

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner,

v.

AUTONOMOUS DEVICES, LLC,
Patent Owner.

IPR2023-01055
Patent 11,238,344 B1

Before BARBARA A. PARVIS, ROBERT J. WEINSCHENK, and
RUSSELL E. CASS, *Administrative Patent Judges*.

PARVIS, *Administrative Patent Judge*.

JUDGMENT

Final Written Decision on Director Remand
Determining Only Remanded Challenged Claim Unpatentable
Denying Patent Owner's Motion to Amend as to Proposed
Substitute Claims 21–29
35 U.S.C. § 318(a)

I. INTRODUCTION

We instituted an *inter partes* review of claims 3–18 of U.S. Patent No. 11,238,344 B1 (Ex. 1001, “the ‘344 patent”) owned by Autonomous Devices, LLC (“Patent Owner”). Paper 20 (“Institution Decision” or “Inst.

Dec.”). Following institution of the trial, Patent Owner filed a Motion to Amend claims contingent upon a finding of unpatentability. Paper 28 (“Motion to Amend” or “MTA”) 1. Patent Owner’s Motion to Amend requests “[i]n the event the Board finds any of original claims 6, 7, 10, 11, 12, or 16 unpatentable . . . the Board grant this motion to amend and issue the corresponding substitute claims [among 23, 24, 26, 27, 28, and 29].” MTA 1. The Motion to Amend also submits that “[c]laims 4, 5, and 9 are hereby cancelled” and requests that “the Board issue claims 21, 22, and 25 as substitutes for claims 4, 5, and 9, respectively,” noting that “[Patent Owner] does not condition its request regarding claims 21, 22, and 25 on any condition.” *Id.* at 1 n. 1, 24.

On December 12, 2024, we entered a Final Written Decision (Paper 47, “2024 Final Written Decision” or “2024 Final Dec.”) determining that “Tesla, Inc. (“Petitioner”) has proved by a preponderance of the evidence that claims 3, 6–8, and 10–18 of the ’344 patent are unpatentable.” Final Dec. 2, 113–115. We also (1) granted Patent Owner’s request to cancel claims 4, 5, and 9 in Patent Owner’s Motion to Amend; and (2) determined that Petitioner has shown by a preponderance of the evidence that the proposed substitute claims are unpatentable. *Id.* We, therefore, denied Patent Owner’s request in its Motion to Amend to issue substitute claims 21–29. *Id.*

Patent Owner filed a Request for Director Review requesting that the Director reverse our unpatentability determination for claim 12 and grant Patent Owner’s Motion to Amend as to the substitute claims other than claim 28. Paper 48 (“Director Review Request” or “DR Req.”). The Acting Under Secretary of Commerce for Intellectual Property and Director of the United States Patent and Trademark Office issued a Decision granting

Director Review and remanding for further proceedings. Paper 49 (“Acting Director’s Decision” or “DR Dec.”). That Decision states agreement “that the Board’s analysis of claim 12 did not make separate factual findings.” DR Dec. 2. The Decision instructs us on remand “to consider Patent Owner’s arguments as to claim 12 and as to proposed substitute claim 21” and “[r]egardless of the Board’s disposition on remand, the Board should explain more fully its findings as to claim 12 and proposed substitute claim 21.” *Id.*

Our 2024 Final Written Decision provided the same reasoning for all proposed substitute claims 21–29. In particular, we stated that proposed substitute claims 22–29 “recite the same features discussed with respect to proposed substitute claim 21” and we decided that Petitioner had proven by a preponderance of the evidence that the remaining proposed substitute claims would have been obvious for the same reasons given with respect to claim 21. 2024 Final Dec. 112–113. In its Request for Director Review, Patent Owner does not dispute our determination that proposed substitute claims 22–29 recite the same features discussed with respect to proposed substitute claim 21. *See generally* DR Req. Instead, consistent with the reasoning given for proposed substitute claims 22–29 in our 2024 Final Written Decision, Patent Owner’s arguments in its Request for Director Review pertain to only claim 21. *Id.* Patent Owner concludes by requesting that the Director grant its “Motion to Amend as to all the substitute claims (except potentially claim 28, whose entry is contingent on unpatentability of claim 12).” *Id.* at 11. Upon consideration of the full record including the arguments in Patent Owner’s Request for Director Review, we maintain our determination that proposed substitute claims 22–29 “recite the same features discussed with respect to proposed substitute claim 21” and we

comply with the instructions in the Acting Director's Decision with respect to claim 21. 2024 Final Dec. 112.

