

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FREE STREAM MEDIA CORP.
d/b/a SAMBA TV,
Petitioner

v.

GRACENOTE, INC.,
Patent Owner.

IPR2020-00219
Patent 8,171,030 B2

Before MICHELLE N. ANKENBRAND, GARTH D. BAER,
and AARON W. MOORE, *Administrative Patent Judges*.

MOORE, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining No Claims Unpatentable
Granting as to Cancellation and Denying as to Substitution Patent Owner's
Revised Motion to Amend
35 U.S.C. § 318(a)

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I. INTRODUCTION

A. Background

Free Stream Media Corp. d/b/a Samba TV (“Petitioner”) filed a Petition requesting *inter partes* review of claims 1, 6, 8, 10, 11, 13, and 15 of U.S. Patent No. 8,171,030 B2 (Ex. 1001, “the ’030 patent”). Paper 1 (“Pet.”). Gracenote, Inc. (“Patent Owner”) filed a Preliminary Response. Paper 10. On June 17, 2020, we instituted an *inter partes* review of claims 1, 6, 8, 10, 11, 13, and 15. Paper 11 (“Decision”), 22.

The following substantive papers have since been filed by the parties or entered by the Board:

Paper	Title	Abbreviation
16	Patent Owner’s Motion to Amend	MTA
17	Patent Owner’s Response	PO Resp.
21	[Petitioner’s] Opposition to Patent Owner’s Motion to Amend	MTA Opp.
22	Preliminary Guidance	PG
23	[Petitioner’s] Reply in Support of its Petition for <i>Inter Partes</i> Review	Pet. Reply
24	Patent Owner’s Revised Motion to Amend	RMTA
27	[Patent Owner’s] Sur-Reply	PO Sur-Reply
28	[Petitioner’s] Opposition to Patent Owner’s Revised Motion to Amend	RMTA Opp.
30	Patent Owner’s Reply to Petitioner’s Opposition to Revised Motion to Amend	RMTA Reply
33	[Petitioner’s] Sur-Reply in Further Opposition to Patent Owner’s Revised Motion to Amend	RMTA Sur-Reply

An oral hearing was held on April 14, 2020, by video only, and a transcript of the hearing is included in the record. Paper 35 (“Tr.”). The demonstratives used in the oral hearing are in the record as Paper 32 (Patent Owner) and Paper 34 (Petitioner).

The Board has jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73.

For the reasons that follow, we determine that Petitioner has not shown claims 6 and 10 to be unpatentable. Further, we grant Patent Owner’s Revised Motion to Amend as to canceling original claims 1, 8, 11, 13, and 15, but deny that motion as to entry of proposed substitute claim 28.

B. Related Matters

The parties identify *Gracenote, Inc. v. Free Stream Media Corp. d/b/a Samba TV*, No. 1:18-cv-01608-RGA (D. Del.), filed October 17, 2018, as a related matter. *See* Pet. 4; Patent Owner Mandatory Notices (Paper 5).

C. The ’030 Patent

The ’030 patent is titled “Method and Apparatus for Multi-Dimensional Content Search and Video Identification” and describes the invention as “generally relat[ing] to information retrieval systems including systems related to complex objects, multi-dimensional data, rich media, and video.” Ex. 1001, 1:20–23.

A first search method described in the patent uses “a multi-dimensional object or video database with traversal nodes constructed from differentiating parts of traversal indexes and leaf nodes storing associated data and associated indexes.” This structure is illustrated in Figure 1A, reproduced below.

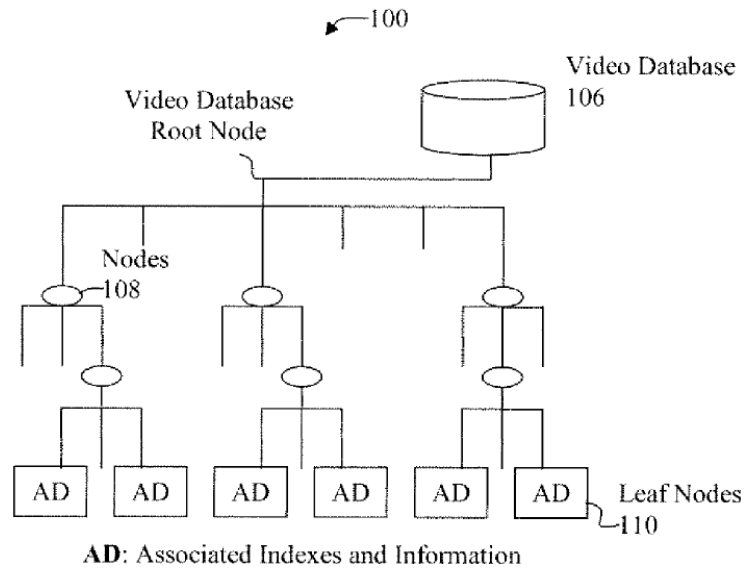


Figure 1A “illustrates a hierarchical representation of a multidimensional . . . database with traversal nodes . . . and . . . leaf nodes storing associated data and associated indexes.” Ex. 1001, 3:14–16.

This method features “a traversal index associated with elements, such as video sequences 104, stored in a multi-dimensional video database 106, and leaf nodes 110.” Ex. 1001, 5:8–10. “The video database is traversed via nodes 108 to reach the leaf nodes 110 storing associated data and associated indexes” and “[t]he traversal indexes store differentiating information between different video frames.” *Id.* at 5:10–14.

An “alternate method of indexing avoids tree traversal altogether and accesses the leaf node directly . . . by generating a direct address or hash for each leaf node.” Ex. 1001, 5:17–19. In this method, “the traversal indexes are a direct address or a hash to each leaf node” and are “equivalent to the hash or direct address of the leaf node.” *Id.* at 5:20–23.

D. The Challenged Claims

In the Revised Motion to Amend, Patent Owner non-contingently requests to cancel claims 1, 8, 11, 13, and 15 (*see* RMTA, 1), which we

grant, leaving claims 6 and 10 as the only challenged claims remaining in this proceeding. These claims, as well as claim 1, from which they both directly depend, are reproduced below.

1. A method of organization of a multi-dimensional video database using a robust hash of a multi-dimensional vector signature as a traversal index, the method comprising:
generation of a robust hash value as a traversal index from multiple parameters extracted from a region of interest in a frame of a video sequence; and
storing data associated with the video sequence at a leaf node addressed by the robust hash value, wherein the leaf node is a member of a plurality of leaf nodes in a multi-dimensional video database.
6. The method of claim 1 wherein the traversal index is generated from a shape signature of a region around a selected object in the frame of the video sequence.
10. The method of claim 1 wherein the traversal index is a multi-dimensional vector comprising a single bit or a few bits per each dimension of the multi-dimensional vector.

Ex. 1001, 15:29–38, 15:57–59, 16:9–11.

II. LEVEL OF ORDINARY SKILL IN THE ART

The level of skill in the art is a factual determination that provides a primary guarantee of objectivity in an obviousness analysis. *See Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 1323 (Fed. Cir. 1999) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966)). The level of skill in the art also informs the claim construction analysis. *See Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 574 U.S. 318, 332 (2015) (explaining that claim construction seeks the meaning “a skilled artisan would ascribe” to the claim term “in the context of the specific patent claim”).

