

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE INC.,
Petitioner,

v.

NETWORK-1 TECHNOLOGIES, INC.,
Patent Owner.

Case IPR2015-00348
Patent 8,656,441 B1

Before KEVIN F. TURNER, LYNNE E. PETTIGREW, and
JON B. TORNQUIST, *Administrative Patent Judges*.

PETTIGREW, *Administrative Patent Judge*.

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

I. INTRODUCTION

Petitioner, Google Inc., filed a Petition for *inter partes* review of claims 1–3, 6–14, 18, 19, 21–27, 29, and 30 of U.S. Patent No. 8,656,441 B1 (Ex. 1001, “the ’441 patent”). Paper 2 (“Pet.”). Patent Owner, Network-1

Technologies, Inc., filed a Preliminary Response. Paper 5 (“Prelim. Resp.”). Institution of an *inter partes* review is authorized by statute when “the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a); see 37 C.F.R. § 42.108. Upon consideration of the Petition and the Preliminary Response, we conclude the information presented shows there is a reasonable likelihood that Petitioner would prevail in establishing the unpatentability of claims 1–3, 6, 8–14, 18, 19, 21–27, 29, and 30 of the ’441 patent.

A. Related Matters

The parties state that Patent Owner has asserted the ’441 patent against Petitioner in *Network-1 Technologies, Inc. v. Google Inc. and YouTube, LLC*, No. 1:14-cv-02396 (S.D.N.Y.) (filed Apr. 4, 2014). Pet. 1; Paper 3, 2 (Patent Owner’s Mandatory Notice). Petitioner states that YouTube, LLC, is a subsidiary of Petitioner and a real party-in-interest with respect to the Petition. Pet. 1. Petitioner has filed petitions for *inter partes* review of three related patents that also are at issue in the cited district court proceeding: IPR2015-00343 (U.S. Patent No. 8,640,179 B1), IPR2015-00345 (U.S. Patent No. 8,205,237 B2), and IPR2015-00347 (U.S. Patent No. 8,010,988 B2). Paper 3, 2–3.

B. The ’441 Patent

The ’441 patent relates to identifying a work, such as a digital audio or video file, without the need to modify the work. Ex. 1001, 1:47–52, 4:41–47. This identification can be accomplished by extracting features from the work and comparing the extracted features with records in a

database. *Id.* at Abstract. Thereafter, an action associated with the work may be determined based on the identification of the work. *Id.* at 4:40–41.

Patent Owner refers to Figure 1 as illustrating the steps performed by the claimed system (Prelim. Resp. 4):

