed to have their ordinary and customary meaning as understood by a person of ordinary skill in the art in the context of the entire patent disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). An inventor may provide a meaning for a term that is different from its ordinary meaning by defining the term in the specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

Petitioner applies the broadest reasonable construction standard, and interprets all terms of the challenged claims “in accordance with their plain and ordinary meaning.” Pet. 7. Patent Owner proposes we construe the terms “tactile feature” and “tactile effect” and to mean “feature/effect that can be easily perceived by touch by most human beings with ordinary sensory/tactile capabilities.” PO Resp. 8. However, no dispute arises regarding the interpretation of these terms or their application to prior art.

We determine that no claim terms require express construction in order to determine the patentability issues raised in this *inter partes* review.

D. Asserted Obviousness over Maurer and Bernecker

Petitioner contends that claims 1 and 2 are unpatentable under 35 U.S.C. § 103(a) as obvious over Maurer and Bernecker. Pet. 3, 14–23. Relying in part on the testimony of Dr. Tentzeris, Petitioner explains how the references allegedly teach or suggest the claim limitations and provides reasoning for combining the teachings of the references. *Id.* at 14–23.

We have reviewed Petitioner’s and Patent Owner’s arguments and evidence of record. For the reasons that follow, we determine that Petitioner

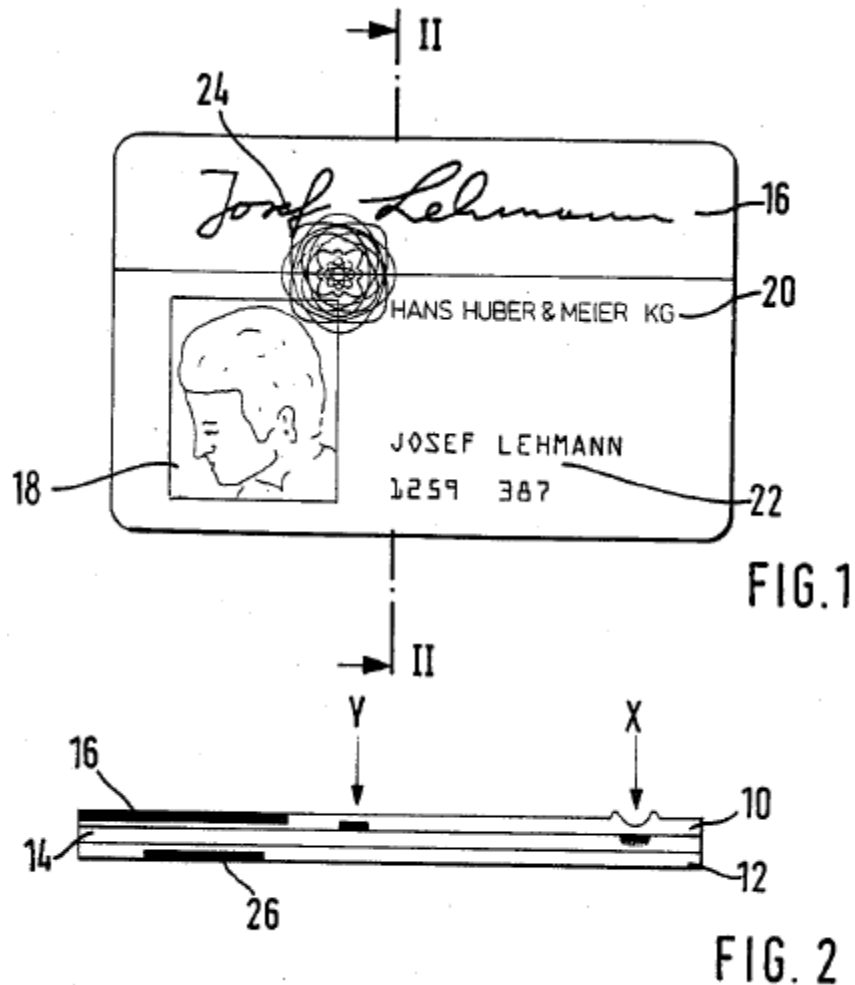
has shown by a preponderance of the evidence that claims 1 and 2 are unpatentable under 35 U.S.C. § 103(a) as obvious over Maurer and Bernecker.

1. Summary of Maurer

Maurer is a U.S. patent titled “Identification Card.” Ex. 1005, [54]. Maurer discloses “a multi-layered identification card comprising a card core laminated between cover sheets with user information appearing on the card inlet.” *Id.* at Abstract. Maurer discloses providing information on the inlet “by means of a laser beam being controlled accordingly so as to protect against forgery.” *Id.* 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 discloses “inscrib[ing] individual features, in particular personal data, in the interior of [a] card after lamination of the card blank.” *Id.* at 4:5–7. Maurer discloses that “[a]t 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. Maurer discloses that in addition to providing information such as a photograph which is accessible to visual inspection, “each card is also provided with a symbol which is specific for the card owner . . . or a pattern which . . . can be provided at some later date on the information already placed on the card core.” *Id.* at 4:56–65.

Figures 1 and 2 of Maurer are shown below:



According to Maurer, Figure 2 above is a cross-section of the identification card depicted in Figure 1. *Id.* at 5:26–28. Maurer discloses that the poly laminated identification card consists of two cover sheets 10 and 12 and a card core or inner opaque layer 14. *Id.* at 5:38–41. Maurer discloses that photograph 18 and data areas 20 and 22 are provided on card core (also called inlet) 14, and that data area 22 includes personal data. *Id.* at 5:54–57. Maurer also discloses that pattern 24 is individual for the card and is applied by means of a laser beam. *Id.* at 5:57–60. Maurer states that “[t]he pattern is arranged such that it covers a portion of the photograph, the general paper core as well as areas of the signature strip.” *Id.* at 5:60–62.

Maurer discloses that alphanumeric indicia are printed on the card core 14 “by means of an appropriately controlled laser beam.” *Id.* at 6:14–18. Maurer states that “[d]epending 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.” *Id.* at 6:18–22. Maurer adds that “[a]n example is indicated by arrow X” in Figure 2. *Id.* at 6:22–23. Maurer states that the identification card does not need to have all the individualizing features shown and that “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 6:68–7:3.

Maurer also discloses “providing a photograph as an individual characteristic directly on the paper core in a manner such as to make it inseparable therefrom.” *Id.* at 8:19–23. Maurer states “[t]he picture is ‘burned’ into the paper core as a mosaic picture with many shades of gray.” *Id.* at 8:23–24. Maurer also discloses that inscribing a magnetic strip on the identification card with appropriate data. *Id.* at 8:38–42.

2. *Summary of Bernecker*

Bernecker is a U.S. patent titled “Data Carrier and Method for Producing It.” Ex. 1006, [54]. Bernecker describes as background that identification documents such as identity cards have “individual, mostly user-related, information” and that that information “must be protected against manipulation and forgery.” *Id.* at 1:10–16. Bernecker explains that “[t]he increasing spread of high-quality, inexpensive reproduction methods and devices . . . makes it ever easier to produce remarkably good imitations of authentic identity cards” and that “new and technically more elaborate

authenticity features must constantly be developed.” *Id.* at 1:16–22.

Bernecker discloses an identity card “which has an authenticity feature that is neither manipulable nor copiable and can be produced simply and cost-effectively on the finished product.” *Id.* at 2:9–13.

Specifically, Bernecker discloses an identity card “with at least one plastic layer having information incorporated in certain areas with the help of a laser.” *Id.* at 1:4–7. Bernecker states that “the externally accessible plastic film . . . is engraved in the form of characters or patterns, i.e., the plastic material is evaporated with the help of the laser so that depressions arise in the plastic material in the form of readable information.” *Id.* at 3:13–17. Bernecker discloses that “at least parts of the user-related data record, e.g.,[.] the photo of the owner, are engraved by removal of material with a laser.” *Id.* at 3:30–34.

Figures 1 and 3 of Bernecker are shown below:

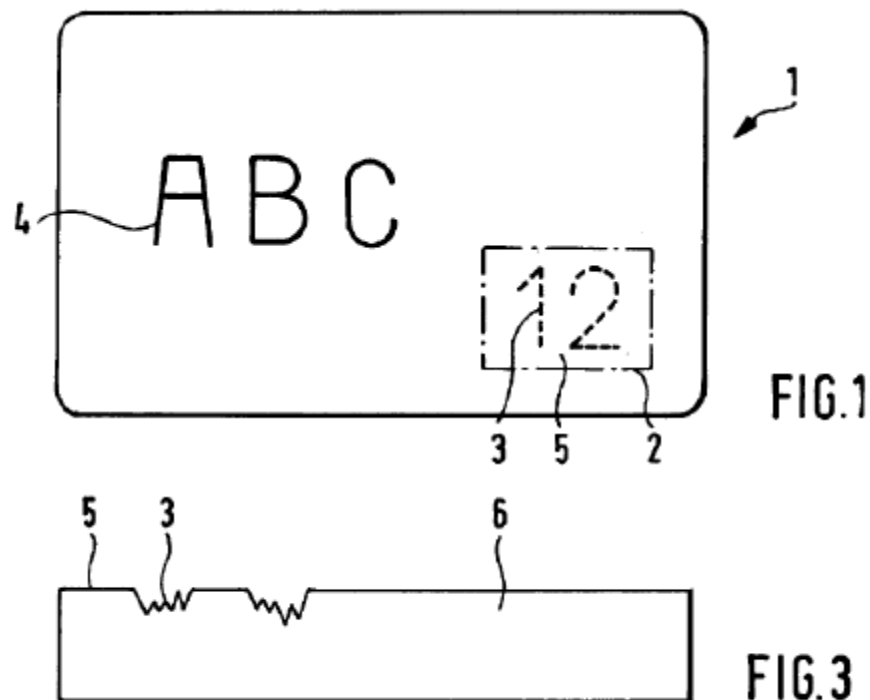


Figure 1 above illustrates features of identity card 1 and Figure 3 shows an embodiment of the security feature of the identity card. *Id.* at 4:32, 4:35–36. According to Bernecker, identity card 1 “can be of single- or multilayer design” and has “an externally accessible plastic layer.” *Id.* at 4:37–40. Bernecker states that the identity card has “usual information 4,” which relates to the issuing authority and user, and “authenticity feature 2.” *Id.* at 4:40–42. Bernecker discloses that identity card 1 “can of course have further security features or an integrated circuit.” *Id.* at 4:50–51.

According to Bernecker, “[a]rea 5 is interrupted by areas 3 which show readable information or a pattern or the like and have a different surface quality from surroundings 5.” *Id.* at 4:43–46. Bernecker discloses that, as shown in Figure 3, “surface area 5 of plastic material 6 has a homogenously smooth surface, while information 3 is incorporated in the material in the form of a laser engraving.” *Id.* at 5:5–8. Bernecker explains that the plastic identity card “is provided in a certain area with a microrelief in the form of characters, patterns or the like” and that “[t]he microrelief has such a fine structure that it cannot be recognized by reflected light and appears only at the glancing angle.” *Id.* at 2:57–65.

3. Analysis

a. Independent claim 1

i. Limitations of claim 1

Petitioner relies on Maurer for teaching all of the limitations of claim 1, except for the limitation of “wherein at least some of the personalized information is defined by voids that extend into, but not through, the laminate layer,” which Petitioner asserts the combination of Maurer and

Bernecker teaches. Petitioner makes a persuasive showing that the combination of Maurer and Bernecker teaches the subject matter of claim 1.

First, Maurer teaches “[a]n identity document comprising an outer top laminate layer and at least one interior layer,” as recited in claim 1. Maurer discloses a “multi-layered identification card comprising a card core laminated between cover sheets.” Ex. 1005, [57]. Petitioner’s annotated version of Figure 2 of Maurer is shown below.

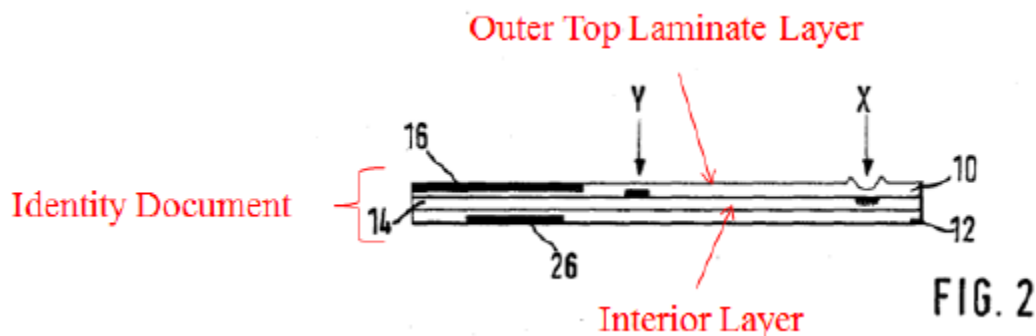


Figure 2 of Maurer shows a cross-section of “a polylaminated identification card consisting of two cover sheets 10, 12, and card core or inner opaque layer 14.” *Id.* at 5:27–28, 5:38–41. Petitioner annotates the figure to add labels for the outer top laminate layer, the interior layer, and the identity document. Pet. 18. We agree with Petitioner that Maurer discloses an identity document (the polylaminated identification card) comprising an outer top laminate layer (10) and an interior layer (14).