Petitioner asserts that a person of ordinary skill in the art (“POSITA”) at the time of the invention “would have had a degree in computer engineering, computer science, information systems, or a similar discipline, along with 3-4 years of experience with the design and/or implementation of video or other content identification software and associated databases” and “would [have] be[en] aware of and generally knowledgeable about different methods employed to generate video signatures, hashing algorithms, and various database structures that can be used to store videos and related data.” Pet. 25 (citing Ex. 1003 ¶¶ 37–40). Patent Owner does not contest Petitioner’s description.

Because there is no dispute, and because we find Petitioner’s characterization of the level of skill in the art generally consistent with the subject matter of the ’030 patent and cited references, we adopt it for purposes of this analysis.

III. CLAIM CONSTRUCTION

We construe claims using the claim construction standard that would be used in a civil action under 35 U.S.C. § 282(b), as articulated by the Federal Circuit in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc), and subsequent cases. See 37 C.F.R. § 42.100(b).

The parties identify for construction the terms “robust hash,” “traversal index,” “leaf node,” “addressed by,” and “around.” See Pet. 10–13; PO Resp. 30–39. Because our resolution of this case does not require us to resolve the disputes over “addressed by” and “around,” we need not, and therefore do not, interpret those terms. See *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Ltd.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017)

(explaining that construction is needed only for disputed terms needed to resolve the controversy). We consider the other terms below.

A. “robust hash”

Petitioner argues that a “robust hash” is a “corresponding smaller numerical value calculated from another value such that it is more immune to noise and disturbances due to distortion.” Pet. 11. According to Petitioner, “hash” is “a well-known term in the computer field” and “those of ordinary skill in the art at the relevant time would [have] consider[ed] a ‘hash’ to be ‘robust’ if a similar value [was] output by the hashing function even if nonsignificant changes, like compression, rescaling, cropping, and the like, are made to the input value.” *Id.*

At institution, we construed this term to mean “a corresponding smaller numerical value calculated from another value, or set of values, so as to provide some immunity to noise and disturbances due to distortion.” Decision 11. Patent Owner agreed with our construction, with the proviso that “smaller” means “fewer bits” (*see* PO Resp. 30), and Petitioner did not address the matter further. “Smaller” does mean “fewer bits” in this context, and we maintain our earlier interpretation of this term.

B. “traversal index”

The parties agree that traversal index means “an index for stepping or traversing through the nodes of a hierarchical database.” *See* Pet. 12; PO Resp. 30–31. Because we find that definition consistent with the disclosures of the ’030 patent and the prior art, we adopt it.

C. “*leaf node*”

Petitioner argues that “leaf node” means “a node in a hierarchical data structure without any children.” Pet. 13. Patent Owner does not address this issue. As we did at institution, we find Petitioner’s construction of “leaf node” consistent with how the term is used in the ’030 patent (*see, e.g.*, Ex. 1001, 5:8–10, Fig. 1A), and we thus maintain the construction.

IV. ORIGINAL CLAIMS

We address remaining original claims 6 and 10 before turning to Patent Owner’s Revised Motion to Amend.

A. *Evidence Relied Upon*

Because we granted Patent Owner’s request to cancel claims 1, 8, 11, 13, and 15, only the following references are still being asserted in this proceeding:

Reference	Exhibit
WO 2005/036877A1 (“Deng”)	1006
US 2002/0126872A1 (“Brunk”)	1007

Deng is an international patent application, titled “Digital Video Signature Apparatus and Methods for Use with Video Program Identification Systems,” describing “[s]ystems that identify video images and/or sequences of video images.” Ex. 1006 ¶ 2. The system “extract[s] audio and/or video information associated with the program . . . and process[es] that extracted information to generate audio and/or video signatures” that “are substantially unique to each portion of [the] audio/video content or program.” *Id.* ¶ 2.

In the embodiment Petitioner cites, Deng uses “a set of tables organized in a linked tree-like data structure,” where “each of the tables may be indexed using centroids or coordinate pairs (e.g., horizontal and vertical coordinates).” Ex. 1006 ¶ 106. “[A] first coordinate pair or centroid associated with a signature is used to index to a link to a subsequent table,” “[t]he next coordinate pair of the signature is then used to index within the subsequent table to another table,” and the “process continues until all coordinate pairs associated with all of the signatures within a signature sequence have been exhausted at a final table.” *Id.* “The last coordinate pair is then used to index to textual information . . . describing the video program associated with the sequence of signatures information (i.e., sequence of centroids or coordinate pairs used to index through the linked tables).” *Id.*

Deng also explains that its signatures are created to avoid errors from differences associated with cropping, padding, scaling, shifting, or the like (*see* Ex. 1006 ¶¶ 61, 67, 75, 78), and thus, are “robust” as that term is used in the art.

Petitioner cites Brunk for the concept that a signature can be subjected to a hashing algorithm to generate a hash. *See* Ex. 1007 ¶¶ 20–21.

Petitioner also relies on a Declaration of Borko Furht, filed as Exhibit 1003. Patent Owner relies on Declarations of Pierre Moulin, filed as Exhibits 2005 and 2012.

B. Legal Standard

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 the invention was made to a person having ordinary skill in the art to which said subject matter

pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) any secondary considerations, if in evidence.¹ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

C. Obviousness of Claims 6 and 10

Petitioner argues that claims 6 and 10 would have been obvious in view of Deng and Brunk. Because claims 6 and 10 depend from claim 1 (which Patent Owner has canceled) and include all of the limitations of claim 1, we also discuss the limitations of claim 1.

For claim 1, Petitioner argues that “Deng discloses almost all of the limitations” and that “Brunk makes clear that Deng’s already robust signature can be hashed.” Pet. 45. For claim 6, Petitioner points to Brunk’s use of edges and distances, and, for claim 10, Petitioner contends that Brunk’s signature is multi-dimensional. *See id.* at 55–57.

More specifically, Petitioner reads the claims on Deng and Brunk as follows:

¹ Patent Owner does not present any objective evidence of nonobviousness (i.e., secondary considerations) as to any of the challenged claims.

1. *Claim 1*

- a. *“method of organization of a multi-dimensional video database using a robust hash of a multi-dimensional vector signature as a traversal index”*

Petitioner argues that Deng “relates to ‘[s]ystems that identify video images and/or sequences of video images (e.g., television commercials or programs) being broadcast and/or viewed on an output device (e.g., a television or video monitor)’” and that “these videos can be stored in a multi-dimensional database.” Pet. 45 (citing Ex. 1006 ¶ 2). In particular, Petitioner points to Deng’s data structure that employs “a set of tables organized in a linked tree-like data structure.” *Id.* (citing Ex. 1006 ¶ 106). Petitioner contends that “[t]his ‘tree-like’ database is hierarchical, and includes a series of nested ‘tables’ with the ‘final table’—the database’s leaf nodes—including information relating to video programs.” *Id.* at 45–46.