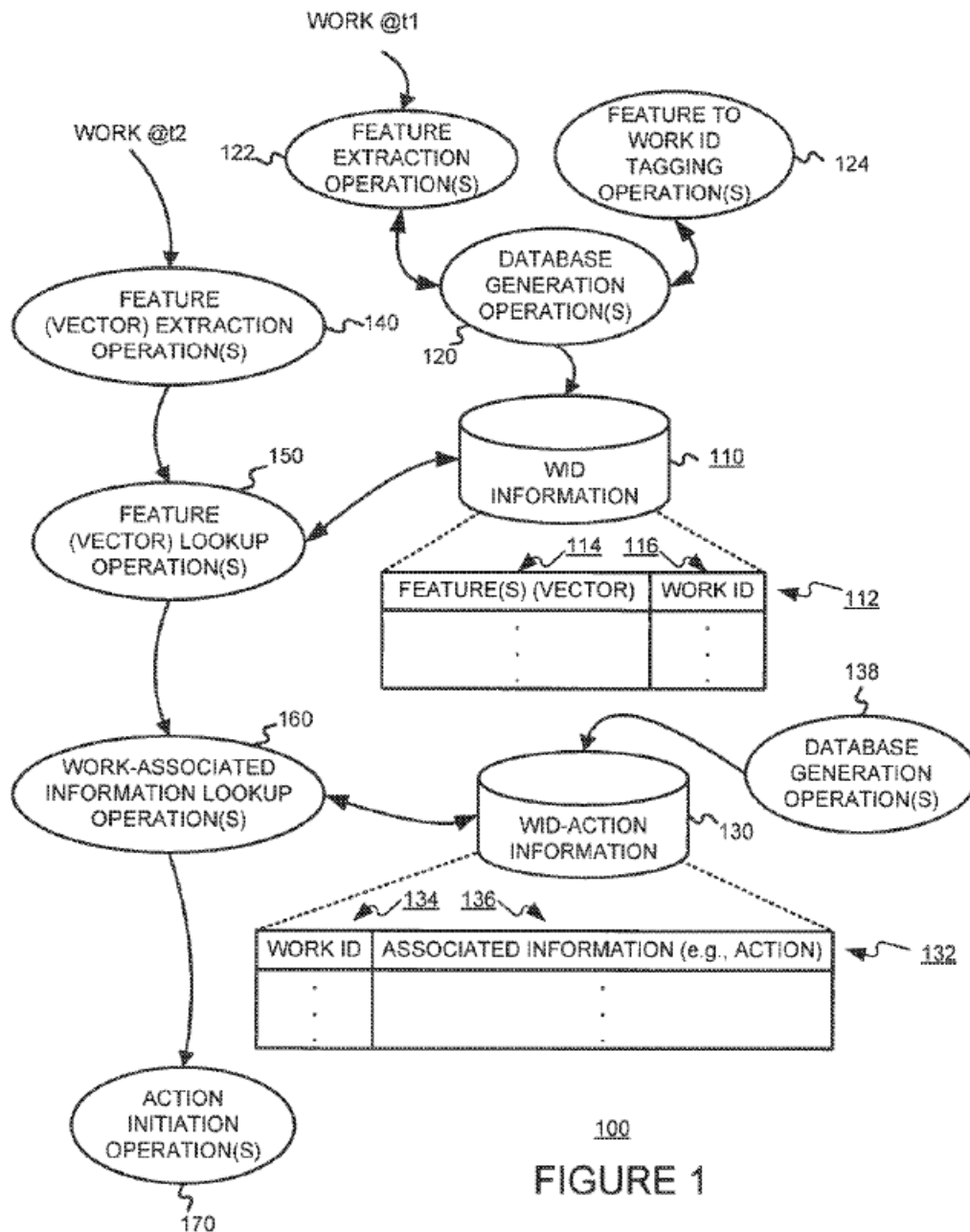


Figure 1 of the '441 patent illustrates steps performed by the claimed system.

C. Illustrative Claim

Claims 1, 13, and 25 of the '441 patent are independent. Claim 1 of is illustrative of the subject matter of the challenged claims:

1. A computer system comprising:
 - one or more electronic communications devices;
 - one or more processors operatively connected to the one or more electronic communications devices; and
 - one or more computer readable media operatively connected to the one or more processors and having stored thereon computer instructions for carrying out the steps of:
 - (a) maintaining, by the computer system, a database comprising:
 - (1) first electronic data related to identification of one or more reference electronic works; and
 - (2) second electronic data related to action information comprising an action to perform corresponding to each of the one or more reference electronic works;
 - (b) obtaining, by the computer system, extracted features of a first electronic work;
 - (c) identifying, by the computer system, the first electronic work by comparing the extracted features of the first electronic work with the first electronic data in the database using a non-exhaustive neighbor search;
 - (d) determining, by the computer system, the action information corresponding to the identified first electronic work based on the second electronic data in the database; and
 - (e) associating, by the computer system, the determined action information with the identified first electronic work.

Ex. 1001, 24:46–25:7.

D. Asserted Grounds of Unpatentability

Petitioner contends that claims 1–3, 6–14, 18, 19, 21–27, 29, and 30 of the ’441 patent are unpatentable based on the following specific grounds (Pet. 8–60):

References	Basis	Challenged Claims
Levy ¹ and Arya ²	35 U.S.C. § 103(a)	1–3, 6–14, 18, 19, 21–26, and 30
Conwell ³	35 U.S.C. § 102(e)	1–3, 6, 8–14, 19, 21–26, and 30
Wood ⁴	35 U.S.C. § 102(e)	1–3, 8–14, 19, 21, 22, 25, 27, 29, and 30
Ghias ⁵ and Philyaw ⁶	35 U.S.C. § 103(a)	1–3, 8, 10–14, 18, 19, 21–27, 29, and 30

In its analysis, Petitioner relies on the declaration testimony of Dr. Pierre Moulin. *See* Ex. 1004.