Maurer also teaches “the document conveying both invariant and personalized information, the personalized information particularly corresponding to a particular person to whom the document is issued,” as required by claim 1. Figure 1 of Maurer, with Petitioner’s annotations, is shown below.

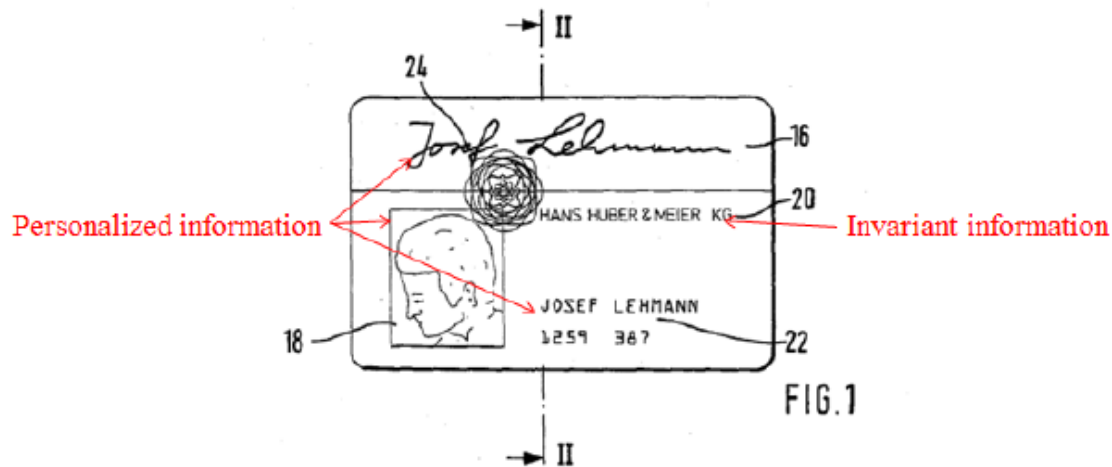
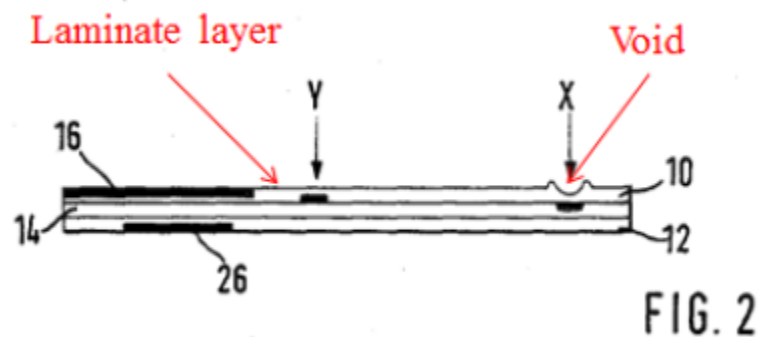


Figure 1 above illustrates an identification card that includes data area 20 with “the name of the issuing authority” and data area 22 “including the personal data of the client.” Ex. 1005, 5:26, 5:54–57. Petitioner adds labels for the invariant and personalized information. Pet. 19. We agree with Petitioner that Maurer discloses that the identity document conveys both invariant (the name of the issuing authority) and personalized information (personal data such as the person’s name, photograph, and signature) and that the personalized information particularly corresponds to a particular person to whom the document is issued. Ex. 1005, Fig. 1, 5:54–57; Ex. 1002 ¶¶ 64–65.

The combination of Maurer and Bernecker teaches “wherein at least some of the personalized information is defined by voids that extend into, but not through, the laminate layer,” as recited in claim 1. Maurer discloses a security feature in the form of a void that extends into, but not through, the laminate layer and Bernecker discloses using a security feature to define at least some of the personalized information.

Maurer discloses “inscrib[ing] individual features, in particular personal data, in the interior of said card after lamination of the card blank.”

Ex. 1005, 4:3–7. Maurer also discloses that “[a]t 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. Figure 2 of Maurer—as annotated by Petitioner—is shown below.



Petitioner annotates Figure 2 of Maurer to identify the void and the laminate layer. Pet. 20. As shown above, Maurer teaches that the identification card includes a void that extends into but not through the laminate layer. Ex. 1005, Fig. 2, 6:18–23.

Bernecker discloses colorless laser engravings that “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, 3:19–26. Bernecker also discloses that “at least parts of the personalized data which are produced in the form of a color contrast and are thus easily readable are provided on the document once again in the form of a colorless laser engraving.” *Id.* at 3:19–23. One of ordinary skill in the art would have recognized that, in addition to defining personal information with color-contrasting lasered information, the

colorless engraving itself also provides the personal information. Ex. 1002 ¶ 68.

A person of ordinary skill in the art would have been motivated to implement at least part of the personalization data, as taught in Bernecker, in the form of Maurer’s transparent, tactile relief in the laminate top layer. Ex. 1002 ¶¶ 60, 69. Maurer discloses a tactile feature in the transparent laminate layer that is formed in conjunction and in register with visible information underneath. Ex. 1005, 4:23–26. Bernecker recognizes the value of colorless engravings formed in register with printed information, explaining that they can be compared with printed information underneath. Ex. 1006, 3:19–25. Bernecker also teaches that the laser engravings themselves provide information because they can be compared with printed information underneath or disposed by themselves in a separate information carrier. *Id.* An ordinarily skilled artisan would have been motivated to use Bernecker’s teaching of the laser engravings themselves providing information to Maurer’s disclosure of voids in the top layer of the laminate to provide an additional security feature in the identification card. Ex. 1002 ¶¶ 56, 57, 60, 61, 69.

Finally, Maurer teaches “said voids providing a feature that can be felt by touch,” as required by claim 1. As explained above, Maurer discloses using a laser beam to “mark the cover sheet[,] which is then accessible to manual inspection by virtue of the resultant, permanent relief-type structure on the cover sheet.” Ex. 1005, 4:25–30. Maurer further explains that the laser beam can melt the cover sheet “in such a way that a relief is formed above the line of the printed information and in register therewith which can also be *felt manually*.” *Id.* at 6:18–23 (emphasis added). Maurer also recites

in claim 3 that “information on said transparent cover sheet is in relief and can be *sensed by touch*.” *Id.* at 9:9–11 (emphasis added).

ii. Patent Owner’s arguments

Patent Owner argues that Maurer and Bernecker are “systematically different references” and that “combining the blackening laser inscription process described in Maurer with the colorless engraving process described in Bernecker to develop the security features” required in claim 1 would undermine the respective purposes of Maurer and Bernecker (and thus a person of ordinary skill in the art would not have combined the references in the manner asserted). PO Resp. 27–32 (citing, e.g., Ex. 2009 ¶¶ 115–122). Specifically, Patent Owner asserts that Maurer exclusively teaches creating blackened inscriptions whereas Bernecker teaches avoiding discoloration at all cost. *Id.* at 31. Patent Owner also asserts that Maurer teaches using laser energy to alter the core of the 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. *Id.*

Patent Owner’s arguments and evidence do not undermine Petitioner’s persuasive showing. Petitioner shows that a skilled artisan would have been motivated to use Maurer’s relief to implement personalized information, as taught by Bernecker. Pet. 14–17, 19–21; Ex. 1002 ¶¶ 57, 60, 61, 69. Petitioner is not relying on modifying the processes of either Maurer or Bernecker. See Reply 15–16. Rather, Petitioner shows that a skilled artisan would have been motivated to use the process of Maurer of creating a relief in an identification card to provide a relief that conveys particular information—personalized information. Ex. 1002 ¶¶ 57, 60, 61, 69. Moreover, to the extent Patent Owner is relying on what its declarant

characterizes as a “combined security feature” (*see* Ex. 2009 ¶ 119 (cited at PO Resp. 32))—a raised tactile feature with an optically variable quality—that feature is not recited in claim 1.

iii. Conclusion regarding claim 1

Having considered the evidence of record and the arguments of the parties, Petitioner has shown by a preponderance of the evidence that the subject matter of claim 1 would have been obvious over Maurer and Bernecker.

b. Claim 2

Claim 2 recites “[t]he identity document of claim 1 in which said voids define a visually-perceptible image of said person.”

Patent Owner relies on the same arguments it raises for claim 1 and does not raise any arguments specific to this dependent claim. *See* PO Resp. 27–32.

Having reviewed the Petitioner’s and Patent Owner’s evidence and arguments, we determine that Petitioner has demonstrated by a preponderance of the evidence that claim 2 is unpatentable under 35 U.S.C. § 103(a) as obvious over Maurer and Bernecker. *See* Pet. 29–43. As explained above, the subject matter of claim 1 would have been obvious over Maurer and Bernecker. *See supra* Section II.D.3.a. In addition, Maurer discloses “inscrib[ing] individual features, in particular personal data, in the interior of said card after lamination of the card blank.” Ex. 1005, 4:3–7. Maurer explains that this personal data includes “client data . . . and, if desired, a photograph.” *Id.* at 8:16–19. Claim 1 of Maurer also recites an identification card that includes “visually perceptible information defined by patterns, letter, numbers and/or pictures.” *Id.* at 8:58–62. Moreover, as

discussed above in connection with claim 1 of the challenged patent, Maurer discloses concurrently marking 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. Thus, Maurer teaches that the voids define a visually-perceptible image of said person. Ex. 1002 ¶ 73.

Moreover, for the reasons explained above in connection with claim 1, one of ordinary skill in the art would have been motivated to combine the teachings of Maurer and Bernecker in the manner claimed. *See supra* Section II.D.3.a.

E. Asserted Obviousness over Maurer, Bernecker, and Gunn

Petitioner contends that claims 3 and 4 of the ’600 patent are unpatentable under 35 U.S.C. § 103(a) as obvious over Maurer, Bernecker, and Gunn. Pet. 3–4, 23–29. Relying in part on the testimony of Dr. Tentzeris, Petitioner explains how the references allegedly teach or suggest the claim limitations and provides reasoning for combining the teachings of the references as claimed. *Id.* at 23–29.

1. Summary of Gunn

Gunn is a U.S. patent titled “Identification Document.” Ex. 1008, [54]. Gunn explains as background that identification documents include “name, address, birth date, signature and [a] photographic image” and may include “other variant data (i.e., data specific to a particular card or document, for example an employee number) and invariant data (i.e., data common to a large number of cards, for example the name of an employer).” *Id.* at 1:10–20. Gunn states that data “crucial to the identification of the bearer are often covertly repeated on the document in encrypted form for data verification in a magnetic strip, bar code, radio frequency module or

integrated circuit chip.” *Id.* at 2:4-8. Gunn also describes as background that centrally issued digital identification documents “generally comprise an opaque laser or ink jet printed core material, typically either paper or plastic, sandwiched between two layers of clear plastic laminate.” *Id.* at 1:33–38.

Gunn describes creating an identification document which can be issued over the counter and which can mimic the appearance of a centrally issued card. *Id.* at 2:15–19. Among other steps in the process, Gunn describes forming indicia on both surfaces of the core layer. *Id.* at 3:18–25. Gunn states that “it is often convenient to provide one or more first indicia intended for human reading of the core layer surface which becomes the front of the completed identification document, 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.* Gunn further discloses that “[f]ollowing the printing of the first indicium, the two layers of substantially transparent polymer are affixed to the core layer.” *Id.* at 3:39–41. According to Gunn, “[t]he polymer layers themselves may be formed from any polymer having sufficient transparency, for example polyester, polycarbonate[,] polystyrene, cellulose ester, polyolefin, polysulfone, or polyimide.” *Id.* at 3:51–55; *see also id.* at 6:25–28 (“The printed core layer 112 is sandwiched between two polymer layers 116 formed from an amorphous or biaxially oriented polyester or other optically clear plastic such as polycarbonate.”).

2. Analysis

Claim 3 recites “[t]he identity document of claim 1 in which at least one layer comprises a polycarbonate.” Claim 4 recites “[t]he identity

document of claim 1 that further comprises a bar code and a semiconductor device.”

Patent Owner relies on the same arguments it raises for claim 1 and does not raise any arguments specific to these dependent claims. *See* PO Resp. 27–51.

Having reviewed the Petitioner’s and Patent Owner’s evidence and arguments, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 3 and 4 are unpatentable under 35 U.S.C. § 103(a) as obvious over Maurer, Bernecker, and Gunn. *See* Pet. 23–29.

As explained above, the subject matter of claim 1 would have been obvious over Maurer and Bernecker. *See supra* Section II.D.3.a. In addition, Maurer discloses that the cover sheets of laminated cards “preferably consist of plastics” (Ex. 1005, 6:57–58) and Gunn discloses a printed core material “sandwiched between two layers of clear plastic laminate” where the laminate material may be polycarbonate (Ex. 1008, 1:33–36, 3:51–55, 6:25–28). Thus, the combination of Maurer, Bernecker, and Gunn teaches that the identity document includes at least one layer comprised of polycarbonate.