Petitioner argues that “Deng also employs a ‘multi-dimensional vector signature’” and that it “works by ‘extracting audio and/or video information associated with the program . . . and processing that extracted information to generate audio and/or video signatures.” Pet. 46 (citing Ex. 1006 ¶ 2). This results in signatures that are “digital sequences or codes that, at a given instant of time, are substantially unique to each portion of audio/video content or program.” Ex. 1006 ¶ 2.

Petitioner argues that the multidimensional signatures Deng generates are intended for use as a database traversal index, as it states that “an unidentified video program can be reliably identified by finding a matching signature within a database or library containing the signatures of known available programs.” Pet. 46 (citing Ex. 1006 ¶¶ 2, 18, 106).

Petitioner further argues that Deng’s “signatures are designed with ‘robustness’ and that this “reduc[es] or eliminat[es] the effects of image scaling, shifting, etc.” on the searching. Pet. 47 (citing and quoting Ex. 1006 ¶¶ 60, 61, 63, 67, 75, 78.)

Petitioner acknowledges that “Deng does not explicitly state that its signatures are subject to a hashing algorithm to generate a ‘robust hash,’” but argues that “as of the ’030 patent’s effective filing date the use of robust hashes as video signatures was well known in the art” and that “Brunk provides an example.” Pet. 47. Petitioner argues that in Brunk, “[a] signature for a video can be generated using multiple ‘relevant features (e.g., perceptual relevant features represented via edges; magnitude peaks, frequency characteristics, etc.) identified’ on ‘sets’ such as ‘frames.’” *Id.* (citing Ex. 1007 ¶¶ 22–24, 42). “Then, a ‘hash (e.g., a manipulation which represents the content item . . . as an item having fewer bits)’ can be applied to the signature to produce a ‘unique identifier.’” *Id.* at 47–48 (citing Ex. 1007 ¶¶ 5, 20–21, 29, 31, 46, 49). Petitioner asserts that “Brunk explains that this hash can be designed so as to be ‘robust.’” *Id.* at 48 (citing Ex. 1007 ¶ 5; Ex. 1003 (Furht) ¶¶ 284–292).

- b. “generation of a robust hash value as a traversal index from multiple parameters extracted from a region of interest in a frame of a video sequence”*

As explained above, Petitioner argues that Deng discloses the extraction of “multiple parameters” from “a region of interest in a frame of a video sequence.” Petitioner argues that Deng may use selected frames of a video, may use only portions of the frames, and that each of the images or

frames may also be recursively sub-divided into a plurality of sub-regions or areas. *See* Pet. 48–49 (citing Ex. 1006 ¶¶ 39, 46, 49, 61, 63, 85, 88).

In Deng, after the frames or portions of frames have been identified, the “center of mass or centroid information for each of the brightness and color components” is calculated to generate a “substantially unique[] . . . signature.” Ex. 1006 ¶ 39. “The data acquisition unit 206 . . . calculat[es] the centroids or centers of mass for each of the image color . . . and brightness components.” *Id.* ¶ 63. For example “a signature ‘S’ for an image could be defined as $S = (Red_x, Red_y, Green_x, Green_y, Blue_x, Blue_y, Yellow_x, Yellow_y, Brightness_x, Brightness_y)$, where Red_x is the horizontal position of the centroid from the color red, Red_y is the vertical position of the color red, etc.” *Id.* ¶ 71; *see id.* ¶¶ 72–74.

Petitioner argues that “Deng also teaches that its multidimensional signatures can form a database ‘traversal index’” in that, “[a]fter signatures are generated, a ‘central processing unit 210 . . . compare[s] the sequence of signatures . . . to a plurality of known or reference signatures that are associated with known video programs and which are stored within a data structure (e.g., a table).” Pet. 50–51 (quoting Ex. 1006 ¶ 42). Petitioner argues that “the ‘set of tables’ forming the ‘tree-like data structure’ can be ‘indexed using centroids or coordinate pairs (e.g., horizontal and vertical coordinates)’ that underlie the signatures. *Id.* at 51 (quoting Ex. 1006 ¶ 106). “[A] first coordinate pair or centroid associated with a signature is used to index to a link to a subsequent table,” “[t]he next coordinate pair of the signature is then used to index within the subsequent table to another table,” and “[t]his process continues until all coordinate pairs associated with all of the signatures within a signature sequence have been exhausted at a

final table” and a signature match is identified. Ex. 1006 ¶ 106. Petitioner contends that “the extracted values making up a given signature are used to step or traverse through a hierarchical database by comparing those values to reference signature values stored in nested indexing tables” and that “[t]his nested ‘set of tables,’ and the signature data it contains, is the claimed ‘traversal index.’” Pet. 51 (citing Ex. 1003 (Furht) ¶¶ 303–308).

Petitioner also argues that Deng’s signatures are “robust” because it uses weighting and “normalized centroid information” to “reduc[e] or eliminat[e] the effects of image scaling, shifting, etc.” Pet. 51–52 (citing Ex. 1006 ¶¶ 60–61, 63, 67, 75, 78).

For hashing, Petitioner cites Brunk’s explanation that a “‘hash (e.g., a manipulation which represents the content item . . . as an item having fewer bits)’ can be applied to the signature to produce a ‘unique identifier.’” Pet. 52 (citing Ex. 1007 ¶¶ 5, 20–21, 29, 31, 46, 49). According to Petitioner, “just like Deng, Brunk explains that a hashed ‘robust signature’ can be used to identify video in a database by ‘match[ing]’ a query signature ‘to . . . corresponding signatures stored in the database.’” *Id.* (citing Ex. 1007 ¶¶ 6, 32).

- c. *“storing data associated with the video sequence at a leaf node addressed by the robust hash value, wherein the leaf node is a member of a plurality of leaf nodes in a multi-dimensional video database”*

According to Petitioner, “Deng explains that video can be stored in a multidimensional ‘searchable tree-like data structure’” and that “[a] POSITA would have understood this to be referring to well known, hierarchical databases.” Pet. 53 (citing Ex. 1006 ¶ 106; Ex. 1003 (Furht) ¶¶ 321–324). Petitioner contends that “[s]uch a database includes a root node, multiple

intermediate nodes below this root node, and multiple child or leaf nodes associated with each intermediate node.” *Id.* (citing Ex. 1003 (Furht)

¶¶ 321–324). Petitioner describes Deng as “explain[ing] that its ‘tree-like’ database is hierarchical in that it includes a nested ‘set of tables’ that are ‘indexed’ and ‘linked’ with each other. *Id.* (citing Ex. 1006 ¶ 106).

Petitioner also argues that Deng’s database “includes a ‘final table’ of signatures” and that “[t]his ‘final table’ includes a series of signatures against which a query signature can be compared to identify a ‘video program associated with the sequence of signature information’ that forms the query signature.” *Id.* Petitioner contends that “[t]he entries in this ‘final table,’ which do not include any children and are used to generate search results, are the claimed ‘leaf nodes’ of Deng’s multidimensional database.” *Id.*

According to Petitioner, “Deng explains that its system arrives at this ‘final table’ using video signatures as an addressing ‘index,’” as “the various ‘coordinate pair[s]’ making up the signatures are used to traverse through the hierarchical nested levels of the database, [to] arrive at the ‘final table,’ and identify ‘the video program associated with the sequence signature information.” Pet. 54. Petitioner argues that “Deng’s signature ‘address[es]’ its leaf nodes (the entries of its final table) as required by claim 1.” *Id.* (citing Ex. 1003 (Furht) ¶ 325).