II. DISCUSSION

A. Claim Construction

In an *inter partes* review, 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).

¹ U.S. Patent No. 6,505,160 B1, issued Jan. 7, 2003 (Ex. 1013, “Levy”).

² Sunil Arya et al., *An Optimal Algorithm for Approximate Nearest Neighbor Searching in Fixed Dimensions*, 45 Journal of the ACM 891–923 (1998) (Ex. 1006, “Arya”).

³ U.S. Patent No. 6,970,886 B1, issued Nov. 29, 2005 (Ex. 1009, “Conwell”).

⁴ U.S. Patent No. 7,743,092 B2, issued June 22, 2010 (Ex. 1015, “Wood”).

⁵ U.S. Patent No. 5,874,686, issued Feb. 23, 1999 (Ex. 1010, “Ghias”).

⁶ U.S. Patent No. 6,098,106, issued Aug. 1, 2000 (Ex. 1014, “Philyaw”).

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).

Petitioner and Patent Owner propose constructions for several claim terms. For purposes of this decision, we determine that only the terms addressed below require express construction.

1. “*non-exhaustive*”

Independent claims 1, 13, and 25 of the ’441 patent recite that the “identifying” step occurs “using a *non-exhaustive* neighbor search.” Petitioner argues that a “non-exhaustive” search should be construed to mean “a search that locates a match without conducting a brute force comparison of all possible matches, and all data within all possible matches.” Pet. 5–6. Patent Owner substantially agrees, but argues that the last clause, “and all data within all possible matches,” would include improperly within a “non-exhaustive” search any search that does not compare “all data” in each record, even if the search was a brute force comparison of each record in the database. Prelim. Resp. 7. Patent Owner continues that the latter portion of Petitioner’s proposed construction is inconsistent with how the term “non-exhaustive” is used in the Specification of the ’441 patent and is not part of the ordinary meaning. *Id.* at 7–9. We largely agree with Patent Owner.

On this record, we are persuaded that the broadest reasonable construction of “non-exhaustive . . . search,” consistent with the Specification, is “a search that locates a match without a comparison of all

possible matches.” As Patent Owner points out, *id.* at 6, the written description of the ’441 patent discusses both exhaustive and non-exhaustive searches. *See* Ex. 1001, 8:30–9:37 (“Exemplary Techniques for Matching Extracted Features with Database Entries”). Patent Owner also supplies an example it contends shows the ordinary meaning of “exhaustive search” or “brute-force search.” *See* Ex. 2001. Neither discussion mentions the evaluation of all data within each possible match. By contrast, Petitioner provides no support for its construction other than the declaration testimony of Dr. Moulin. *See* Ex. 1004 ¶ 40. To the extent Dr. Moulin testifies that a non-exhaustive search “encompassed anything other than a ‘brute force’ search,” *id.*, we agree, but we do not find that his testimony supports the latter portion of Petitioner’s proposed construction, i.e., “and all data within all possible matches.”

Accordingly, based on the instant record and for purposes of this decision, we construe a “non-exhaustive . . . search” as “a search that locates a match without a comparison of all possible matches.”

2. “neighbor search”

Independent claims 1, 13, and 25 of the ’441 patent recite that the “identifying” step occurs “using a non-exhaustive *neighbor search*.” Petitioner argues that the term “neighbor search” should be construed to mean “identifying a close, but not necessarily exact, match.” Pet. 6. Patent Owner largely agrees with that construction, arguing that “neighbor search” should be defined as “identifying a close, but not necessarily an exact or the closest, match of a feature.” Prelim. Resp. 9. Patent Owner provides further refinements as to what “close” and “feature” mean in the context of the ’441 patent, *id.* at 9–10, but we are not persuaded that such refinements are

necessary. Specifically, Patent Owner argues that “close” should mean “a distance or difference that falls within a defined threshold,” *id.* at 9, but we are persuaded such an alteration would incorporate the element of a threshold into the independent claims, where none is required specifically. Although the Specification addresses such a threshold, *see* Ex. 1001, 6:46–48, we are not persuaded that such an implicit limitation should be applied to the construction of “neighbor search.” Similarly, Patent Owner urges that “feature” means a “feature vector,” Prelim. Resp. 9–10, but we are persuaded that characterizing a “feature” as a “feature vector” would unduly limit the scope of the independent claims.