Maurer further discloses that identification cards include machine-readable information in the form of a magnetic strip (Ex. 1005, 4:43–48, 8:38–42) and Bernecker discloses including an integrated chip in an identification card (Ex. 1006, 4:50–51). Gunn similarly discloses that data which is “crucial to the identification of the bearer” is covertly stored “in encrypted form for data verification in a magnetic stripe, bar code, radio frequency module or integrated circuit chip.” Ex. 1008, 2:4–8; *see also id.*

at 3:18–25 (disclosing bar codes). Thus, the combination of Maurer, Bernecker, and Gunn teaches that the identity document includes a bar code and a semiconductor device.

Petitioner also persuasively shows that one of ordinary skill in the art would have combined the teachings of Gunn with that of Maurer and Bernecker. First, for the reasons explained above in connection with claim 1, one of ordinary skill in the art would have been motivated to combine the teachings of Maurer and Bernecker in the manner claimed. *See supra* Section II.D.3.a. In addition, an ordinarily skilled artisan would have been motivated to use polycarbonate, as taught by Gunn, as one of the layers in Maurer’s identity document, because that material was commonly used for the plastic layers of identification cards. Ex. 1002 ¶ 79.

Moreover, one of ordinary skill in the art would have been motivated to include machine-readable information in the form of a bar code and an integrated circuit chip, as disclosed in Gunn, in the multi-layered laminated identification card of Maurer, as modified by Bernecker, to provide the benefits of machine reading of information and as an extra layer of security. Ex. 1002 ¶ 81.

Patent Owner raises the same arguments for claims 3 and 4 that it raises for claim 1. PO Resp. 32. For the reasons explained above in connection with claim 1, Patent Owner’s arguments and evidence do not undermine Petitioner’s persuasive showing. *See supra* Section II.D.3.a.ii.

F. Asserted Obviousness over Maurer, Bernecker, and Fry

Petitioner contends that claims 5–8 of the ’600 patent are unpatentable under 35 U.S.C. § 103(a) as obvious over Maurer, Bernecker, and Fry. Pet. 4, 29–52. Relying in part on the testimony of Dr. Tentzeris, Petitioner

explains how the references allegedly teach or suggest the claim limitations and provides reasoning for combining the teachings of the references. *Id.* at 29–52.

1. Summary of Fry

Fry is a U.S. patent titled “Scoring of Materials with Laser Energy.” Ex. 1007, [54]. Fry describes “[a] process for grooving thermoplastic sheet[s] with a laser beam.” *Id.* at 1:69–70. Fry discloses that “the beam degrades the thermoplastic without cutting through the sheet, thereby forming a groove or score in the thermoplastic having a bead that has been formed during the operation bordering the groove.” *Id.* at 1:72–2:3

Figure 2 of Fry is shown below:

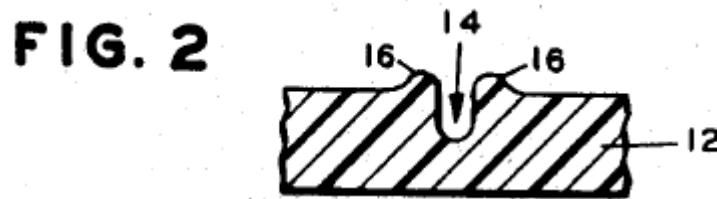


Figure 2 “shows a typical cross section of a score or groove generated by a laser beam 11 in the substrate 12.” *Id.* at 2:69–70. According to Fry, “[w]hen the relative motion between the laser beam and substrate 12 is of the correct velocity, a bead 16 forms along the sides of the score or groove.” *Id.* at 2:70–73. Fry states that “[a]side from this bead, the score 14 has a neat and clean surface, remaining unscorched after the scoring process has ended.” *Id.* at 2:73–75.

Fry also provides more details regarding the formation of the beads. Fry states that “[w]hen a groove or score is accomplished successfully, a bead is formed on both edges of the groove” and that “[m]icroscopic examination of the grooves . . . reveals the presence of small bubbles in the

beads formed on the sides of the groove.” *Id.* at 3:60–62, 3:63–65. Fry states that “[t]here are at least two possible sources from which the bubbles may arise.” *Id.* at 4:40–42. One possibility, according to Fry, is “the release of entrained gases or water vapor from the plastics in the molten region, with the bubbles forming due to pressure buildup on release of these gases.” *Id.* at 4:42–45. Another possibility, according to Fry, is “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 4:45–48. Fry explains that, in the grooving operation, “the energy density in the laser beam must be such that the plastic is evaporated or decomposed while the relative motion between the beam the sample is of the velocity whereby the groove does not extend entirely through the depth of the material.” *Id.* at 4:7–12. Fry adds that, “[t]o accomplish this structure, precise control over the beam focus and the relative velocity is required.” *Id.* at 4:12–14.

2. Analysis

a. Independent claim 5

i. Limitations of claim 5

Independent claim 5 is similar to independent claim 1 but recites that some of the personalized information is defined by “laser-ablated voids that extend through the top surface of the document” and that at least some of the voids “are defined by sidewalls that are angled obliquely, rather than perpendicularly” relative to the top surface. Petitioner relies on Maurer for teaching most of the limitations of claim 5 and relies on the combination of Maurer, Bernecker, and Fry for teaching “wherein at least some of the personalized information is defined by laser-ablated voids that extend

through the top surface of the document.” Petitioner persuasively shows that the combination of Maurer, Bernecker, and Fry teaches the subject matter of claim 5.

First, Maurer teaches “[a]n identity document comprising at least one interior layer and a laminate layer, an outer surface of the laminate layer defining a top surface of the document” as recited in claim 5. Maurer discloses a “multi-layered identification card comprising a card core laminated between cover sheets.” Ex. 1005, [57]. Petitioner’s annotated version of Figure 2 of Maurer is shown below. Pet. 33.

Outer surface of laminate layer / Top surface of document

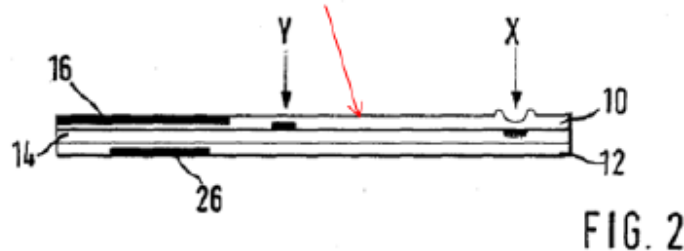


Figure 2 of Maurer shows a cross-section of “a polylaminated identification card consisting of two cover sheets 10, 12, and card core or inner opaque layer 14.” Ex. 1005, 5:27–28, 5:38–41. Petitioner annotates the figure to add labels for the outer surface of laminate layer and the top surface of the document. Pet. 33. Petitioner also provides another annotated version of Figure 2 to identify the features that correspond to the claimed identification document, interior layer, and laminate layer. *Id.* We agree with Petitioner that Maurer discloses an identity document (the polylaminated identification card) comprising an interior layer (14) and a laminate layer (10), an outer surface of the laminate layer defining a top surface of the document. Ex. 1005, 5:27–28, 5:38–41.

Maurer also teaches “the document conveying both invariant and personalized information, the personalized information particularly corresponding to a particular person to whom the document is issued,” as required by claim 5. Figure 1 of Maurer, with Petitioner’s annotations, is shown below.

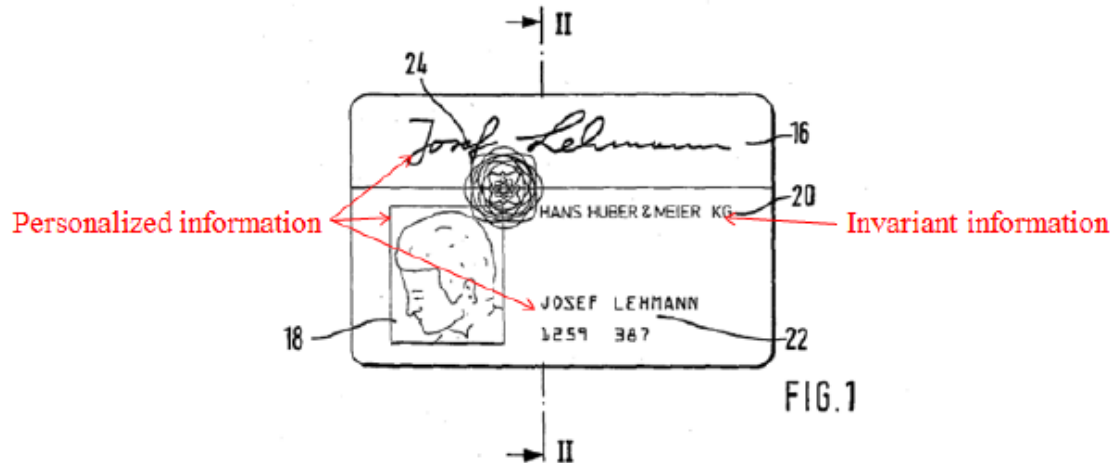
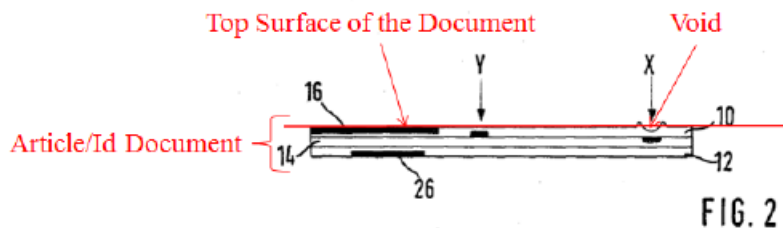


Figure 1 above illustrates an identification card that includes data area 20 with “the name of the issuing authority” and data area 22 “including the personal data of the client.” Ex. 1005, 5:26, 5:54–57. Petitioner adds labels for the invariant and personalized information. Pet. 34. We agree with Petitioner that Maurer discloses that the identity document conveys both invariant (the name of the issuing authority) and personalized information (personal data such as the person’s name, photograph, and signature) and that the personalized information particularly corresponds to a particular person to whom the document is issued. Ex. 1005, Fig. 1, 5:54–57; Ex. 1002 ¶¶ 65, 91.

The combination of Maurer, Bernecker, and Fry teaches “wherein at least some of the personalized information is defined by laser-ablated voids that extend through the top surface of the document,” as recited in claim 5.

As discussed below, Maurer discloses a security feature in the form of laser-ablated voids; Bernecker discloses using a security feature to define personalized information; and Fry teaches the implementation details for grooving or scoring thermoplastic using laser ablation to create a relief structure that extends through the top surface of a document.

Specifically, Maurer discloses “inscrib[ing] individual features, in particular personal data, in the interior of said card after lamination of the card blank.” Ex. 1005, 4:3–7. Maurer also discloses that “[a]t 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. Figure 2 of Maurer below—as annotated by Petitioner—is shown below.



Petitioner annotates Figure 2 of Maurer to identify the identification document, the top surface of the document, and the void and the laminate layer. Pet. 35. As shown above, Maurer teaches that the identification card includes a relief-type structure that extends through and below the top surface of the document. Ex. 1005, Fig. 2, 6:18–23; Ex. 1002 ¶ 93.

Bernecker discloses that “at least parts of the personalized data which are produced in the form of a color contrast and are thus easily readable are provided on the document once again in the form of a colorless laser engraving.” Ex. 1006, 3:19–23. Bernecker discloses that the colorless laser

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.” *Id.* at 3:19–26. Thus, one of ordinary skill in the art would have recognized that Bernecker teaches that the colorless engraving itself provides the personal information. Ex. 1002 ¶ 94.

A person of ordinary skill in the art would have been motivated to implement at least part of the personalization data, as taught in Bernecker, in the form of Maurer’s permanent, relief-type structure. Ex. 1002 ¶¶ 60, 69, 95. Maurer discloses a tactile feature in the transparent laminate layer that is formed in conjunction and in register with visible information underneath. Ex. 1005, 4:23–26. Bernecker recognizes the value of colorless engravings formed in register with printed information, explaining that they can be compared with printed information underneath. Ex. 1006, 3:19–26. Bernecker also teaches that the laser engravings themselves provide information because they can be compared with printed information underneath or disposed by themselves in a separate information carrier. *Id.*

An ordinarily skilled artisan would have been motivated to use Bernecker’s teaching of the laser engravings themselves providing information to Maurer’s disclosure of a permanent, relief-type structure to provide an additional security feature in the identification card. Ex. 1002 ¶¶ 56, 57, 60, 61, 95.

Moreover, Maurer discloses that its relief structure is formed when “the upper cover sheet 10 [is] melted” with a laser. Ex. 1005, 6:18–23. A person of ordinary skill in the art would have understood that Maurer

discloses a laser process in the form of laser ablation (i.e., a process that removes material from the upper cover sheet or laminate.). Ex. 1002 ¶ 96.

Fry confirms that the process of scoring or grooving plastic results from laser ablation (i.e., removes material) and further discloses the particular implementation details for using the laser. Fry describes the detailed process of grooving or scoring thermoplastic, which “degrade[s] or melt[s] the thermoplastic.” Ex. 1007, 1:69–72. Fry explains that plastic may undergo decomposition, which “completely vaporize[s] the regions upon which the [laser] beam impinges.” *Id.* at 1:31–44. Fry explains that in its process of grooving or scoring thermoplastic, “the energy density in the laser beam must be such that the plastic is evaporated or decomposed while the relative motion between the beam and the sample is of the velocity whereby the groove does not extend entirely through the depth of the material.” *Id.* at 4:6–12. A person of ordinary skill in the art would have understood that when plastic is vaporized or evaporated, plastic material is removed or ablated. Ex. 1002 ¶ 97.