In our 2024 Final Written Decision, we also determined that Petitioner had proved by a preponderance of the evidence that claims 3, 6–8, 10, 11, and 13–18 of the '344 patent are unpatentable. 2024 Final Dec. 2, 113–114. That determination is not vacated by the Acting Director's Decision. *See generally* DR Dec. We also granted Patent Owner's request to cancel claims 4, 5, and 9 in Patent Owner's Motion to Amend. 2024 Final Dec. 2, 113–114. Our determination in that regard also is not vacated by the Acting Director's Decision. *See generally* DR Dec.

With respect to claim 12 and the proposed substitute claims, we have jurisdiction under 35 U.S.C. § 6 and pursuant to the Acting Director's Decision. This decision is a Final Written Decision issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons we discuss below, we determine that Petitioner has proved by a preponderance of the evidence that claim 12 is unpatentable. We also determine that Petitioner has shown by a preponderance of the evidence that the proposed substitute claims are unpatentable and, therefore, deny Patent Owner's request in its Motion to Amend to issue proposed substitute claims 21–29.

A. Procedural History Prior to the 2024 Final Written Decision

Petitioner filed a Petition (Paper 1 ("Pet.)) requesting *inter partes* review of claims 1–20 of the '344 patent. Patent Owner filed a Preliminary Response (Paper 11 ("Prelim. Resp.)) stating that it had disclaimed claims 1, 2, 19, and 20 of the '344 patent. *Id.* at 1 (citing Ex. 2004; 37 C.F.R. § 42.107(e)). We determined that the Petition established a reasonable likelihood that Petitioner would prevail with respect to at least one claim.

Inst. Dec. 35–36. In light of the disclaimer, we instituted as to only claims 3–18 (“challenged claims”) of the ’344 patent in this proceeding.¹

Thereafter, Patent Owner filed a Response. (Paper 26, “PO Resp.”), Petitioner filed a Reply (Paper 30, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 33, “PO Sur-reply”). Patent Owner also filed a Motion to Amend claims contingent upon a finding of unpatentability. MTA 1. In its Motion to Amend, Patent Owner requested Preliminary Guidance. *Id.* Petitioner filed an Opposition to Patent Owner’s Motion to Amend. Paper 31 (“Opp. MTA”). We provided Preliminary Guidance. Paper 32 (“PG”). Patent Owner filed a Reply in support of its Motion to Amend. Paper 34 (“Reply MTA”). Petitioner filed a Sur-reply to Patent Owner’s Motion to Amend. Paper 38 (“Sur-reply MTA”). A hearing was held September 18, 2024. A transcript of the hearing is part of the record. Paper 46 (“Hearing Tr.”).² After the hearing, Patent Owner was authorized to file (and filed) a Sur-sur-reply (Paper 44, “Sur-sur-reply”). Patent Owner did not oppose Petitioner’s filing of a responsive paper and Petitioner was authorized to file (and filed) a Sur-sur-sur-reply (Paper 45).

B. Real Parties-in-Interest

Petitioner identifies itself as the real party-in-interest. Pet. 1. Patent Owner names itself as the real party-in-interest. Paper 4, 1.

¹ With authorization, Petitioner filed a Preliminary Reply (Paper 12 (“Prelim. Reply”)), and Patent Owner filed a Preliminary Sur-reply. Paper 13 (“Prelim. Sur-reply”).

² On September 18, 2024, a hearing also was conducted in IPR2023-01054 involving challenges to a related patent. To streamline the hearing in the instant proceeding, the transcript of the hearing in IPR2023-01054 also is entered into the record of the instant proceeding. Paper 46.

C. Related Matters

The parties inform us that the '344 patent was asserted in *Autonomous Devices LLC v. Tesla, Inc.*, No. 22-cv-1466 (MN) (D. Del.) (“parallel district court proceeding”). Pet. 1; Paper 4, 1. The parties also identify a concurrently filed petition challenging a patent related to the '344 patent in IPR2023-01054 (challenging U.S. Patent No. 10,452,974). Pet. 1; Paper 4, 1.

D. The '344 Patent

The '344 patent is titled “Artificially Intelligent Systems, Devices, and Methods for Learning and/or Using a Device’s Circumstances for Autonomous Device Operation.” Ex. 1001, code (54). The '344 patent describes “devices, apparatuses, systems, and related methods for providing advanced learning, anticipating, decision making, automation, and/or other functionalities.” *Id.* at 1:21–26. The '344 patent describes artificially intelligent devices, systems, and methods

that enable learning a device’s circumstances including objects with various properties along with correlated instruction sets for operating the device, storing this knowledge in a knowledgebase (i.e. neural network, graph, sequences, etc.), and operating a device autonomously.

Id. at 57:58–66.

Figure 2 of '344 patent is depicted below.