Thus, on this record, and for purposes of this decision, we construe “neighbor search” as “a search that identifies a close, but not necessarily exact or closest, match.”

B. Asserted Obviousness over Levy and Arya

Petitioner contends that claims 1–3, 6–14, 18, 19, 21–26, and 30 are unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of Levy and Arya. Pet. 7–21. Levy relates to identification of media objects based on identifiers embedded into those objects or their containers. Ex. 1013, Abstract. An identifier can be extracted from an object and mapped to an action, such as returning metadata, redirecting a request, or requesting additional information to identify the media object. *Id.* The identifying characteristics of the object may be a unique identifier or encoded metadata of the object, and preferably the system may use a hash algorithm to create statistically-unique “fingerprints” of the content of the object. *Id.* at 2:29–37, 9:40–61.

Arya is directed to optimal algorithms for approximate nearest neighbor searching. Ex. 1006, Abstract. Arya discloses that its nearest neighbor searching is non-exhaustive and can provide significant improvements over brute-force searching. *Id.* at 19–21.

Petitioner argues that one of ordinary skill in the art would have been motivated to combine the teachings of Levy and Arya. Pet. 8–9. Specifically, Petitioner contends that an ordinarily skilled artisan would have understood that due to slight discrepancies in Levy’s generated identifiers (i.e., fingerprints of the work), identifying a work would require finding not only exact matches, but also near matches. *Id.* at 9 (citing Ex. 1013, 9:42–61; Ex. 1004 ¶ 61). Petitioner argues that Arya’s teaching of approximate nearest neighbor searching would have allowed for such a variation in Levy’s identification processes. *Id.*

Patent Owner argues that the “fingerprints” produced in Levy, based on a hash function, would be unique, but that minor changes to the content would result in widely varying fingerprints. Prelim. Resp. 11–12. As a result, outputs of hash functions that are “close,” i.e., differing by a few bits from each other, would provide no indication that the underlying contents are close or similar. *Id.* Patent Owner continues that “incorporating the neighbor search algorithm of Arya into the exact-match system of Levy will create erroneous meaningless results.” *Id.* at 17.

We are persuaded by Patent Owner’s argument. Finding the approximate nearest neighbors of objects, as taught by Arya, listed by their “fingerprints” or unique identifiers, per Levy, would not provide a result commensurate with independent claims 1, 13, and 25. The discovered “neighbors” would not be related to the obtained identifier, as the unique

identifiers in the database are indexed only by the hashed extracted features. Therefore, on this record, we agree with Patent Owner that there would be no benefit in applying the approximate nearest neighbor searching of Arya to the fingerprinting process of Levy.

Although we acknowledge Petitioner's argument "that disparities in the source of a fingerprinted work led to slight discrepancies in generated fingerprints," and the testimony of Petitioner's declarant, Dr. Moulin, that ordinarily skilled artisans would want near matches, as well as exact fingerprint matches, Pet. 9 (citing Ex. 1004 ¶ 61), we are not persuaded that this would be sufficient to motivate the combination of Levy and Arya, given the differences discussed above. On this record, the information presented does not demonstrate a reasonable likelihood that Petitioner would prevail in showing that claims 1–3, 6–14, 18, 19, 21–26, and 30 would have been obvious over Levy and Arya.

C. Asserted Anticipation by Conwell

Petitioner contends that claims 1–3, 6, 8–14, 19, 21–26, and 30 are unpatentable under 35 U.S.C. § 102(e) as anticipated by Conwell. Pet. 21–34. Conwell relates to a method for directing users of digital content to websites related to the content being played. Ex. 1009, Abstract. An identifier can be derived from the content, for example, by applying a hashing algorithm to some or all of the content to generate the identifier. *Id.* at 1:60–2:3. Conwell also discloses use of "hashing algorithms by which similar or related, but non-identical, inputs map to the same hash outputs." *Id.* at 4:64–5:3. Each identifier is stored in a database along with an associated web address. *Id.* at 3:43–45, Figs. 3–4. The entries in the

database may be sorted by identifier, and the system may be keyed by identifier. *Id.* at 5:58–64.