Figure 2 of Fry is shown below.

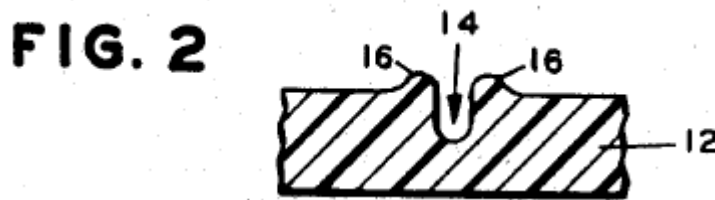


Figure 2 “shows a typical cross section of a score or groove generated by a laser beam 11 in the substrate 12.” *Id.* at 2:69–70. According to Fry, “[w]hen the relative motion between the laser beam and substrate 12 is of the correct velocity, a bead 16 forms along the sides of the score or groove.”

Id. at 2:70–73. As shown in Figure 2, the groove (void) extends through the top surface of the substrate.

A person of ordinary skill in the art would have been motivated to apply the techniques for scoring and grooving thermoplastic taught by Fry to create a security feature for use in a laminated identification document, as taught by Maurer and Bernecker. Ex. 1002 ¶ 98. An ordinarily skilled artisan would have understood that creating such a security feature would result in voids formed from laser ablation of the plastic laminate material and that extend through the top surface of the document. *Id.*

Thus, the combination of Maurer, Bernecker, and Fry teaches “wherein at least some of the personalized information is defined by laser-ablated voids that extend through the top surface of the document,” as recited in claim 5.

Finally, Maurer teaches “wherein at least some of said voids are defined by sidewalls that are angled obliquely, rather than perpendicularly, relative to said top surface,” as required by claim 5. Figure 2 of Maurer below—with Petitioner’s annotations—illustrates this feature.

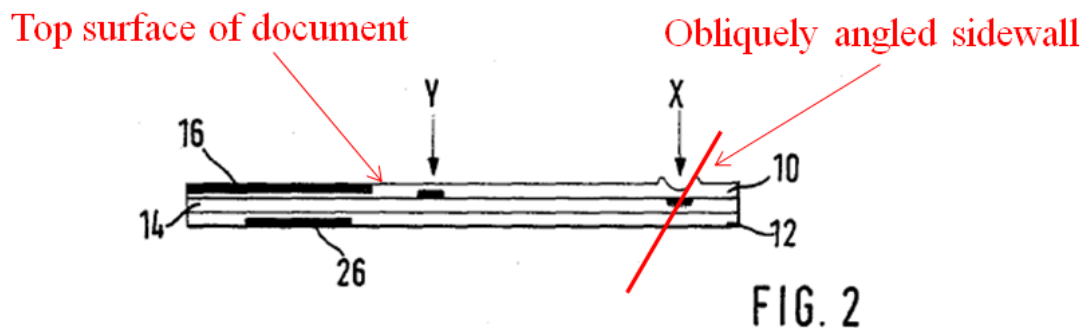


Figure 2 of Maurer illustrates a cross section of the identification card and shows a void in the laminate layer. Ex. 1005, Fig. 2, 5:27–28.

Petitioner adds annotations to the figure, identifying the top surface of the

document and obliquely angled sidewall of the void. Pet. 39. As explained above, Maurer discloses using a laser beam to “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. We agree with Petitioner that Figure 2 illustrates the relief-type structure, which includes a void defined by sidewalls that are angled obliquely, not perpendicularly, relative to the top surface of layer 10. *Id.* at Fig. 2, 6:18–23; Ex. 1002 ¶ 99. Maurer thus teaches at least some of the voids are defined by sidewalls that are angled obliquely, rather than perpendicularly, relative to the top surface of the identification document. Ex. 1002 ¶ 99.

ii. Patent Owner’s arguments

Patent Owner relies on its arguments raised in connection with claim 1 that a person of ordinary skill in the art would not have been motivated to combine Maurer and Bernecker as Petitioner contends. PO Resp. 32. Patent Owner also argues that an ordinarily skilled artisan would not have combined Maurer with Fry. *Id.* at 32–45.

Whether Fry is directed to a divergent field of endeavor

First, Patent Owner argues that Fry is directed to a “divergent field of endeavor” in that “Fry’s laser processing techniques were designed for scoring plastics for form a weakened line, not for use in the contrasting or contrastless laser processes taught in Maurer or Bernecker.” *Id.* at 33. This appears to be an attempt to raise an analogous art issue. Contrary to this implied argument, the ’600 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 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 ’600 patent and Fry fall in the same field of endeavor of using a laser to form grooves in plastic layers. Even if it were not in the same field of endeavor, Fry is still reasonably pertinent because the matter with which it deals, logically would have commended itself to the inventor’s attention in considering his problem. *In re Clay*, 966 F.2d 656, 658–659 (Fed. Cir. 1992); see also *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1000–01 (Fed. Cir. 2016) (relying on *Clay*).

The ’600 patent states the technical field “generally relate[s] to identification documents, and in one particular arrangement *concerns laser engraving* security features onto such documents.” Ex. 1001, 2:21–24 (emphasis added). The ’152 patent provides that “identification documents” covers a broad range of items

including (but are not limited to), documents, magnetic disks, credit cards, bank cards, phone cards, stored value cards,

prepaid cards, smart cards (e.g., cards that include one more semiconductor chips, such as memory devices, microprocessors, and microcontrollers), contact cards, contactless cards, proximity cards (e.g., radio frequency (RFID) cards), passports, driver's licenses, net-work access cards, employee badges, debit cards, security cards, visas, immigration documentation, national ID cards, citizenship cards, social security cards and badges, certifi-cates, identification cards or documents, voter registration and/or identification cards, police ID cards, border crossing cards, security clearance badges and cards, gun permits, badges, gift certificates or cards, membership cards or badges, tags, CD's, consumer products, knobs, keyboards, electronic components, etc., or any other suitable items or articles that may record information, images, and/or other data, which may be associated with a function and/or an object or other entity to be identified.

Id. at 4:39–59. In addition, the '600 patent states that its laser engraving technique can be employed to mark a wide variety of items in addition to identification documents:

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.

Id. at 4:67–5:5. The '600 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 8:38–42; *accord id.* at 9:43–60 (it is “expressly contemplated” that the laser etching methods can be used with any layer that is affixed 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 ’600 patent further notes “the technology disclosed herein can be used in combination with other technologies.” *Id.* at 10:22–23.

Thus, the field of technology includes marking any type of document, package or container, without necessarily providing textual information, just like Fry.

Moreover, Fry is reasonably pertinent to problems the ’600 patent sought to address. The ’600 patent states that it is often desirable to mark a portion of a structure with “text, information, graphics, logos, security indicia, security features, marks, images and/or photographs,” and that laser etching helps provide unique individualized features. Ex. 1001, 6:56–60, 65–7:1. Because the ’600 patent contemplates broad categories of types of etching, such as “marks,” on a broad range of items, Fry’s disclosure of implementation details for scoring using laser techniques logically would have commended itself to the attention of the inventor of the ’600 patent. *In re Clay* at 659. Also Petitioner notes, Fry is generally applicable to the same types of “plastic film or sheet material,” Pet. Reply 16 (citing Ex. 1007, 2:18) involved in identification cards, *id.* (citing Ex. 1015 ¶ 32). *See also* Ex. 1002 ¶¶ 83–88 (Dr. Tentzeris testifying an artisan of ordinary skill would have turned to Fry for particular implementation details regarding scoring plastics).

Whether Maurer teaches a raised tactile feature

Patent Owner also argues that Maurer does not teach a raised tactile feature. PO Resp. 34–42. Patent Owner argues that Figure 2 of Maurer “was not intended to portray the specific dimensions or attributes of any particular feature—much less any feature not separately described in the specification. *Id.* at 35. Patent Owner also argues that “the actual process described in Maurer—simultaneous melting the cover sheet while burning indicia onto the underlying core—could not produce a raised tactile feature.” *Id.* at 37. Patent Owner’s arguments do not undermine Petitioner’s persuasive showing.

Figure 2 of Maurer is shown below.

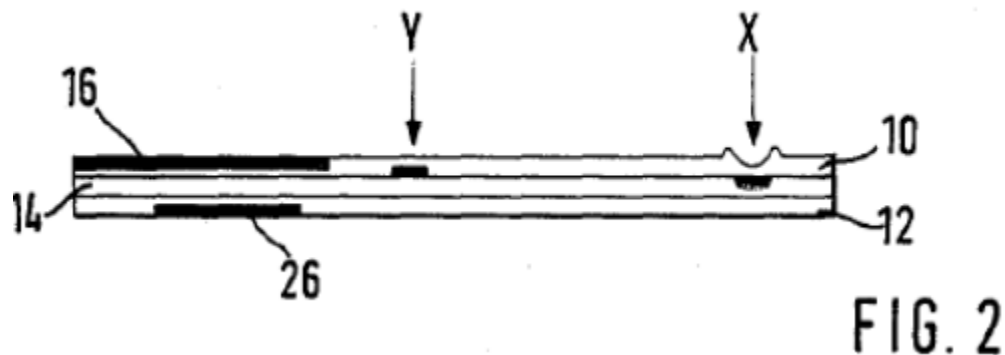


Figure 2 above shows a depression in, and ridges on, top laminate layer 10 above printed information (blackened area) in core layer 14. See Ex. 1005, 6:18–23. Maurer describes “arrow X” as follows: “[A] relief is formed above the line of printed information and in register therewith which can also be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

According to Patent Owner, 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 cover sheet.” PO Resp. 17

(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” is not limited to a depression below the top surface of cover sheet 10. *See* Ex. 1005, 4:29–30. In describing Figure 2, Maurer refers to an “indicated by arrow X” and describes “a relief above the line of printed information” without limiting the relief to the depicted depression. *Id.* at 6:18–23.

The plain and ordinary meaning of “relief” is “[t]he projection of figures or forms from a flat background.”⁶ Ex. 3001. Consistent with this plain and ordinary meaning, Maurer depicts a “relief” in Figure 2 as including a raised feature—i.e., “a projection . . . from a flat background.” *See* Ex. 3001; Ex. 1005, 4:28–30, 6:18–23.

Patent Owner contends that the panels’ cited definition (Ex. 3001) 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. 39 (citing “definition 6” of Ex. 3001). 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. 38 (citing Ex. 1006, 3:13–17; Ex. 2009 ¶ 103).

The definition entered as Exhibit 3001 that Patent Owner relies upon defines a relief as “[v]ariations in elevation of *a portion of the earth’s surface*.” Ex. 3001 (definition 6) (emphasis added). The definition on

⁶ 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) (Ex. 3001).

which the panel relies 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.” Even if Patent Owner’s definition also applies, “variations in elevation” 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 typical meaning of “relief” in the art means (or at least includes) a raised feature. See Reply 7–8 n.4 (citing Ex. 2002, Abstract (“[T]he ‘natural foamability’ that laser action brings about in plastic materials . . . is exploited to obtain a relief height sufficient for 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 Maurer’s relief, which is “on” the cover sheet and 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. Patent Owner asserted the following: “[M]elting can create localized distortions that may at some point, smoothly and unpredictably undulate above the top surface.” Prelim. Resp. 16 (citing Ex. 2001 ¶¶ 56–63).⁷ 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.”

⁷ 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).

Id. In other words, Patent Owner contended that Maurer *can* create “localized distortions that may at some point . . . *undulate above the top surface.*” *Id.* (emphasis added). Claim 5 does not require that any raised feature be predictable or discrete.

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 (Dr. Cairns testifying in support of the Preliminary Response that “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)). Setting aside that Maurer produces at least “unpredictable undulations” as Patent Owner argued (Prelim. Resp. 16), Patent Owner now contends “[t]he use of the term ‘relief’ in Maurer does not provide a legitimate basis to conclude that Maurer attributed its tactile feature to a *raised* feature instead of the depressed area.” PO Resp. 39; *see also id.* at 18 (“Maurer attributes the ability of the feature to be ‘felt manually’ to the depression shown by the ‘X,’ not a raised feature.”). Patent Owner’s different arguments reveal an inconsistency, because a person can feel raised undulations in Maurer’s card if that person can feel depressions.

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. As Petitioner persuasively argues, nowhere does Maurer attribute the tactility of the feature to the depression. Reply 13.

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.”).⁸ Also, Maurer’s disclosure is not only 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.

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 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 ’600 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 proportions of features of Figure 2 for support. *See* PO Resp. 16–17 (reproducing precise annotations of Figure 2 and arguing the “feature” X must exactly line up with outer contours of the printed

⁸ 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.”).

information on core layer 14 (citing Ex. 2009 ¶ 80)). Patent Owner also argues “‘arrow X’ merely designates the depression” and “is not intended to be an accurate depiction of the features and dimensions of the final identification card” (PO Resp. 15), but then Patent Owner contends “Maurer . . . pointed the arrow [from X] directly at the center of this depressed area” (*id.* at 16). Patent Owner explains Maurer “used a slightly curved line connecting the reference number 10” “to generally identify the entire cover sheet 10.” *Id.* at 17. 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, or Dr. Cairns’ related testimony. *See* PO Resp. 14–17 (citing Ex. 2009 ¶¶ 72–82, 84); Ex. 2009 ¶¶ 77–84.