Petitioner further argues that “Deng’s leaf nodes . . . are also designed to ‘stor[e] data associated with the video sequence,’” in that “[t]he last coordinate pair’ used to match an entry in the ‘final table’ of its database ‘is . . . used to index to textual information (e.g., in the form of metadata) describing the video program associated with the sequence of signature

information.” Pet. 54 (quoting Ex. 1006 ¶ 106). Petitioner asserts that “[t]his ‘textual information’ and ‘metadata’ is the claimed ‘data associated with the video sequence.’” *Id.* (citing Ex. 1003 ¶¶ 326–327.)

2. *Claim 6*

Claim 6 recites that the “traversal index” is “generated from a shape signature of a region around a selected object in the frame of the video sequence.”

Petitioner argues that Deng describes how “video signatures are generated by ‘extracting . . . information’ from the video,” as well as “the use of the ‘centroids’ of the various color and brightness components making up a video frame to generate a signature.” Pet. 55 (citing Ex. 1006, ¶¶ 2, 39, 46, 61.) Petitioner further argues that “[w]hile Brunk also recognizes that color centroids can be used to generate a signature, it discusses a number of other alternatives,” including how “edges can . . . be used to calculate an object’s center of mass” and “[a] distance . . . may be calculated from the center of mass to each edge, or to a subset of edges, and such dimensions may be used as a signature for the object or for the frame.” *Id.* at 54–55 (citing Ex. 1007 ¶¶ 24, 42). According to Petitioner, “[t]his is the claimed ‘shape signature.’” *Id.* at 55 (citing Ex. 1003 (Furht) ¶¶ 330–335.)

Petitioner argues that because “Brunk identifies . . . a shape-based signature as an alternative to a color centroid signature, a POSITA would have considered it highly obvious to use such a signature with Deng” and, “in view of Brunk’s disclosure . . . would have had a more than reasonable expectation that a shape signature could be used with Deng.” Pet. 56 (citing Ex. 1003 (Furht) ¶¶ 336–338).

3. *Claim 10*

Claim 10 recites that the “traversal index” is a “multi-dimensional vector comprising a single bit or a few bits per each dimension of the multi-dimensional vector.”

Petitioner contends that Brunk’s “signature may be ‘an N-bit hash of N real numbers, where N is an integer,’” that “[t]he N real numbers may correspond to (or represent) . . . a data set,” and that “[a] POSITA would have understood that this ‘data set’ includes the multiple features making up Brunk’s hash.” Pet. 57 (citing Ex. 1007 ¶ 73; Ex. 1003 (Furht) ¶¶ 343–345). Petitioner argues that “each bit making up Brunk’s N-bit signature corresponds to one of the signature features or dimensions.” *Id.* Petitioner additionally argues that “a signature can include multiple smaller ‘sequence[s],’ such as a ‘1-bit hash’ or larger sequences like ‘4-bit hashes, 8-bit hashes, etc.,” and that “[e]ach of [those] ‘sequences’ is another dimension of Brunk’s signature.” *Id.* (citing Ex. 1007 ¶ 100; Ex. 1003 (Furht) ¶¶ 346–347).

D. *Our Analysis*

We expressed concerns about the combination of Deng and Brunk in the Institution Decision. We noted that “Petitioner specifically relies on the Deng’s ‘linked tree-like data structure,’ in which the system steps through linked tables using individual pairs of the query signature,” but questioned “how this could work if all of the pairs are hashed into a single value.” Decision 20.

Patent Owner focuses on that issue, arguing that “[i]f Deng’s signature sequence were to be hashed, the resulting single hash value would not be usable to index into Deng’s nested tables because the nested tables

require individual coordinate pairs to index into a table to retrieve a pointer to a subsequent table until a final table is reached.” PO Resp. 40. Patent Owner further argues that “[h]ashing Deng’s signature sequence into a single result value would destroy the . . . ordering and the hash result value would not be operable to navigate through the nested table ‘database’ of Deng.” *Id.* at 45.

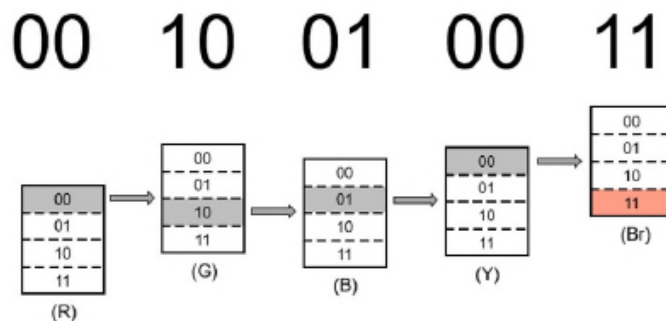
Petitioner responds that the combination is viable because one could use a “robust hash [that is] specifically meant and designed to preserve the ordering and other data present in a signature—albeit in reduced or compressed form—to maintain its ‘discriminating capabilities.’” Reply 10 (emphasis omitted). Petitioner contends that “[b]ecause a ‘robust hash’ preserves a signature’s ‘discriminating capabilities,’ a POSITA would also have understood that a robust hash of Deng’s signature could be used to step through Deng’s tree-like linked tables in exactly the same way as a signature.” *Id.* According to Petitioner, “[a] ‘hash’ is simply a string of letters and numbers” and “[t]hus, hashing Deng’s signatures amounts to nothing more than a change in data form” where “[t]he signature function is not impacted.” *Id.*

Petitioner then suggests that Deng’s “signature can be hashed by, for instance, transforming the comma separated list into a string of letters and numbers that similarly represents the centroid coordinates: ‘RxRyGxGyBxBYxYyBrxBry.’” Reply 11.

Petitioner further argues that “[t]he size of the hash relative to the signature [could] be decreased by reducing the number of unique values in the x and y directions (i.e., if the signature employs an x coordinate with numerical values ranging from 0-100, the hash can employ a coordinate that

covers the same distance but does so using only numerical values ranging from 0-50)” and that “Deng is expressly open to signatures—like this hash—that employ less data.” Reply 11. Petitioner argues that “[b]ecause it is robust and not cryptographic, this hash preserves the ordering and data present in the original signature.” *Id.*

Petitioner alternatively argues that “rather than employing a more complicated string of letters and numbers, Deng’s signature could be hashed into a series of 0s and 1s.” Reply 11. In this scenario, “the locations of the frame’s red, green, blue, yellow, and brightness centroids could be used to generate a frame identifying hash” where “[e]ach portion of the hash corresponds to one centroid,” resulting in a “ten-bit hash of ‘0010010011.’” *Id.* at 12. Petitioner illustrates traversing “Deng’s linked tables using the complete hash ‘0010010011’” on page 13 of the Reply, as follows:



Petitioner’s Representation of its “0s and 1s” Example

We find Petitioner’s arguments unpersuasive.