When a user plays the digital content, such as a CD, DVD, or MP3 file, the identifier is generated and sent to the database, which uses the identifier to look up the corresponding URL in the database and sends that URL back to the user device. *Id.* at 1:60–62, 2:4–10, 3:46–60. In the event that the content identifier is not associated with a URL, for a small fee the user can create a web page to be associated with the content, where the web page can include banner advertisements, sponsored links to online retailers, or other methods of generating revenue. *Id.* at 4:14–24, 4:30–34.

Patent Owner argues that Conwell does not disclose a “non-exhaustive neighbor search,” as recited in independent claims 1, 13, and 25, and therefore cannot anticipate the challenged claims. Prelim. Resp. 24–29. According to Patent Owner, the identification process in Conwell is the same as that in Levy. *Id.* at 25. Patent Owner asserts that the hash algorithms in both Conwell and Levy are designed to produce a unique output for any given input. *Id.* at 26. Thus, Patent Owner concludes, Conwell does not describe a “neighbor” search. *Id.*

We are not persuaded by Patent Owner’s argument. In contrast to Levy, Conwell discloses that its hash algorithm generates the same output identifier for similar, but non-identical, inputs, as discussed by Petitioner. *See* Pet. 23 (citing Ex. 1009, 4:64–5:3). Patent Owner acknowledges the citation, but argues that the same “hashed output identifier is compared to the records using an exact match lookup.” Prelim. Resp. 29. Patent Owner continues that such an exact match search is not the same as a “neighbor” search as recited in the claims. On the present record, however, we are

persuaded that similar, but non-identical, inputs (e.g., Song A and Song A₁, in Patent Owner’s example, *id.* at 28), would produce the same identifier, and the hash table lookup in Conwell would provide the same URL for both. In other words, the search, or lookup, would “identify[] a close, but not necessarily exact or closest, match,” such that a user would be directed to the same URL for both Song A and Song A₁, thereby matching both Song A and Song A₁. Although it appears that such a search process is different from that disclosed in the written description of the ’441 patent, we are persuaded, on the present record, that it meets the discussed limitations recited in the independent claims.

We also have reviewed Petitioner’s arguments and claim chart and determine that, for purposes of this decision, Petitioner has shown sufficiently that Conwell discloses the remaining limitations of the independent claims and the dependent claims challenged on this ground. On the present record, we determine that the information presented demonstrates a reasonable likelihood that Petitioner would prevail in showing that claims 1–3, 6, 8–14, 19, 21–26, and 30 are anticipated by Conwell.

D. Asserted Obviousness over Ghias and Philyaw

Petitioner contends that claims 1–3, 8, 10–14, 18, 19, 21–27, 29, and 30 are unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of Ghias and Philyaw. Pet. 45–60. Ghias relates to searching for melodies. Ex. 1010, Abstract. The system of Ghias receives a melody input through a microphone, converts it into a digitized representation based on relative pitch differences between successive notes, and searches a database of such representations for an approximate match. *Id.* Ghias also

provides that a preselected error tolerance may be applied to the search. *Id.* at 2:50–59. The results of the search are presented as a ranked list of approximately matching melodies, or alternately just one best match. *Id.* at 2:50–59, 6:60–63. Ghias also discloses that it is desirable to perform key-searching within the database using “an efficient approximate pattern matching algorithm,” where different algorithms have various running times dependent on the number of entries in the database. *Id.* at 6:7–11, 6:23–35.