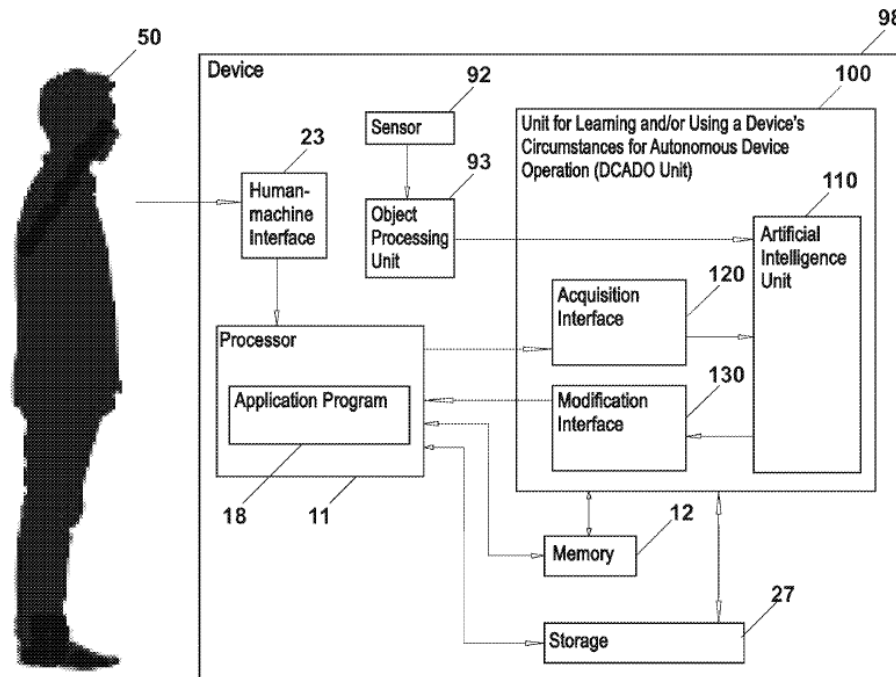


FIG. 2

Figure 2 illustrates an embodiment of device 98 comprising “Unit for Learning and/or Using a Device’s Circumstances for Autonomous Device Operation” (DCADO Unit) 100, processor 11, human-machine interface 23, sensor 92, object processing unit 93, memory 12, and storage 27. *Id.* at 66:65–67:4.

Processor 11 is configured to execute instruction sets for operating the device. *Id.* at 67:14–17. User 50 issues an operation direction to application program 18 responsive to which application program’s 18 instructions or instruction sets are executed by processor 11 to perform a desired operation on device 98. *Id.* at 68:34–37.

Sensor 92 “comprises the functionality for obtaining or detecting information about [the sensor’s] environment” and “can be used to detect objects and/or their properties” near device 98. *Id.* at 69:11–16. Object processing unit 93 “comprises the functionality for processing output from

[s]ensor 92” and can be used “to detect objects and/or their properties.” *Id.* at 71:45–49.

DCADO Unit 100 comprises artificial intelligence unit 110, acquisition interface 120, and modification interface 130. *Id.* at 67:5–7. Artificial intelligence unit 110 is “configured to receive a first collection of object representations” that include “one or more representations of objects detected by the sensor.” *Id.* at 67:21–27.

Artificial intelligence unit 110 comprises functionality for learning device’s 98 operation. *Id.* at 96:34–35. Figure 32 of the ’344 patent is depicted below.

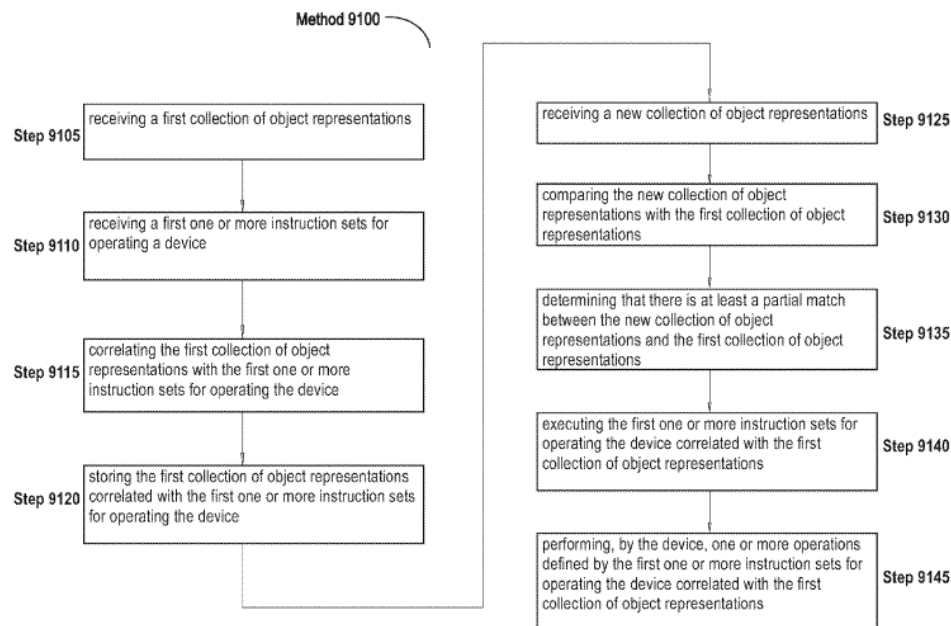


FIG. 32

Figure 32 is an illustration showing an embodiment of method 9100 “for learning and/or using a device’s circumstances for autonomous device operation.” *Id.* at 150:18–20.