First, we do not agree that, because a hash is intended to “preserve a signature’s discriminating capabilities,” “[t]he signature function is not impacted.” Reply 10. The “discriminating capabilities” that are preserved are those relative to the original material to which the signature relates (i.e., the hashed signature generally still identifies the original material from

which the signature was derived), not between the signature and the hash of the signature. Petitioner cites no evidence suggesting that a hash of the multiple individual signatures of Deng—cryptographic, robust, or otherwise—would preserve the ability to step through the coordinate pairs as Deng describes.

Second, we do not agree that Deng’s “signature can be hashed by, for instance, transforming the comma separated list into a string of letters and similarly represents the centroid coordinates.” Reply 11. This does not appear to be a “hash” because it does not appear to reduce the size of the list (which of course does not include commas when represented in the computer), and Petitioner does not explain otherwise. Nor does Petitioner explain how this would amount to “generation of a robust hash value as a traversal index from multiple parameters,” as claim 1 requires, because Petitioner does not explain how the “string of letters” would be “a” robust hash value.

Third, we do not agree with the argument that one could prepare a signature with values in the range of 1–100 and then “hash it” by reducing the value ranges to 1–50. *See* Reply 11. Petitioner again does not explain how this would reduce the bits required to represent the values, does not explain why one would do that instead of just starting with values in the 1–50 range (suggesting the improper influence of hindsight²), and also does not explain how that would amount to generation of “a” robust hash value. It

² *See St. Jude Med., Inc. v. Access Closure, Inc.*, 729 F.3d 1369, 1381 (Fed. Cir. 2013) (“Even under our ‘expansive and flexible’ obviousness analysis . . . we must guard against ‘hindsight bias’ and ‘ex post reasoning.’”) (citing *KSR*, 550 U.S. at 415, 421).

appears that this would instead use a set of individual values ranging from 1 to 50.

Finally, we also do not agree with Petitioner's "0s and 1s" example, which does not appear to include hashing at all, but is instead an entirely different approach in which the centroids are identified only by the quadrant in which they appear, reducing the resolution substantially. *See* Reply 11–13. Petitioner does not explain how this amounts to a "hash," and it appears instead that "0010010011" is simply an unhashed signature obtained using a method slightly different than what is described in Deng. In order to correspond to what is claimed, one would need to hash "0010010011" to some smaller value, in which case it is unclear how the traversal would or could operate.

The question is whether "a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention." *Allied Erecting & Dismantling Co., Inc. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016) (quoting *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1361 (Fed. Cir. 2007)). Absent a showing of how Brunk's signature hash teachings could be combined with Deng's method without destroying Deng's method, we find that Petitioner has not established that one of skill in the art would have been motivated to combine these references as described in the Petition. We thus conclude that Petitioner has not shown claims 6 and 10, which include all of the limitations of claim 1, to be unpatentable in view of those references.

We need not, and therefore do not, reach Patent Owner's arguments that the "decrease in resolution would be contrary to the teachings of Deng, that "there would be little benefit" to the combination "because Deng's

signature was already a relatively small amount of data,” that Deng’s leaf nodes would not be “addressed by the robust hash value,” or that claims 6 and 10 are separately patentable over Deng and Brunk. *See* PO Resp. 47–62, 66–75.

V. MOTION TO AMEND

Patent Owner filed a Non-Contingent Motion to Amend and then a Revised Non-Contingent Motion to Amend, both requesting to cancel claims 1, 8, 11, 13, and 15, and seeking to add proposed substitute claim 28. For the reasons that follow, we deny Patent Owner’s motion to add proposed substitute claim 28.

A. *Applicable Law*

A patent owner does not have a right to amend claims in an *inter partes* review, but instead must move for amendment. *See* 35 U.S.C. § 316(d). The Board will assess the patentability of proposed substitute claims “without placing the burden of persuasion on the patent owner.” *Aqua Prods., Inc. v. Matal*, 872 F.3d 1290, 1328 (Fed. Cir. 2017) (en banc); *see Bosch Automotive Service Solutions, LLC v. Matal*, 878 F.3d 1027 (Fed. Cir. 2017), *as amended and corrected on rehearing*; *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 at 3–4 (PTAB Feb. 25, 2019) (precedential). “[T]he petitioner bears the burden of proving that the proposed amended claims are unpatentable by a preponderance of the evidence,” *Bosch*, 878 F.3d at 1040, and we focus on “arguments and theories raised by the petitioner in its petition or opposition to the motion to amend,” *Nike, Inc. v. Adidas AG*, 955 F.3d 45, 51 (Fed. Cir. 2020).

Proposed substitute claims must meet the requirements of 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121. *Lectrosonics*, Paper 15 at 4–8. The statute and rules require a patent owner to demonstrate that: (1) the amendment proposes a reasonable number of substitute claims; (2) the proposed claims are supported in the original disclosure; (3) the amendment responds to a ground of unpatentability involved in the trial; and (4) the amendment does not seek to enlarge the scope of the claims of the patent or introduce new matter. *See* 35 U.S.C. § 316(d); 37 C.F.R. § 42.121.

B. Procedural Background

In the Institution Decision, we determined that Petitioner had shown a reasonable likelihood that it would prevail in proving that claims 1, 8, 11, 13, and 15 were obvious in view of Satoh and DeRoover. In particular, we concluded that “Petitioner ha[d] shown, sufficiently for institution, that it would have been obvious in view of Satoh and De Roover to create a multidimensional video database using a traversal index (as in Satoh) where that traversal index was a hash (to save space and increase speed, as taught in Feinleib) and also was robust (to match despite immaterial differences, as taught in De Roover).” Decision 16.

Patent Owner then filed a Motion to Amend in which it non-contingently requested to cancel claims 1, 8, 11, 13, and 15, and proposed substitute claim 28. *See* MTA 1. Proposed substitute claim 28 was based on and added a number of limitations to claim 1, including pivots, that the hashing involved use of a threshold, that the leaf node included the traversal index and multiple signatures associated with the video sequence, and use of the traversal index to access the database by comparing the query index to the pivots and then traversing the hierarchy. *See* MTA, App. A.

Petitioner opposed the Motion to Amend, and we issued Preliminary Guidance in which we tentatively concluded that proposed substitute claim 28 added new matter because we agreed with Petitioner that the disclosure describes “(a) an embodiment in which the hash is used to traverse a hierarchical tree structure and (b) an embodiment in which the hash is used as a direct address, but *not* (c) an embodiment in which the hash is used as both a means for traversing a tree and as a direct address.” PG 5.

Patent Owner then filed a Revised Motion to Amend, in which it again requested to cancel claims 1, 8, 11, 13, and 15, and revised proposed substitute claim 28 by removing from the claim “and wherein the traversal index is a direct address to the leaf node.” *See* RMTA, App. A, iii.