Dr. Cairns’ testimony tracks Patent Owner’s arguments and relies on the same annotations of Figure 2. *See* Ex. 2009 ¶¶ 77–84. 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. 2009 ¶ 85 (emphasis omitted). We address melting below and conclude Maurer discloses a raised relief and involves some evaporation in addition to melting. *See* Ex. 1015 ¶ 21 (“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.”).

Melting and vaporization

Patent Owner further contends that Maurer teaches a melting process that “is distinct from, and incompatible with, the high-energy vaporization processes taught in Fry.” PO Resp. 42. Patent Owner argues that “[b]ecause Maurer specifically relies on melting to create its security features,” a skilled artisan would not turn to Fry to learn how to implement a melting process. *Id.* at 43. Patent Owner also argues that “it is impossible to generate the security features of Maurer using the vaporization technique taught by Fry.” *Id.* at 43–44 (emphasis omitted). For the reasons below, Patent Owner’s arguments do not undermine Petitioner’s persuasive showing.

Patent Owner improperly characterizes Maurer and the combined teachings of Maurer and Fry. *See* Reply 3–15, 16–20; Ex. 1015 ¶¶ 20–24. 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 a person of ordinary skill in the art would have recognized as the same or similar to the laser groove forming process in Maurer. *See* Pet. 29–52; Ex. 1002 ¶¶ 54–55 (citing, e.g., Ex. 1007, Fig. 2, 1:72–2:3, 2:39–61, 2:69–75, 3:19–24, 4:7–12), ¶¶ 83–88; Ex. 1005, Fig. 2; Ex. 1007, Fig. 2. 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. 1015 ¶ 22 (“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).”) (emphasis omitted), ¶ 20 (“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 that “[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. 1015 ¶ 24 (quoting Ex. 2009 ¶ 47) (emphasis added by Dr. Tentzeris).

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 id.* at 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*” in order to “*form[] a groove or score in the thermoplastic having a bead* that has been formed during the operation bordering the groove.” Ex. 1007, 1:70–2:3 (emphases added); *see also id.* at 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”).

Thus, for some short-hand purposes, 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 processes—because melting by itself only occurs in an idealized world. *See, e.g.,* Ex. 1015 ¶ 22 (“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 the following: “[T]he 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, 1:51–53 (emphasis added); *see also* Ex. 1015 ¶ 29 (“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 ’600 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 9 n.6. Emphasizing the point about absorption of heat inside the plastic, Fry teaches that “plastics are not strong absorbers of 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*.” Ex. 1007, 3:20–23 (emphasis added).

Patent Owner also argues the following:

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.

PO Resp. 19 (citing Ex. 2009 ¶¶ 89–103) (emphasis added and other emphasis omitted). Patent Owner does not quantify what “just below the top surface” means. In any event, 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 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 relative to the laser’s focus. 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 (when focusing the laser “on any given spot on the material 12, for too long at 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 a person of ordinary skill in the art 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 can be felt manually (see PO Resp. 21), and Dr. Cairns cites it as “consistent” with his opinions (Ex. 2009 ¶ 98), but Maurer ’754 also discloses 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. 2006, Fig. 2, 4:2–39 (ALKOR PVC layer

description), 2:68–3:17 (“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 laser 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).

In any event, Fry and Maurer (and Bernecker) each teach cutting a groove into a 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), 5:14 (claim 1 reciting “at least one plastic layer”), Fig. 3 (etched OV features). Even though Maurer’s process provides laser energy to the paper core, like Fry (and Bernecker), Maurer’s process does not cut all the way through the top layer—rather, Maurer’s process darkens/blackens the “white paper” core without cutting through the

top layer to the 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. 1015 ¶¶ 20–24; Ex. 2009 ¶ 87 & n.7 (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)).

Dr. Cairns and Dr. Tentzeris agree that what occurs depends on several factors. For example, Dr. Cairns testifies as follows:

Whether 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. 2009 ¶ 35; *accord id.* ¶¶ 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. 1015 ¶ 20 (“[A] person of skill in the art would have understood that the chemical processes involved in melting and vaporizing plastics are complex and were not understood at the time to be mutually exclusive.”). As noted above, Bernecker verifies “melting” 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. 1015 ¶ 24; Ex. 2009 ¶ 47. (On the other hand, as noted above, even though evaporation may be necessary to form a groove, Bernecker discloses that evaporation does not necessarily create a raised ridge or discoloration, even if it decomposes material to create depressions. See Ex. 1006, 3:15–17).

Regarding the second mechanism, Fry states “[i]n polyethylene, bubble formation occurs *before the formation of the groove* and not thereafter.” Ex. 1007, 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). Fry thus 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).

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.” Fry thus discloses that some vaporization arises from the molten material to create raised ridges.

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 a person of ordinary skill in the art readily knew how to foam plastics to create ridges. *See* Ex. 2009 ¶¶ 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. 1015 ¶ 28 (noting Fry discloses 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 a person of ordinary skill in the art 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 printing, laminating, and creating voids, raised features, and OV features. *See, e.g.*, Pet. 7–14 (discussing level of skill and background art); Ex. 1005, 6:26–28 (A “laser does not have to cause a blackening or destruction of the core.”), 8:25–32 (The “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 (“The 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), 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).

Nothing in Maurer supports Patent Owner’s assertion that Maurer’s process requires focusing the laser on the white paper core. *See* PO Resp. 20–21; Ex. 2009 ¶¶ 67–68; Ex. 1015 ¶¶ 27–28. 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, does not preclude, and requires, some evaporation of the molten plastic, in order to form the beads. Ex. 1015 ¶ 24; Ex. 2009 ¶ 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. 2009 ¶ 67 n.3 (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. 1015 ¶ 29 (“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. 2009 ¶ 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.* ¶ 70. 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 or depression created as a result of “gravity”

making the melted plastic sink into the paper pores and does not support Dr. Cairns on that point.

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. 2009 ¶ 96. Dr. Cairns does not cite anything to support this latter hypothesis. *See id.* ¶¶ 96–97. 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.* ¶ 98 (citing Ex. 2006, 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. 2006, Abstract, 2:57–3:17, 4:39–44, 5:10–40.⁹ 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

⁹ Maurer ’754 specifically notes ALKOR PVC exhibits different properties than other conventional PVC materials employed for laminating cards. *See* Ex. 2006, 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”).

the groove.¹⁰ See Ex. 2006, 5:10–41, Fig. 2 (showing bubbles 15 and black points 14 “first form[ed]” before groove 19 and discolored areas 20).

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. 2009 ¶¶ 77, 86, 96. 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. See Ex. 1015 ¶¶ 21–26. 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 cool.” Ex. 2009 ¶ 47 (emphasis added). According to Dr.

¹⁰ Maurer ’754 states “it is only essential that [laser transformable cover films] are absorb[e]nt 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. 2006, 6:20–24.

Cairns, “[w]ith such a process, microbubbles are allowed to form in the plastic substrate and are then trapped when the material cools.” *Id.* Dr. Cairns refers to this as “routinely referred to in the art as foaming.” *Id.* ¶ 50.

Dr. Cairns cites (Ex. 2009 ¶¶ 38–42) to an article that describes the “fabrication of microfluidic devices for chemical and biomedical analysis” (Ex. 2012 (“the 2009 Micromachining Article”), 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.* at 4).¹¹ The 2009 Micromachining Article does not support Dr. Cairns, as the article shows a molten region existing underneath what Maurer refers to as a vaporization region. *See* Ex. 2009 ¶¶ 38–39 (discussing Ex. 2012 for a polycarbonate layer).¹² Also, Dr. Cairns states that “[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 absorption of laser energy by the polycarbonate material at the focal point, and the extreme temperature drop

¹¹ Although this article forms a primary basis for Dr. Cairns’ testimony, Patent Owner does not cite it. *See* Ex. 2009 ¶¶ 38–42 (discussing Ex. 2012); PO Resp. 21 n.4 (citing Ex. 2009 ¶¶ 37–40).

¹² We assume without deciding that the 2009 Micromachining Article may shed some light on the laser process at issue here, even though no evidence 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. 2009 ¶ 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.

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.*”).¹³ 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 mm *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. 2009 ¶ 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.” Ex. 2012, 3; Ex. 1007, 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

¹³ 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 off quickly from the focal point.” See Ex. 2009 ¶¶ 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 the thermal diffusivity of the plastic” as important factors “pertinent in the scoring of plastics”).

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 so that it accumulates sufficient energy to burn regardless of whether the plastic material above melts, or melts as some of it also 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 provides a predictable tactile feel as suggested by specifics regarding Fry's “neat and regular” groove and bead structure (Ex. 1006, 3:62–63). *See* Ex. 1002 ¶¶ 83–88, 97, 98. Dr. Cairns refers to creating ridges via microbubbles as “routinely referred to in the art as foaming,” suggesting a person of ordinary skill in the art readily knew how to foam plastics to create the ridges described in Fry and Maurer. *See* Ex. 2009 ¶¶ 47–50.

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, 1:49–52. 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. So given that Fry and Maurer disclose cutting grooves in the same type of plastic material (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. 1015 ¶¶ 27–28 (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)).

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 and Maurer do not employ incompatible processes. Stated differently, contrary to Patent Owner’s arguments, Fry does not teach that the whole thickness of the region forming the groove and hit by the laser vaporizes; rather, Fry teaches it remains molten, similar to Maurer. *See* Ex. 1015 ¶¶ 23–26.

Petitioner persuasively shows that a person of ordinary skill would have considered Maurer’s and Fry’s similar teachings regarding using a laser to cut grooves in a top layer of plastic, where Maurer discloses (or at least suggests) creating a raised tactile feel, thereby making visual and manual inspection possible, and also making it more difficult to forge the card. *See* Pet. 29–32; Ex. 1005, 4:25–30, 5:10–20, 6:4–5, 7:1–3. Petitioner

also sufficiently explains that Fry discloses beads formed from bubbles alongside grooves, which serve to mark a plastic structure. *See* Pet. 13–14 (citing Ex. 1007, 2:69–75, 3:59–65, 4:30–40). Credible testimony by Dr. Tentzeris on this record indicates “a person of ordinary skill in the art would have been motivated to look and apply techniques known in the art for scoring and/or grooving thermoplastic, such as those disclosed decades ago in *Fry* to create *Maurer*’s tactile relief.” Ex. 1002 ¶¶ 83–88. As noted above, Dr. Cairns refers to creating ridges via microbubbles as “routinely referred to in the art as foaming,” suggesting a person of ordinary skill in the art readily knew how to foam plastics to create ridges. *See* Ex. 2009 ¶¶ 47–50.

iii. Conclusion regarding claim 5

Having considered the evidence of record and the arguments of the parties, Petitioner has shown by a preponderance of the evidence that the subject matter of claim 5 would have been obvious over Maurer, Bernecker, and Fry.

b. Dependent claim 6

Claim 6 recites “[t]he identity document of claim 5 wherein said voids define a feature that can be felt by touch.”

Patent Owner relies on the same arguments it raises for claim 5 and does not raise any arguments specific to claim 6. *See* PO Resp. 32–51.

Having reviewed the Petitioner’s and Patent Owner’s evidence and arguments, we determine that Petitioner has demonstrated by a preponderance of the evidence that claim 6 is unpatentable under 35 U.S.C. § 103(a) as obvious over Maurer, Bernecker, and Fry. *See* Pet. 39.

As explained above, the subject matter of claim 5 would have been obvious over Maurer, Bernecker, and Fry. *See supra* Section II.F.2.a. In addition, Maurer discloses using a laser beam to “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. Maurer further explains that the laser beam can melt the cover sheet “in such a way that a relief is formed above the line of the printed information and in register therewith which can also be *felt manually*.” *Id.* at 6:18–23 (emphasis added). Maurer also recites in claim 3 that “information on said transparent cover sheet is in relief and can be *sensed by touch*.” *Id.* at 9:9–11 (emphasis added).

c. Independent claim 7

Independent claim 7 is directed to a method for manufacturing an identification document for a person. As with claim 5, Petitioner relies in part on Fry for teaching the laser-ablating features. Pet. 42–46. Petitioner asserts that Maurer teaches printing information, including invariant information, on a document core and applying a laminate layer atop the printed core. *Id.* at 40–41. Petitioner also asserts that Maurer and Fry teach laser-ablating the laminate layer to impart a tactile feature and that Maurer, Bernecker, and Fry teach doing so without ablating the document core. *Id.* at 42–46. Petitioner further asserts that Maurer and Bernecker teach that the tactile feature is personalized to correspond to the person. *Id.* at 46–47.

Patent Owner relies on the same arguments it raises for claim 5 and does not raise any arguments specific to claim 7. *See* PO Resp. 32–51.

Petitioner persuasively shows that the combination of Maurer, Bernecker, and Fry teaches the subject matter of claim 7.