In addition, Petitioner cites to Philyaw for its disclosure of extracting identifying information embedded into a broadcast signal and directing a computer to receive and display appropriate product information, such as an advertisement, based on the identifying information. Ex. 1014, Abstract, 1:66–2:8. This display is accomplished by having the computer query an Advertiser Reference Server (“ARS”), which has a database of product codes and associated URLs, and returns an advertiser’s URL for display. *Id.* at 5:23–27, 5:52–58, 5:64–6:2. Petitioner contends that a person of ordinary skill in the art would have been motivated to combine Ghias and Philyaw “to present advertisements related to content without undertaking the time consuming and expensive step of embedding identifying information in content.” Pet. 49.

Patent Owner argues that the search in Ghias is exhaustive, detailing that the query engine compares the work to “all the songs” in the melody database, and thus Ghias cannot teach or suggest a “non-exhaustive neighbor search,” as recited in the independent claims. Prelim. Resp. 34–40 (citing Ex. 1010, 5:66–6:2). Patent Owner also argues that the search of all the songs is not part of a preprocessing phase in Ghias. *Id.* at 37. Patent Owner continues that the system in Ghias “applies no intelligence to the process of

selecting the melody references in [the] melody database to be compared to the melody to be identified.” *Id.* at 37–38. Patent Owner also asserts that Petitioner quotes Ghias out of context, arguing that the passages of Ghias cited in the Petition discuss the comparison of a work with a single record of the database. *Id.* at 39.

On the present record, we are not persuaded by Patent Owner’s arguments. Ghias provides that “[t]he number of matches that the database 14 should retrieve depends upon the *error-tolerance* used during the key-search.” Ex. 1010, 6:63–65 (emphasis added). Ghias further provides that “the user can perform a *new query on a restricted search list consisting of songs just retrieved*. This allows the user to identify sets of songs that contain similar melodies.” *Id.* at 7:5–8 (emphasis added). Thus, Ghias makes clear that the search need not be exhaustive, as Patent Owner argues, and will act to “identify[] a close, but not necessarily exact or closest, match,” per our claim construction. Additionally, given the “comprising” language used in the independent claims, we are not persuaded that the claimed methods could not cover processes with both exhaustive and non-exhaustive searching, as long as the latter provides identification.

We also have reviewed Petitioner’s arguments and claim chart and determine that, for purposes of this decision, Petitioner has shown sufficiently that the combination of Ghias and Philyaw teaches or suggests the remaining limitations of the independent claims and the dependent claims challenged on this ground. In addition, Petitioner has provided articulated reasoning with rational underpinning for combining Ghias and Philyaw. Thus, on the present record, the information presented demonstrates a reasonable likelihood that Petitioner would prevail in

showing that claims 1–3, 8, 10–14, 18, 19, 21–27, 29, and 30 would have been obvious over the combination of Ghias and Philyaw.

E. Asserted Anticipation by Wood

Petitioner contends that claims 1–3, 8–14, 19, 21, 22, 25, 27, 29, and 30 are unpatentable under 35 U.S.C. § 102(e) as anticipated by Wood. Pet. 34–45. In light of the grounds on which we have instituted review of the same claims, we do not institute an *inter partes* review on this alternative ground asserted by Petitioner. See 37 C.F.R. § 42.108(a).

III. CONCLUSION

For the foregoing reasons, we determine that the information presented establishes a reasonable likelihood that Petitioner would prevail in showing that claims 1–3, 6, 8–14, 18, 19, 21–27, 29, and 30 of the ’441 patent are unpatentable. At this preliminary stage, the Board has not made a final determination with respect to the patentability of the challenged claims or any underlying factual and legal issues.

IV. ORDER

Accordingly, it is:

ORDERED that pursuant to 35 U.S.C. § 314(a), an *inter partes* review is instituted as to claims 1–3, 6, 8–14, 18, 19, 21–27, 29, and 30 of the ’441 patent on the following grounds of unpatentability:

- A. Claims 1–3, 6, 8–14, 19, 21–26, and 30 under 35 U.S.C. § 102(e) as anticipated by Conwell; and
- B. Claims 1–3, 8, 10–14, 18, 19, 21–27, 29, and 30 under 35 U.S.C. § 103(a) as obvious over Ghias and Philyaw;

FURTHER ORDERED that no other grounds set forth in the Petition are authorized for *inter partes* review as to the claims of the '441 patent; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial, which commences on the entry date of this decision.

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