C. Proposed Substitute Claim

Proposed substitute claim 28 is reproduced below, with underlining showing the matter added to original claim 1, straight brackets showing the matter deleted from original claim 1, and curly brackets showing the matter deleted in the Revised MTA from the version of proposed substitute claim 28 presented in the Patent Owner’s original MTA:

28. A method of organization and access of a multi-dimensional video database using a robust hash of a multidimensional vector signature as a traversal index, the method comprising:

partitioning the multi-dimensional video database by a plurality of pivots, wherein each pivot of the plurality of pivots is a central point around which a respective cluster of the multi-dimensional video database is organized, and wherein a pivot of the plurality of pivots is coupled to a hierarchical arrangement of traversal nodes and leaf nodes;

generation of a robust hash value as a traversal index from multiple parameters extracted from a region of interest in a frame of a video sequence, wherein generating the robust hash value comprises

comparing at least one feature with a threshold value that is selected such that the robust hash value has some immunity to noise and disturbances due to distortion in a query video as compared to an original video; [and]

storing the traversal index, multiple signatures associated with the video sequence, and data associated with the video sequence at a leaf node addressed by the robust hash value, wherein the leaf node is a member of a plurality of leaf nodes in a multi-dimensional video database {and wherein the traversal index is a direct address to the leaf node}; and

using the traversal index to access the multi-dimensional video database by:

comparing an incoming query index against the plurality of pivots; and then traversing the hierarchical arrangement via a plurality of the traversal nodes to reach the leaf node, wherein the plurality of traversal nodes are constructed from differentiating parts of the traversal index.

RMTA, App. A.

D. Statutory and Procedural Requirements

1. Number of Substitute Claims

The number of substitute claims must be reasonable. *See* 35 U.S.C. § 316(d)(1)(B); 37 C.F.R. § 42.121(a)(3). Patent Owner presents one substitute claim corresponding to original claim 1, which is reasonable given that more than one claim was challenged. *See* 37 C.F.R. § 42.121(a)(3) (describing “[t]he presumption . . . that only one substitute claim would be needed to replace each challenged claim”).

2. Claim Scope

Substitute claims may not enlarge the scope of the issued claims. *See* 35 U.S.C. § 316(d)(3); 37 C.F.R. § 42.121(a)(2)(ii). Patent Owner contends that “proposed substitute independent Claim 28 retains all features of issued

Claim 1 and does not enlarge the scope.” RMTA 2. Petitioner does not argue otherwise, and we agree that proposed substitute claim 28 does not enlarge the scope of the issued claims, as it includes a number of additional features making it narrower than original claim 1.

3. *Responsiveness to a Ground of Unpatentability*

The amendment must “respond to a ground of unpatentability involved in the trial.” 37 C.F.R. § 42.121(a)(2)(i). Patent Owner contends that “[p]roposed substitute Claim 28 is responsive to one or more grounds of alleged unpatentability” because “limitations of the substitute claim are not obvious from the prior art cited in Petitioner’s Opposition To Patent Owner’s Motion to Amend.” RMTA 2. Petitioner does not argue that this requirement is not met, and we conclude that it is, because the added claim language is intended to distinguish over the prior art.

4. *New Matter*

A substitute claim may not introduce new subject matter, and the motion to amend must identify the support in the original disclosure for each substitute claim. *See* 35 U.S.C. § 316(d)(3); 37 C.F.R. § 42.121(a)(2)(ii); 37 C.F.R. § 42.121(b).

The written description requirement is met if the application as originally filed reasonably conveys to a person of ordinary skill in the art that the inventor had possession of the claimed subject matter at the time of filing. *See Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc); *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563 (Fed. Cir. 1991); *In re Kaslow*, 707 F.2d 1366, 1375 (Fed. Cir. 1983). “[I]t is the specification itself that must demonstrate possession” and “a description that

merely renders the invention obvious does not satisfy the requirement.”
Ariad, 598 F.3d at 1351–52.

a. 35 U.S.C. § 316(d)(3)

We first address Patent Owner’s argument that the issue of written description support “could not form a statutory basis for denying the [RMTA]” because “[t]he relevant statute limits such denials to situations where the proposed amendment itself introduces new matter.” RMTA Reply 3. Patent Owner points out that “[t]he term ‘addressed by’ is found in original Claim 1 as well as substitute Claim 28.” *Id.* at 4.

We do not agree with Patent Owner that we cannot consider whether there is support for language presented in proposed substitute claim 28 simply because those same words appeared in original claim 1. We do not read 35 U.S.C. § 316(d)(3) as limiting our inquiry to words that did not appear in the original claims. Section 316(d)(1) states that the patent owner may file “a motion to amend the patent” by “[c]ancel[ing] any challenged patent claim” or “propos[ing] a reasonable number of substitute claims.” Therefore, an “amendment” in this context is the cancelation or addition of a claim, not the differences in the words in the original and new claims. Proposed substitute claim 28—in its entirety—is an “amendment” of the ’030 patent that may not introduce new matter. *Cf. Uniloc 2017 LLC v. Hulu, LLC*, 966 F.3d 1295, 1304 (Fed. Cir. 2020) (“The plain language of the IPR Statutes demonstrates Congress’s intent for the PTAB to review proposed substitute claims for overall ‘patentability’ . . . of the claims.”); *see id.* at 1306 (applying the reasoning from *In re NTP*, 654 F.3d 1268, 1275 (Fed. Cir. 2011), to *inter partes* review proceedings and explaining that “[p]roposed substitute claims in an IPR proceeding have not undergone a

patentability review by the USPTO . . . and so the ‘substantial new questions of patentability’ that ‘have not previously been considered by the [US]PTO’ include[] all patentability questions”).

We also note that we determine whether there is new matter by comparing the proposed substitute claim to *the original disclosure*, not the issued claims. *See* 37 C.F.R. § 42.121(b). Patent Owner may not rely on issued claim 1 because it was not part of the original disclosure—the applicant added the “addressed by” language to original application claim 1 during prosecution. *See* Ex. 1002, 27.

*b. Simultaneously “Traversing” a Tree
and “Addressing” a Leaf Node*

Petitioner argues that “[w]hile Patent Owner changed the words of claim 28” in the RMTA by “removing the phrase ‘the traversal index is a direct address to the leaf node,’” Patent Owner’s “interpretation of the claim remains the same,” as “Patent Owner continues to read claim 28 as requiring the claimed ‘robust hash value’ ‘traversal index’ to be the ‘address’ of one particular database leaf node.” RMTA Opp. 1. This is a problem, according to Petitioner, because “the ’030 patent’s specification provides no written description support for a claim that simultaneously requires (1) the ‘traversal’ and searching of a multidimensional database to arrive at a leaf node and (2) an ‘address’ to a leaf node.” *Id.*; *see id.* at 3–4.

Petitioner also argues that “[t]he RMTA cites to nothing in the ’030 patent that provides written description support for a ‘robust hash’ that ‘is ... the logical address of the leaf node.’” RMTA Opp. 5. Petitioner observes that “Patent Owner no longer cites the ‘direct address’ passage as support

[for] this ‘addressed by’ limitation” and that “reference to that passage has completely disappeared from Patent Owner’s motion.” *Id.*

Patent Owner responds that proposed substitute “[c]laim 28 recites that the leaf node is ‘addressed by’ the hash, but uses the traversal index, not the address, to access the database (‘using the traversal index to access the multi-dimensional video database.’).” RMTA Reply 1–2. Patent Owner argues that “‘addressed by’ is a passive property that need not be used in operation of the claimed method and that this ‘addressed by’ property is supported.” *Id.* at 2.