Maurer teaches a method of manufacturing an identification document for a person. Maurer discloses “producing [a] card” in the form of a “multi-layered identification card comprising a card core laminated between cover sheets.” Ex. 1005, [57]. Maurer discloses that the identification card is for a person, explaining that “identification cards also include as a rule variable information such as the personal particulars of the card owner, his photograph and other data specific to his person.” *Id.* at 1:55–59; *see also id.* at Fig. 1 (illustrating an identification card with a photograph), 5:38–41, 3:54–57.

Maurer also teaches “printing information, including invariant information, on a document core,” as required by claim 7. Maurer discloses an identification card, shown in Figure 1, that includes data area 20 with the name of the issuing authority (invariant information). *Id.* at 5:54–57. Maurer explains that data area 20 is provided on inlet/card core 14. *Id.* at 5:54–57. Maurer also discloses that “[t]he alphanumeric indicia are printed on the card core 14 by burning them into the surface thereof.” *Id.* at 6:14–16; *see also id.* at 6:31–34 (printing by “conventional printing technology”).

Maurer also teaches “applying a laminate layer atop the printed core,” as required by claim 7. Maurer discloses a “multi-layered identification card comprising a card core laminated between cover sheets.” *Id.* at [57]; *see* Fig. 2, 5:38–41. Maurer discloses that laminating the 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.

The combination of Maurer, Bernecker, and Fry teaches “laser-ablating the laminate layer to impart a tactile feature thereto, without ablating the document core, said tactile feature being personalized to

correspond to said person” as recited in claim 7. As discussed above with respect to claim 1, Maurer discloses that “[a]t 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. Maurer explains that the laser beam can melt cover sheet 10 “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.” *Id.* at 6:18–22. Maurer also recites in claim 3 that “information on said transparent cover sheet is in relief and can be *sensed by touch*.” *Id.* at 9:9–11 (emphasis added). Maurer further discloses that its relief structure is formed when “the upper cover sheet 10 [is] melted” with a laser. *Id.* at 6:18–24. A person of ordinary skill in the art would have understood that Maurer discloses laser ablation—removing material from the upper cover sheet or laminate. Ex. 1002 ¶ 105. Maurer also discloses, as shown in Figure 2, that the relief structure does not extend into document core 14. A person of ordinary skill in the art would have understood that creating Maurer’s groove does not ablate the document core because the groove extends only into the laminate layer. Ex. 1002 ¶ 108.

Fry teaches a process of grooving or scoring thermoplastic, which “degrade[s] or melt[s] the thermoplastic.” Ex. 1007, 1:69–72. Fry explains that plastic may undergo decomposition, which “completely vaporize[s] the regions upon which the [laser] beam impinges.” *Id.* at 1:31–44. Fry explains that in its process, “the energy density in the laser beam must be such that the plastic is evaporated or decomposed while the relative motion between the beam and the sample is of the velocity whereby the groove does

not extend entirely through the depth of the material.” *Id.* at 4:6–12. A person of ordinary skill in the art would have understood that when plastic is vaporized or evaporate, plastic material is removed or ablated. Ex. 1002 ¶ 106.

Bernecker discloses colorless laser engravings that “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, 3:18–26. Bernecker also discloses that “at least parts of the personalization data which are produced in the form of a color contrast and are thus easily readable are provided on the document once again in the form of a colorless laser engraving.” *Id.* at 3:19–23.

As explained above in connection with claim 1, a person of ordinary skill in the art would have been motivated to implement at least part of the personalization data in the form of Maurer’s tactile structure. *See supra* Section II.D.3.a.; Ex. 1002 ¶ 113. In view of Bernecker’s disclosure that when colorless laser engraving is disposed above printed information, the colorless engraving itself also provides the personal information, an ordinarily skilled artisan would have been motivated to use Maurer’s tactile feature to provide personalized data that corresponds to the person. Ex. 1002 ¶ 113.

d. Independent claim 8

i. Limitations of claim 8

Petitioner contends that the subject matter of claim 8 of the ’600 patent would have been obvious over Maurer, Bernecker, and Fry. Pet. 47–52. Petitioner contends that Maurer and Bernecker teach an identification document having at least one layer of material and a top surface including a

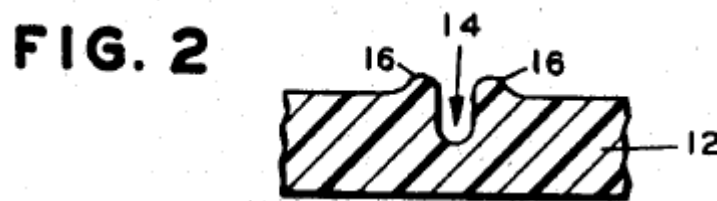
laser-formed void pattern creating an indicia. Pet. 47–48. Petitioner also contends that the combination of Maurer, Bernecker, and Fry teaches that the document is characterized by raised features that are also laser-formed, that the raised features comprise foamed material, and that the raised features extend above a nominal top surface level of the document to provide a tactile effect. *Id.* at 48–52. Petitioner persuasively shows that the combination of Maurer, Bernecker, and Fry teaches the subject matter of claim 8.

Maurer teaches “[a]n identification document comprising at least one layer of material,” as recited in claim 8. Maurer discloses a “multi-layered identification card comprising a card core laminated between cover sheets.” Ex. 1005, [57]. Figure 2 illustrates such a “polylaminated card consisting of two cover sheets 10, 12, and a card core or inner opaque layer 14.” *Id.* at Fig. 2, 5:38–41.

The combination of Maurer and Bernecker teaches “the top surface of the document including a laser-formed void pattern creating an indicia,” as required by claim 8. Maurer discloses a “permanent relief-type structure on the cover sheet.” *Id.* at 4:25–30. As shown in Figure 2, the relief structure includes a void pattern. Maurer explains that relief-type structure is created “[a]t the same time as the information is provided on the core of the card by means of the laser beam.” *Id.* A person of ordinary skill in the art would have understood that the relief-type structure creates indicia, which the ’600 patent states includes markings suitable for human or machine reading. Ex. 1002 ¶ 116; Ex. 1001, 5:28–30. Bernecker discloses that “at least parts of the personalized data which are produced in the form of a color contrast and are thus easily readable are provided on the document once again in the form

of a colorless laser engraving.” Ex. 1006, 3:19–23. Bernecker discloses that the colorless laser 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.” *Id.* at 3:19–26. Thus, one of ordinary skill in the art would have recognized that Bernecker teaches that the colorless engraving itself provides the personal information. Ex. 1002 ¶ 117. One of ordinary skill in the art would have been motivated to apply Bernecker’s teachings to Maurer by implementing at least parts of the personalization data in the form of Maurer’s relief structure to convey information in an additional security feature. Ex. 1002 ¶ 118.

The combination of Maurer, Bernecker, and Fry teaches “the document characterized by raised features that are also laser-formed, said raised features comprising foamed material,” as required by claim 8. Maurer and Fry disclose raised features along the edges of voids in the top surface of the laminate/substrate. Maurer illustrates in Figure 2 that the relief structure includes raised features that are laser-formed. Ex. 1005, Fig. 2; Ex. 1002 ¶ 119. Similarly, Fry discloses a plastic card with raised features, as shown in Figure 2 below.



Fry’s Figure 2 above “shows a typical cross section of a score or groove generated by a laser beam 11 in the substrate 12.” Ex. 1007, 2:69–70. According to Fry, “[w]hen the relative motion between the laser beam and substrate 12 is of the correct velocity, a bead 16 forms along the sides of

the score or groove.” *Id.* at 2:70–73. Fry thus discloses a process for scoring or grooving thermoplastic with a laser beam that forms raised features along the sides of the groove (void pattern). A person of ordinary skill in the art would have understood that the raised tactile feature illustrated in Figure 2 of Maurer would have been formed by a laser, as described in Fry. Ex. 1002 ¶ 121.

Fry also discloses that the raised features comprise foamed material. Fry explains that the process of grooving or scoring thermoplastic results in “small bubbles” in the bead that can be seen during microscopic examination. Ex. 1007, 3:63–68. Fry explains that in polyethylene, bubble formation occurs before the formation of the groove and in other materials “bubble formation occurs throughout the grooving or scoring process.” *Id.* at 4:60–64. Fry further discloses that the raised features result from the bubbling process. *Id.* at 4:32–34. A person of ordinary skill in the art would have understood that these small bubbles in the bead are foamed material. Ex. 1002 ¶ 122.

The combination of Maurer, Bernecker, and Fry also teaches “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,” as required by claim 8. Maurer discloses marking the cover sheet to create a security feature that becomes “accessible to manual inspection.” Ex. 1005, 4:25–30. As shown in Figure 2, Maurer’s security feature extends above the top surface of the identification document. *Id.* at Fig. 2. Maurer thus teaches that the security feature can be felt by touch aids in verifying the authenticity of the identification document. Ex. 1002 ¶ 124; Ex. 1005, 1:5–22, 9:9–11 (claim 3).

ii. Patent Owner's arguments

Patent Owner relies on the same arguments it raises for claim 5. *See* PO Resp. 32–51. As explained above in connection with claim 5, those arguments do not undermine Petitioner's persuasive showing. *See supra* Section II.F.2.a.ii.

iii. Conclusion regarding claim 8

Having considered the evidence of record and the arguments of the parties, Petitioner has shown by a preponderance of the evidence that the subject matter of claim 8 would have been obvious over Maurer, Bernecker, and Fry.

III. MOTION TO AMEND

As discussed above, Petitioner has demonstrated by a preponderance of the evidence that claims 1–8 of the '600 patent are unpatentable. We therefore consider Patent Owner's Contingent Motion to Amend.

Patent Owner filed a Contingent Motion to Amend (Paper 19, "MTA"), Petitioner filed a Response in Opposition to the Motion to Amend (Paper 25, "MTA Opp."), Patent Owner filed a Reply in Support of the Motion to Amend (Paper 29, "MTA Reply"), and Petitioner filed a Sur-Reply (Paper 37, "MTA Sur-Reply"). We also granted Patent Owner's request to file a second substitute claims appendix (Paper 31, 7–8), which Patent Owner filed on September 27, 2018 (Paper 33, "Claims App'x").

Patent Owner proposes substituting claims 9–16 for claims 1–8, respectively. MTA 1, 7–20; Claims App'x.

"During an inter partes review . . . , the patent owner may file 1 motion to amend the patent," by, "[f]or each challenged claim, propos[ing] a reasonable number of substitute claims." 35 U.S.C. § 316(d)(1); *see also* 37

C.F.R. § 42.121(a)(3). “An amendment under this subsection may not enlarge the scope of the claims of the patent or introduce new matter.” 35 U.S.C. § 316(d)(3); *see also* 37 C.F.R. § 42.121(a)(2)(ii). The amendment also must “respond to a ground of unpatentability involved in the trial.” 37 C.F.R. § 42.121(a)(2)(i).

As explained below, Patent Owner’s Contingent Motion to Amend is denied. The record shows that proposed substitute claims 9–12 introduce new matter. In addition, Petitioner has shown by a preponderance of the evidence that the subject matter of each of the proposed substitute claims (claims 9–16) would have been obvious.

A. New matter (substitute claims 9–12)

Patent Owner proposes substituting claim 1 with claim 9, shown below with underlining indicating additions:

9. An identity document comprising an outer top laminate layer and at least one interior layer, the document conveying both invariant and personalized information, the personalized information particularly corresponding to a particular person to whom the document is issued, the outer top laminate layer comprising a laser-etched security feature, wherein the laser-etched security feature comprises at least one raised feature extending above a nominal top surface of the outer top laminate layer and providing a tactile effect, wherein the at least one raised feature comprises an optically variable quality and has a height above the nominal top surface of $\geq 30\%$ of a thickness of the outer top laminate layer before the outer top laminate layer is laser-etched, and wherein at least some of the personalized information is defined by voids that extend into, but not through, the laminate layer, said voids providing a feature that can be felt by touch.

Claims App’x, i–ii; MTA 1.

Patent Owner relies on the following for support of the greater than or equal to 30% limitation: the sentence in the original '600 patent application incorporating by reference U.S. Patent No. 5,005,872 (“the '872 patent”), passages from the '872 patent, and the testimony of Dr. Cairns relying on the same passages of the original application and the '872 patent. MTA 9–10 (citing Ex. 2011, 4; Ex. 1012, 2:66–3:6, 6:11–16; Ex. 2010 ¶ 51).

Petitioner argues that the original specification of the '600 patent provides no support for the limitation that the raised feature has a height above the nominal top surface of “ $\geq 30\%$ ” of the thickness of the outer top laminate layer, and that the '872 patent, which is incorporated by reference “in a single sentence in the '600 patent,” “does not convey to a person of ordinary skill in the art that the *particular security feature* of the '600 patent had a specific height.” MTA Opp. 4 (citing Ex. 1016 ¶ 17).

Having considered the arguments and evidence of the parties, we determine that the evidence does not show written description support for the “ $\geq 30\%$ ” limitation (“at least one raised feature . . . has a height above the nominal top surface of $\geq 30\%$ of a thickness of the outer top laminate layer before the outer top laminate layer is laser-etched”) of claim 9 or its dependent claims 10–12.