Patent Owner then points to Figure 2A and the accompanying description in column 8 of the patent (corresponding to page 15 of the non-provisional application), which states that “the database of signatures of original videos is also indexed by the traversal indexes computed.” RTMA Reply 2 (citing Ex. 1001, 8:53–55; Ex. 1002, 15:5–11). Patent Owner contends that this “clearly provides written description support for the active traversal combined with a passive organizational feature of a database indexed by (or addressed by) the computed traversal indexes.” *Id.* (citing Ex. 2023 (Moulin) ¶ 53). Patent Owner cites its expert declaration for the opinion that “a POSITA would have understood the phrase ‘indexed by’ in this context to yield the same result as the ‘addressed by’ language of Claim 28, where leaf nodes ‘indexed by’ traversal indexes provide the property of having the hash as an index (or address).” *Id.* at 2–3.

Patent Owner also points to the Background section of the ’030 patent, which “identifies three problems with conventional large and complex database systems: (1) update time to update new entries into the database; (2) query performance; and (3) thoroughness of querying” and

argues that the subject matter of proposed substitute claim 28 “provid[es] a solution to all three of these problems.” RMTA Reply 3 (citing Ex. 2023 ¶¶ 56–62).

Petitioner responds that Patent Owner has “changed course” and “proposed a third construction” of “addressed by” as “‘simply a passive property of the leaf node’ that ‘need not be used in operation of the claimed method.’” RMTA Sur-Reply 2. Petitioner also argues that Patent Owner “cites an entirely new portion of the specification—four lines from column 8—as providing written description support for its newfound understanding of ‘addressed by.’” *Id.* Petitioner contends that “any interpretation of claim 28 that requires . . . the ‘traversal index’ to actually be an address—regardless of whether that address is used as part of the claimed method or a ‘passive’ feature—causes the claim to lack written description.” *Id.* at 1–2.

Petitioner further argues that the description in column 8 “does not describe a database indexed by a ‘robust hash value’ as claim 28 requires” and “does not mention an ‘address’ to one particular leaf node, or even leaf node ‘addressing’ in general,” but “instead . . . relates only to the use [of] the ‘traversal index’ to query or search the database to generate a list of ‘likely’ leaf node candidates.” RMTA Sur-Reply 4 (emphasis omitted). According to Petitioner, “it remains true that the *only* place the ’030 patent references the use of an ‘address’ is in column 5.” *Id.*

Having carefully considered the arguments, we agree with Petitioner that the RMTA does not identify adequate written description support for a claim that includes “a robust hash value as a traversal index” and “storing the traversal index . . . at a leaf node addressed by the robust hash value.”

As a preliminary matter, we find that Patent Owner did not identify in the RMTA the material at column 8 of the '030 patent and in the Background section, as our rules require, and that the RMTA Reply is too late to raise new evidence. *See* 37 C.F.R. § 42.121(b) (requiring that a motion to amend “set forth . . . [t]he support in the original disclosure of the patent for each claim that is added or amended”); 37 C.F.R. § 42.23(b) (“All arguments for the relief requested in a motion must be made in the motion.”); Consolidated Office Patent Trial Practice Guide (Nov. 2019) (“CTPG”) § II.I (identifying as “[e]xamples of indications that a new issue has been raised in a reply . . . new evidence necessary to make out a prima facie case for the patentability or unpatentability of an original or proposed substitute claim”). Even if we were to consider that material, however, we would find it insufficient.

The passage from column 8 of the patent and page 15 of the non-provisional reads as follows: “This traversal index is used to access the database efficiently. Also, the database of signatures of original videos is also indexed by the traversal indexes computed.” It does not say that the leaf nodes are “addressed by” traversal indices or have the traversal indices as their logical addresses.³ Instead, it says that the database is indexed by the traversal indexes. We do not agree with Patent Owner that *the database* being “indexed by the traversal indexes” provides sufficient support for *the leaf nodes* being “addressed by traversal index.”

³ For purposes of considering the proposed substitute claim, we will interpret “addressed by” as Patent Owner proposes: “whose logical address within the database is.” PO Resp. 31 (citing Ex. 2012 (Moulin) ¶¶ 89–93).

We have reviewed cited paragraph 53 of the Moulin MTA Declaration (Ex. 2023) and find it too conclusory to sufficiently correlate these different concepts. Dr. Moulin states that “a POSITA would understand ‘indexed by’ to . . . yield the same (or similar) functional end result as the ‘addressed by’ language . . . , such that a database indexed by computed traversal indexes would be understood to include leaf nodes indexed by (or addressed by) the computed traversal indexes.” Ex. 2023 ¶ 53. We find the testimony that one of skill in the art would find the “functional end result” to be “the same (or similar)” insufficient to show support for the specific limitation at issue. *See D Three Enterprises, LLC v. SunModo Corp.*, 890 F.3d 1042, 1050 (Fed. Cir. 2018) (“It is not sufficient for purposes of the written description requirement of § 112 that the disclosure, when combined with the knowledge in the art, would lead one to speculate as to [the] modifications that the inventor might have envisioned, but failed to disclose.”) (quoting *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997)). Moreover, the testimony fails to explain how or why “indexing” a database by traversal indices would require that the leaf nodes be “addressed by” the traversal indices. We thus cannot conclude that a skilled artisan would have understood the cited passage to mean that the inventors possessed the concept of leaf nodes being “addressed by” the traversal index at the time of filing.

We also find the testimony that “[a] video database that is indexed by computed traversal index values would be understood to be one in which the leaf nodes of the database have the property of being indexed by (or addressed) by the computed traversal indexes” (Ex. 2023 ¶ 55) unpersuasive

because it too is conclusory, and because it also lacks support for the opinion that “indexing” would *require* storage of the index in the leaf nodes.

Patent Owner’s argument about the Background section is also insufficient to show possession of leaf nodes that are “addressed by traversal index.” The fact that leaf nodes addressed by a traversal index could provide benefits that can be said to line up with what is described in the Specification is not sufficient to make up for the lack of a description of that feature. In order for this argument to carry logical weight, Patent Owner would need to show that the disclosure ties the benefits to the feature, or that there is no other way to achieve the stated benefits. Patent Owner has not done either.

For the foregoing reasons, we find that Patent Owner has not identified sufficient support for a claim that includes “a robust hash value as a traversal index” and “storing the traversal index . . . at a leaf node addressed by the robust hash value.”

c. “Storing the Traversal Index, Multiple Signatures Associated with the Video Sequence, and Data Associated with the Video Sequence at a Leaf Node Addressed by the Robust Hash Value”

Proposed substitute claim 28 recites “storing the traversal index, multiple signatures associated with the video sequence, and data associated with the video sequence at a leaf node addressed by the robust hash value.”

The RMTA cites various portions of the provisional and non-provisional applications as supporting the “storing” limitation, but does not specify exactly what in those disclosures might support “storing the traversal index . . . at a leaf node addressed by the robust hash value.” *See* RMTA

10–12. We identify in bold text below the specific passages of the non-provisional application that Patent Owner might be relying on:

Location in Ex. 1002	Identified Support (emphasis added)
8:12–14	“[A] hierarchical representation 100 of a multi-dimensional object or video database with traversal nodes constructed from differentiating parts of traversal indexes and leaf nodes storing associated data and associated indexes. ”
3:9–10	“In general, the architecture includes associated data and differentiating indexes at the leaf node. ”
3:15	“ Multiple associated data or signatures are stored at a leaf node. ”
4:21–23	“Fig. 1A illustrates a hierarchical representation of a multidimensional object or video database with traversal nodes constructed from differentiating parts of traversal indexes and the leaf nodes storing associated data and associated indexes. ”
8:16–17	“The video database is traversed via nodes 108 to reach the leaf nodes 110 storing associated data and associated indexes. ”
15:18–19	“At step 203, a similarity search computation is performed, which involves reading the leaf nodes for associated data. ”
16:11–12	“Additional computations can also be performed by using additional indexes or signatures such as texture, motion, and associated data such as location and size.”
20:3–5	“A given set of query indexes 301A derived from a query video sequence is received in step 301. In step 302, a database index is traversed for this set to access leaf nodes for associated data and associated indexes which are stored in step 303. ”

Patent Owner also identifies Figures 1A, 2A, and 3A of the non-provisional application (which have the same numbers in the issued patent),

all of which place the letters “AD,” which stand for “Associated Indexes and Information” in leaf nodes 110 or storage steps 203 and 303. *See* RMTA 10. Our review of the material cited in the provisional application does not identify any disclosures that are more pertinent.

Petitioner argues that “the ’030 patent does not disclose storing the specific ‘traversal index’ required by claim 28 in a multi-dimensional database’s leaf nodes.” RTMA Opp. 11. Petitioner argues that the patent’s “limited description” of “additional indexes” at the nodes suggests “they are substantive data used for making computations upon arrival at the leaf node,” and that nothing “suggests that they are used for finding the node, much less as a ‘logical address’ of the node.” *Id.* at 12–13.

Patent Owner argues in the RMTA Reply that “[t]he ’030 Abstract states ‘[t]raversal indexes are stored in leaf nodes’” and that “[t]he specification is replete with examples of storing indexes at leaf nodes, which are described as ‘differentiating indexes’ and ‘associated indexes’ among other things.” RMTA Reply 6 (citing Ex. 1002, 8:12–24, 20:4–5, 3:9–10). Citing Dr. Moulin, Patent Owner argues that “[a] POSITA would recognize the connection of a given traversal index with a corresponding leaf node and readily understand that ‘associated’ and ‘differentiating’ describe the traversal index corresponding to a leaf node.” *Id.* at 7 (citing Ex. 2023 ¶¶ 77–79).

We find the material cited in the RMTA insufficient to support “storing the traversal index . . . at a leaf node addressed by the robust hash value.” The cited passages refer to storing “associated data and associated indexes,” “associated data and differentiating indexes,” or “[m]ultiple associated data or signatures” at the leaf nodes. None of these describe

storing traversal indices in the leaf nodes, and Patent Owner does not identify support in the disclosure that equates the “associated” or “differentiating” indices with the traversal index.

Dr. Moulin testifies that a “POSITA would understand that the traversal index a leaf node is addressed by would be most closely ‘associated’ with that leaf node because the leaf node is addressed by the traversal index” and that “a POSITA would recognize that a differentiating index would be one that differentiates a leaf node from other leaf nodes.” Ex. 2023 ¶ 78. We are not persuaded. The first contention is circular and conclusory, lacking a reasoned explanation of *why* the person of skill in the art would have such an understanding. The second is insufficient to show that “associated indices” *must* include the traversal indices because it does not rule out other the possibility that other types of indices might also differentiate the leaf nodes.

Finally, though it is true that the Abstract says “[t]raversal indexes are stored in leaf nodes,” we find this evidence and the related argument also untimely, coming as they did in the RMTA Reply. *See* 37 C.F.R. § 42.121(b); 37 C.F.R. § 42.23(b); CTPG § II.I. We also find this sentence too vague to indicate to a person of ordinary skill in the art that the inventors were in possession of the concept of storing traversal indices in the leaf nodes as “addresses” in an embodiment that searches using the traversal method, as recited in proposed substitute claim 28.

5. *Conclusion*

Because we find that the proposed substitute claim would add new matter, we deny Patent Owner’s request in the RMTA to substitute claim 28 for claim 1 for failure to meet the requirements of 35 U.S.C. § 316(d) and

37 C.F.R. § 42.121. We do not reach the issues of “pivots,” indefiniteness, or whether proposed substitute claim 28 would have been obvious.

VI. CONSTITUTIONALITY

Patent Owner argues that “[t]his IPR should be dismissed as unconstitutional under *Arthrex, Inc. v. Smith and Nephew, Inc.*, 941 F.3d 1320 (Fed. Cir. 2019) and *Tumey v. Ohio*, 273 U.S. 510, 523 (1927).” PO Resp. 75.

We decline to dismiss this case on the grounds that we were unconstitutionally appointed because our reviewing Court has addressed this issue, severed the statute, and held that the severance “cures the constitutional violation.” *Arthrex*, 941 F.3d at 1337 (Fed. Cir. 2019); *see also Arthrex, Inc. v. Smith & Nephew, Inc.*, 953 F.3d 760, 764 (Fed. Cir. 2020) (Moore, J., concurring in denial of rehearing) (“Because the APJs were constitutionally appointed as of the implementation of the severance, *inter partes* review decisions going forward were no longer rendered by unconstitutional panels.”).

We also decline to dismiss this case under *Tumey*, at least because Patent Owner has presented no evidence or argument that any member of this panel “has a direct, personal, substantial, pecuniary interest in reaching a conclusion against [Patent Owner] in his case,” nor are we aware of any such evidence. *Tumey*, 273 U.S. at 523.

VII. CONCLUSION

Claims 6 and 10 of the '030 patent have not been shown to be unpatentable. The RMTA is granted as to Patent Owner's request to cancel claims 1, 8, 11, 13, and 15, and denied as to proposed substitute claim 28.

The results are summarized below.

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
6, 10	103	Deng, Brunk		6, 10
Overall Outcome				6, 10

Motion to Amend Outcome	Claim(s)
Original Claims Cancelled by Amendment	1, 8, 11, 13, 15
Substitute Claims Proposed in the Amendment	28
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	28
Substitute Claims: Not Reached	

VIII. ORDER

For the reasons given, it is:

ORDERED that claims 6 and 10 of U.S. Patent 8,171,030 B2 have not been shown to be unpatentable;

FURTHER ORDERED that Patent Owner's Revised Motion to Amend is granted as to Patent Owner's request to cancel claims 1, 8, 11, 13, and 15 of U.S. Patent 8,171,030 B2 and denied as to proposed substitute claim 28; and

FURTHER ORDERED that, because this is a Final Written Decision, the parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.⁴

⁴ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

IPR2020-00219
Patent 8,171,030 B2

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