The original application for the '600 patent includes the following paragraph:

For additional background, various laser marking and/or engraving techniques are disclosed, e.g., in U.S. Patent Nos. 6,022,905, 5,298,922, 5,294,774, 5,215,864 and 4,732,410. Each of these patents is herein incorporated by reference. *In addition*, U.S. Patent Nos. 4816372, 4894110, 5005872, 5977514, and 6179338 *describe various implementations for using a laser to print information, and these patents are incorporated herein in their entirety.*

Ex. 2011, 4 (emphasis added).

Patent Owner relies on the following passages from the '872 patent:

In the present invention this increase in volume arising from the gas bubbles is exploited selectively 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 beam even without additional foaming agents, and without a substantial loss of strength in the film in these areas.

This 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.

Ex. 1012, 2:66–3:6, 6:11–16) (emphases added); MTA 9–10 (citing Ex. 1012, 2:66–3:6, 6:11–16). Dr. Cairns relies on the same passages of the '872 patent without providing any further explanation. Ex. 2010 ¶ 51.

The phrase “ $\geq 30\%$ of a thickness of the outer top laminate layer,” as recited in substitute claim 9, lacks an upper bound for thickness that the '872 patent does not support. 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. 1012, 2:66–3:6 (emphasis added). This passage does not quantify “and more.” However, elsewhere, the '872 patent indicates the extent of the “more.” The '872 patent states the following:

This 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. This expansion (a) *by about 100 μ* reached by the laser action yields, together, together with plateau formation (≈ 0.36 mm) produced by the mechanical embossing, height H of 0.46 mm above the rest of the card surface as required by the standard.

Id. at 6:11–21 (emphases added). The ’872 patent thus describes an amount that a transparent cover film can be expanded *using appropriate laser action*. *Id.* 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%. Patent Owner does not identify, nor do we discern, any disclosure of laser action that would result in an unbounded expansion, and therefore unbounded raised feature height, of the transparent cover film.

The record shows that the inventors were not in possession of the full scope of substitute claim 9—a raised feature that has a height above the nominal top surface that exceeds 30% of the thickness of the outer top laminate layer before the layer is laser-etched, which claim 9 encompasses. *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.”).

The inventors did not have possession of the “ $\geq 30\%$ ” 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. 2011, 4. These “implementations for using a laser” point to no result thereof, such as a thickness limitation or range thereof. Nothing else in the ’600 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.

B. Obviousness (all substitute claims)

Each proposed substitute claim adds a limitation directed to a raised feature that has an optically variable quality. Claim 9 recites “wherein at least one raised feature comprises an optically variable quality.” Claims 10–12 depend from claim 9. Claim 13 recites “wherein the at least one raised feature comprises reflecting surfaces that are not parallel to the nominal top surface of the laminate layer such that an optically variable quality is produced.” Claim 14 depends from claim 13. Like claim 13, claim 15 recites “wherein the at least one raised feature comprises reflecting surfaces that are not parallel to the nominal top surface of the laminate layer such that an optically variable quality is produced.” Claim 16 recites “wherein the raised features comprise an optically variable quality.”

Petitioner shows that the combination of Maurer, Bernecker, and Fry teaches this new limitation of a raised feature (or raised features) with an

optically variable quality. As explained below, Petitioner persuasively shows that (i) the subject matter of substitute claims 9 and 10 would have been obvious over the combination of Maurer, Bernecker, and the '872 patent, (ii) the subject matter of claims 11 and 12 would have been obvious over the combination of Maurer, Bernecker, the '872 patent, and Gunn, and (iii) the subject matter of substitute 13–16 would have been obvious over the combination of Maurer, Bernecker, and Fry.

1. Substitute claim 9

As explained above, Petitioner shows by a preponderance of the evidence that claim 1 is unpatentable as obvious over Maurer and Bernecker. In addition, the combination of Maurer, Bernecker, Fry, and the '872 patent teaches the limitation added in proposed substitute claim 9 and a person of ordinary skill in the art would have been motivated to combine the teachings of the references in the manner claimed.

The combination of Maurer, Bernecker, and Fry teaches “the outer top laminate layer comprising a laser-etched security feature, wherein the laser-etched security feature comprises at least one raised feature extending above a nominal top surface of the outer top laminate layer and providing a tactile effect,” as recited in claim 9, for the reasons explained above in connection with a very similar limitation in claim 8. *See supra* Section II.F.2.d.

The combination also teaches “wherein the at least one raised feature comprises an optically variable quality,” as recited in claim 9. Maurer, Bernecker, and Fry collectively teach implementing Maurer’s raised, tactile relief according to the teachings of Bernecker (i.e., in a colorless/contrastless manner), resulting in an optically variable security feature. Maurer teaches a transparent relief structure formed in register with printed information on the

core of the card, as shown in Figure 2 and discussed above. Ex. 1005, 6:18–23. Bernecker teaches producing laser engraving without discoloration—known as “colorless” laser engraving. Ex. 1006, 3:23; Ex. 1016 ¶ 23. Bernecker also teaches using clear laser engraving in conjunction with printed information so that the surface engraving could be compared with printer material underneath. Ex. 1006, 3:18–26. Bernecker also recognized that laser engraving without discolorations or color contrast is useful 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.” Ex. 1006, 2:16–25. Bernecker discloses that the security feature “cannot be recognized by reflected light and appears only at the glancing angle.” *Id.* at 2:63–65.

A person of ordinary skill in the art would have recognized the benefits of having both a raised relief structure that can be felt manually, as taught in Maurer, and a colorless engraved security feature that is only visible at a glancing angle, as taught in Bernecker. Ex. 1016 ¶ 24. Specifically, an ordinarily skilled artisan would have been motivated to combine the teachings of the references because (i) multiple security features were desirable for use in identification cards; (b) tactility and optical variability were known and desired features for providing security; (c) Bernecker recognized that clear/colorless engraving is useful by itself; and (d) visibility only at a glancing angle would be an additional security benefit for engravings with tactile features. *Id.* ¶¶ 21–45; Ex. 1006, 2:9–13.

The combination of Maurer, Bernecker, Fry, and the ’872 patent teaches “wherein the at least one raised feature . . . has a height above the nominal top surface of $\geq 30\%$ of a thickness of the outer top laminate layer

before the outer top laminate layer is laser-etched,” as required in claim 9. Fry teaches that its process involves foaming, teaching the formation of bubbles. Ex. 1007, 4:60–64, 4:32–34. The ’872 patent teaches that foaming can increase height and/or volume by 30% or more. Ex. 1012, 2:66–3:6, 6:14–17. In addition, Petitioner persuasively explains that Patent Owner admits that the $\geq 30\%$ height limitation was known in the art through the ’872 patent. MTA Opp. 23. Petitioner also persuasively shows that, in view of the teachings of the ’872 patent, 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 that they could be felt easily, thereby enhancing the ability to determine authenticity readily. *See id.* at 23–24 (citing, e.g., Ex. 1016 ¶ 114).

Patent Owner’s arguments do not undermine Petitioner’s persuasive showing. Patent Owner argues that Maurer does not teach a tactile relief that extends above the top surface of the document, “much less a raised feature having the combination of attributes required by the substitute claims.” MTA 23; *see also* MTA Reply 7, 8 (arguing same). Petitioner persuasively shows that Maurer teaches a clear raised feature, as does Fry.¹⁴ *See* Ex. 1002 ¶¶ 55, 87; Ex. 1015 ¶¶ 16–29; Ex. 1016 ¶¶ 23, 50–52. Contrary to Dr. Cairns’ assertion that “[n]othing 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

¹⁴ Patent Owner does not argue in its Motion that Fry’s ridges would be discolored or blackened, but as discussed below, raises the issue in its Reply to Petitioner’s Opposition to the Motion to Amend. *See* MTA Reply 8.

card” (Ex. 2009 ¶ 100), Maurer specifically describes as the “invention” a transparent cover sheet *through which* the card core information can be perceived:

The invention relates to an identification card, comprising two cover sheets of which at least one is transparent, and a card core or inner layer of an opaque material, in particular paper, which is provided with information which can be perceived visually through said transparent cover sheet.

Ex. 1005, 1:6–10. The “invention” arises *after* laser processing, which creates “information which can be perceived visually through said transparent cover sheet.” *Id.* at 4:25–43. Maurer’s claims 1–3 support this interpretation of a transparent cover sheet after laser processing. *See id.* at 8:58–9:11 (independent claim 1 reciting “visually perceptible information . . . in the form of . . . degraded core portions formed in said core by means of a laser beam traversing the transparent cover sheet . . . whereby the information is also formed in said cover sheet in register . . . with the information in the card core,” dependent claim 2 reciting “the information is present in the form of dark markings caused by partial burning of the paper material,” and dependent claim 3 reciting “the information on said transparent cover sheet is in relief and can be sensed by touch”).

Moreover, contrary to Dr. Cairns’ testimony (Ex. 2009 ¶ 101) that Bernecker’s description of Maurer’s German priority document shows Maurer’s process burns the top layer, 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., Bernecker does not state that the “discolorations” necessarily occur in both the plastic and in the

paper core described in Maurer’s German priority document. *See* Ex. 1006, 2:26–34.¹⁵

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 substrate material *and* without providing color contrast with the surroundings.” *Id.* at 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.*

¹⁵ Also, Dr. Cairns’ testimony assumes, without requisite support, that Maurer’s German priority document and Maurer disclose the same thing. In addition, the relied-upon passage from Bernecker cites three German patents as showing the “common practice” instead of focusing on a single document such as Maurer’s German priority document. *See* Ex. 1006, 2:26–34 (listing DE 29 07 004 C2, DE 30 48 736 A1, and DE 31 514 07 C1).

at 6:34–36 (claim 17: “using said laser to apply further information in the form of discolorations or burnings of material”).

Patent Owner also argues that Fry teaches “a scorched bead.” MTA Reply 8; *see also* Ex. 2009 ¶¶ 114, 125 (Dr. Cairns testifying that Fry teaches a scorched bead). On balance, however, the record does not support Patent Owner’s allegation that Fry teaches a raised “scorched” (i.e., blackened or burned) feature. Ex. 1016 ¶¶ 28 (Fry discloses specifics about how to score thermoplastic without scorching), 30; Ex. 1015 ¶¶ 12–13. Dr. Cairns 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.” *See* Ex. 2009 ¶ 114 (quoting Ex. 1007, 2:73–75 (emphasis added by Dr. Cairns); MTA Reply 8. 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). In addition, Fry does not describe the bead and groove as blackened. “[A] reference need not state a feature’s absence in order to disclose a negative limitation.” *See AC Techs.*, 912 F.3d at 1367 (quoting *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”))).

Even if Fry somehow suggests blackened raised features, the '600 patent does not provide any insight as to how to create an unscorched raised bead. *See* MTA Opp. 14. This suggests, and as Petitioner argues, that a skilled artisan readily knew how to create a raised clear feature. *See id.*; Ex. 1016 ¶ 30; Ex. 1005, 1:5–10, 4:25–30; Ex. 1006, 4:1–18 (creating notches in “melted and partly decomposed” plastic areas without color changes by altering laser power); Ex. 1007, 3:60–63 (forming a beaded groove).

In addition, as Petitioner persuasively argues, “*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.’” MTA Opp. 11 (quoting Ex. 1006, 2:16–25; citing *id.* at 3:27–28)). Furthermore, *Bernecker* teaches that “[i]t is known . . . 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.” Ex. 1006, 4:1–3. The invention of *Bernecker* adds to prior art discolored cards with burned paper core markings by providing at other card places no “discoloration” in the form of notches “without producing color contrast with the surroundings.” *See id.* at 2:54–56; 4:19–29 (adding “inconspicuous” data to prior art cards “without complication”).

Patent Owner argues that “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*).” MTA 23; *see* Ex. 2009 ¶¶ 121–122. According to Dr. Cairns, *Bernecker*’s additions would undermine a “fundamental

purpose” of Maurer, which is inscribe “personal data” “in the *interior* of said card after lamination of the card blank.” Ex. 2009 ¶ 121 (quoting Ex. 1005, 4:3–7 (emphasis by Dr. Cairns)). 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.

In its Reply, Patent Owner emphasizes that “Maurer exclusively teaches the creation of blackened inscriptions whereas Bernecker teaches avoiding discoloration.” MTA Reply 7 (emphases omitted) (citing Ex. 2009 ¶¶ 65–74, 99–101, 105). Patent Owner also contends “Maurer does not teach a colorless laser engraving technique or a colorless security feature.” *Id.* (emphases omitted) (citing Ex. 2009 ¶¶ 99–101, 117). 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.* (emphases omitted) (citing Ex. 2009 ¶¶ 65–74, 99–101, 105, 108, 117). Patent Owner adds “the dimensions involved in Fry would have been useless to a skilled artisan designing laser processing techniques for identification documents.” *Id.* at 8 (citing Ex. 2009 ¶¶ 109–114, 124). Finally, Patent Owner contends 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 ‘without discoloration.’” *Id.* at 7–8 (citing Ex. 2009 ¶¶ 114, 125).

Many of Patent Owner’s arguments repackaging and restate arguments presented in Patent Owner’s Response, arguments we find do not undermine

Petitioner's persuasive showing. *See supra* Section II.F.2.a.ii. Patent Owner does not address Petitioner's showing that it would have been obvious to create a security feature as suggested by Bernecker's OVD teachings and Maurer's colorless raised features in other areas of Maurer's card, retaining Maurer's registration and darkened areas, in order to provide a more secure card.

Maurer does not exclusively contemplate blackening all card information with registration. 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” (Ex. 1005, 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).

Thus, Maurer specifically discloses adding information without any registration in the upper laminate and without burning the core. 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. 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. So nothing in the combination precludes employing the two features, even if the laser must focus on different parts of the card (i.e., in the core and on the surface).

Patent Owner’s arguments also are not commensurate in scope with the substitute claims. The substitute claims generally only require the raised feature itself to not be visible when viewed straight on. See claim 9 (“wherein the at least one raised feature comprises an optically variable quality”), claim 13 (“wherein the at least one raised feature comprises reflecting surfaces . . . such that an optically variable quality is produced”), claim 15 (“wherein the at least one raised feature comprises reflecting surfaces . . . such that an optically variable quality is produced”), claim 16 (“wherein the raised features comprise an optically variable quality”). So even if Maurer’s card as modified by Bernecker and Fry includes visible blackened printing on the core in register with raised features on the cover, this does not render the *colorless raised features* visible—these features do not contrast with the top laminate even if they contrast with inscriptions in the blackened core.

Nevertheless, even if the contrast between the underlying blackened printed material and some of the colorless raised features in Maurer render those colorless raised features visible, Petitioner persuasively shows that 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 the top laminate. *See* MTA Opp. 10–12 (referring to laser engravings without color contrast); Ex. 1016 ¶ 24 (obvious to provide the combined features without color contrast), ¶ 26 (obvious to provide Maurer’s raised feature with Bernecker’s OV feature without registration with printed information), ¶¶ 33–36 (testifying the collective teachings of Maurer, Bernecker, and Fry render the claimed security feature obvious).

In other words, 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. *See* Ex. 1016 ¶ 31 (“The combined security feature would include raised features that extend above the nominal top surface of the card and be accessible to manual inspection, as disclosed by *Maurer*, while also being visible only at the glancing angle and resistant to copying, as disclosed by *Bernecker* because the contrastless laser engraving would be implemented without discoloration and by itself (rather than with printed information) as a security feature, as taught by *Bernecker*.”), ¶ 32 (obvious to implement the combined security feature in Maurer’s laminated card). 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, and lamination teachings—while adding the colorless, raised, non-registered, tactile features at adjacent or other card areas, as suggested by Fry and Bernecker, as Petitioner proposes.

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.F.2.a.ii. Maurer's tactile features, in light of Bernecker, suggests colorless tactile features with limited visibility at least at some angles as Bernecker teaches, because the purpose of *tactile* features suggests providing authenticity in conditions of limited visibility. Providing raised OV features allows the features to be felt more readily and provide the benefit of added authenticity. 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 OVD features to provide further authenticity, Petitioner persuasively shows that providing unscorched raised beads without registration at colorless areas of Maurer's existing card 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* MTA Opp. 10–14; Ex. 1016 ¶¶ 22–32, 34–36.

As explained above, Petitioner provides a number of persuasive reasons to add raised colorless tactile features without registration with blackened printing to Maurer's card. *See* Opp. 13–14 (identifying the “desire” for “multiple security features,” known benefits of tactile features for security, 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”). Petitioner

persuasively explains the benefits of combining Bernecker's OVD features as raised features based on Maurer's teachings. MTA Opp. 11–12.

Petitioner explains persuasively 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 other security features.” *Id.* at 12–13 (citing Ex. 1016 ¶ 26). Petitioner persuasively shows that a person of ordinary skill in the art

would have recognized that by implementing *Maurer*'s clear tactile relief *by itself*, rather than in conjunction/register with printed information below the relief, and in a colorless/contrastless manner, as taught by *Bernecker*, that the resulting combined security feature would remain tactile, with raised features that extend above the top surface of the laminate, providing the benefits of the tactile security feature . . . and that the resulting combined security feature would be optically variable and visible only at a glancing angle such that the relief would beneficially be “neither manipulable nor copiable.”

Id. at 13 (citing Ex. 1016 ¶ 26; Ex. 1006, 2:9–13). Petitioner persuasively adds that, in view of Fry, which discloses “specifics about how to score thermoplastic without scorching or discoloration such that the resulting groove includes raised beads surrounding the groove” (Ex. 1007, 2:69–76) and which discloses particular details about how to create the grooves in a variety of thermoplastics commonly used for identification cards (*see* Ex. 1007, Table II; Ex. 1016, ¶ 29), using a laser to create a security feature that is both raised and lacks discoloration was well within the skill of a person of ordinary skill in the art. MTA Opp. 14. Indeed, as Petitioner points out, the '600 patent assumes that creating such a feature was within the skill of a person of ordinary skill in the art because the patent does not disclose any details about laser engraving. *Id.*

Patent Owner also argues that “Petitioner depends solely on Maurer for the raised tactile feature” and that “Maurer does not disclose such a feature.” MTA Reply 8. Contrary to this argument, Maurer teaches a raised feature even without Fry’s added teachings, as found above. *See supra* Section II.F.2.a.ii. Also, Petitioner does not rely solely on Maurer, but generally contends “*Maurer, Bernecker, and Fry* render obvious such a combined security feature.” Opp. 9; *see also id.* at 15. As indicated above, Petitioner persuasively explains a person of ordinary skill in the art would have turned to Fry, because Fry discloses “specifics about how to score thermoplastic without scorching or discoloration such that the resulting groove includes raised beads” and “particular details about how to create the grooves in a variety of thermoplastics commonly used for identification cards.” Opp. 14 (citing Ex. 1007, 2:69–76, Table II; Ex. 1016 ¶¶ 29–30). Petitioner also persuasively explains that the references, including Fry, show “[i]t would have been routine and straightforward for a [person of ordinary skill in the art] to implement the combined security feature [i.e., including raised discolored features] and it would have been clear that such a feature would provide the expected functionality to yield predictable results.” *Id.* at 16 (citing Ex. 1016 ¶¶ 31–32).

In sum, as Petitioner persuasively explains, claim 9 is directed to subject matter that merely combines known features of the prior art, including raised tactile colorless features produced typically by foaming and that provide an OVD quality.

2. *Substitute claims 10–12*

Substitute claims 10–12 depend from claim 9 and are amended to change the dependency from claim 1 to claim 9. Claims App’x, ii. For the

reasons discussed above in connection with proposed substitute claim 9 and claims 2–4, respectively, Petitioner has shown by a preponderance of the evidence that the subject matter of substitute claim 10 would have been obvious over the combination of Maurer, Bernecker, and the '872 patent and that the subject matter of substitute claims 11 and 12 would have been obvious over the combination of Maurer, Bernecker, the '872 patent, and Gunn.

3. *Substitute claim 13*

Patent Owner also proposes substituting claim 5 with claim 13, shown below with underlining indicating additions:

13. An identity document comprising at least one interior layer and a laminate layer, an outer surface of the laminate layer defining a top surface of the document, the document conveying both invariant and personalized information, the personalized information particularly corresponding to a particular person to whom the document is issued, the outer surface of the laminate layer comprising a laser-etched security feature, wherein the laser-etched security feature comprises at least one raised feature extending above a nominal top surface of the laminate layer and providing a tactile effect, wherein the at least one raised feature comprises reflecting surfaces that are not parallel to the nominal top surface of the laminate layer such that an optically variable quality is produced; and wherein at least some of the personalized information is defined by laser-ablated voids that extend through the top surface of the document, and wherein at least some of said voids are defined by sidewalls that are angled obliquely, rather than perpendicularly, relative to said top surface.

Claims App'x, ii–iii; MTA 1.

As explained above, Petitioner shows by a preponderance of the evidence that claim 5 is unpatentable as obvious over Maurer, Bernecker,

and Fry. In addition, the combination of Maurer, Bernecker, and Fry teaches “the outer surface of the laminate layer comprising a laser-etched security feature, wherein the laser-etched security feature comprises at least one raised feature extending above a nominal top surface of the laminate layer and providing a tactile effect,” as recited in claim 13, for the reasons explained above in connection with a very similar limitation in claim 8. *See supra* Section II.F.2.d.

The combination of Maurer, Bernecker, and Fry also teaches “wherein the at least one raised feature comprises reflecting surfaces that are not parallel to the nominal top surface of the laminate layer such that an optically variable quality is produced,” as recited in claim 13. Maurer, Bernecker, and Fry collectively teach implementing Maurer’s raised, tactile relief according to the teachings of Bernecker (i.e., in a colorless/contrastless manner), resulting in an optically variable security feature. *See supra* Section III.B.1. Petitioner also provides persuasive reasoning with rational underpinning for why a person of ordinary skill in the art would have combined the teachings of the references in the manner asserted by Petitioner. *See id.* Patent Owner raises the same arguments for claim 13 that it raises for claim 9 (*see* MTA 4, 22–24; MTA Reply 6–8), which are addressed above. *See supra* Section III.B.1.

4. *Substitute claim 14*

Substitute claim 14 depends from claim 13 and is amended to change the dependency from claim 5 to claim 13. Claims App’x, iii. For the reasons discussed above in connection with proposed substitute claim 13 and claim 6, Petitioner has shown by a preponderance of the evidence that the

subject matter of substitute claim 14 would have been obvious over the combination of Maurer, Bernecker, and Fry.

5. *Substitute claim 15*

Patent Owner also proposes substituting claim 7 with claim 15, shown below with underlining indicating additions.

7. A method of manufacturing an identification document for a person, comprising:

- printing information, including invariant information, on a document core;
- applying a laminate layer atop the printed core; and
- laser-ablating the laminate layer to impart a tactile feature thereto, without ablating the document core, wherein the a tactile feature comprises at least one raised feature extending above a nominal top surface of the laminate layer, wherein the at least one raised feature comprises reflecting surfaces that are not parallel to the nominal top surface of the laminate layer such that an optically variable quality is produced, said tactile feature being personalized to correspond to said person.

Claims App’x, iii–iv; MTA 1.

As explained above, Petitioner shows by a preponderance of the evidence that claim 7 is unpatentable as obvious over Maurer, Bernecker, and Fry. In addition, the combination of Maurer, Bernecker, and Fry teaches “wherein the a tactile feature comprises at least one raised feature extending above a nominal top surface of the laminate layer,” as recited in claim 15, for the reasons explained above in connection with a very similar limitation in claim 8. *See supra* Section II.F.2.d.

The combination of Maurer, Bernecker, and Fry also teaches “wherein the at least one raised feature comprises reflecting surfaces that are not parallel to the nominal top surface of the laminate layer such that an

optically variable quality is produced,” as recited in claim 15. Maurer, Bernecker, and Fry collectively teach implementing Maurer’s raised, tactile relief according to the teachings of Bernecker (i.e., in a colorless/contrastless manner), resulting in an optically variable security feature. *See supra* Section III.B.1. Petitioner also provides persuasive reasoning with rational underpinning for why a person of ordinary skill in the art would have combined the teachings of the references in the manner asserted by Petitioner. *See id.* Patent Owner raises the same arguments for claim 15 that it raises for claim 9 (*see* MTA 4, 22–24; MTA Reply 6–8), which are addressed above. *See supra* Section III.B.1.

6. *Substitute claim 16*

Patent Owner also proposes substituting claim 8 with claim 16, shown below with underlining indicating additions.

8. An identification document comprising at least one layer of material, the top surface of the document including a laser-formed void pattern creating an indicia, the document characterized by raised features that are also laser-formed, said raised features comprising foamed 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; wherein the raised features comprise an optically variable quality.

Claims App’x, iv; MTA 1.

As explained above, Petitioner shows by a preponderance of the evidence that claim 8 is unpatentable as obvious over Maurer, Bernecker, and Fry. In addition, the combination of Maurer, Bernecker, and Fry teaches “wherein the raised features comprise an optically variable quality,” as recited in claim 16. Maurer, Bernecker, and Fry collectively teach implementing Maurer’s raised, tactile relief according to the teachings of

Bernecker (i.e., in a colorless/contrastless manner), resulting in an optically variable security feature. *See supra* Section III.B.1. Petitioner also provides persuasive reasoning with rational underpinning for why a person of ordinary skill in the art would have combined the teachings of the references in the manner asserted by Petitioner. *See id.* Patent Owner raises the same arguments for claim 16 that it raises for claim 9 (*see* MTA 4, 22–24; MTA Reply 6–8), which are addressed above. *See supra* Section III.B.1.

IV. CONCLUSION

Petitioner has demonstrated by a preponderance of the evidence that (i) claims 1 and 2 are unpatentable under 35 U.S.C. § 103(a) as obvious over Maurer and Bernecker; (ii) claims 3 and 4 are unpatentable under 35 U.S.C. § 103(a) as obvious over Maurer, Bernecker, and Gunn; and (iii) claims 5–8 are unpatentable under 35 U.S.C. § 103(a) as obvious over Maurer, Bernecker, and Fry. We deny Patent Owner’s motion to amend to replace claims 1–8 with substitute claims 9–16.

V. ORDER

Accordingly, it is

ORDERED, based on a preponderance of the evidence, that claims 1–8 of U.S. Patent No. 7,661,600 B2 are unpatentable;

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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Patent 7,661,600 B2

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