At step 9105 of Figure 32, “a first collection of object representations is received.” *Id.* at 150:32–33. “An object representation may include an

electronic representation of an object (i.e., Object 615, etc.) detected in a device's surrounding." *Id.* at 150:37–39. At step 9110, "a first one or more instruction sets for operating a device are received." *Id.* at 152:4–5. At step 9115, "the first collection of object representations is correlated with the first one or more instruction sets for operating the device." *Id.* at 153:26–28. At steps 9125 and 9130, a new collection of object representations is received and "compared with the first collection of object representations." *Id.* at 154:50–55. At step 9135, "a determination is made that there is at least a partial match between" the two collections. *Id.* at 155:39–41. At step 9140, the "first one or more instruction sets for operating the device correlated with the first collection of object representations are executed." *Id.* at 157:11–13.

E. Challenged Claim on Remand

We address Petitioner's challenge to claim 12 in this Decision. Claim 12 depends from claim 3, which depends from disclaimed claim 1. Ex. 1001, 170:11–172:26. Claims 1, 3, and 12 are reproduced below.

1. [1.1³] A system comprising:
 - [1.2] one or more processors configured to perform at least:
 - [1.3] accessing a memory that stores at least a knowledgebase that includes a first circumstance representation correlated with a first one or more instruction sets for operating a first device, wherein the first circumstance representation represents a first circumstance detected at least in part by one or more sensors of the first device, [1.4] and wherein at least a portion of the first circumstance representation or at least a portion of the first one or more instruction sets for operating the first device is learned in a learning

³ Herein we use Petitioner's designations for the elements of the claims. *See* Pet. 11–25, 63–65.

process that includes operating the first device at least partially by a user;

- [1.5] generating or receiving a second circumstance representation, wherein the second circumstance representation represents a second circumstance detected at least in part by: the one or more sensors of the first device, or one or more sensors of a second device;
- [1.6] anticipating the first one or more instruction sets for operating the first device based on at least partial match between the second circumstance representation and the first circumstance representation; and
- [1.7] at least in response to the anticipating, executing the first one or more instruction sets for operating the first device, wherein the first device or the second device autonomously performs one or more operations defined by the first one or more instruction sets for operating the first device.

Ex. 1001, 169:46–170:6.

3. The system of claim 1, wherein the first circumstance representation includes a first one or more object representations, and wherein the second circumstance representation includes a second one or more object representations.

Id. at 170:11–14.

12. [12.1] The system of claim 3, wherein the knowledgebase further includes a third circumstance representation correlated with a second one or more instruction sets for operating a third device, and wherein the third circumstance representation represents a third circumstance detected at least in part by one or more sensors of the third device, and wherein one or more processors are further configured to perform at least:

- [12.2] generating or receiving a fourth circumstance representation, wherein the fourth circumstance representation represents a fourth circumstance detected at least in part by one or more sensors of a fourth device;

anticipating the second one or more instruction sets for operating the third device based on at least partial match between the

fourth circumstance representation and the third circumstance representation; and

at least in response to the anticipating the second one or more instruction sets for operating the third device, executing the second one or more instruction sets for operating the third device, wherein the fourth device autonomously performs one or more operations defined by the second one or more instruction sets for operating the third device.

Id. at 172:3–26.

F. Evidence

Petitioner relies on the references summarized in the table below.

Name	Reference	Exhibit
Grotmol	US 9,604,359 B1, filed Jan. 27, 2015, issued Mar. 28, 2017	1004
Hickman	US 8,639,644 B1, filed May 4, 2012, issued Jan. 28, 2014	1005

Petitioner also relies on the Declaration of Jason Janet, Ph.D. (Ex. 1002) and the Second Declaration of Dr. Jason Janet (Ex. 1010) to support its contentions that challenged claim 12 is unpatentable and that Patent Owner's Motion to Amend should be denied. Patent Owner relies on the Declaration of Eli Saber, Ph.D. (Ex. 2007) to support its contentions that Petitioner has not shown that challenged claim 12 unpatentable.

G. Asserted Ground

Petitioner asserts that challenged claim 12 of the '344 patent is unpatentable based on the following ground summarized in the table below (Pet. 4):

Claim Challenged	35 U.S.C. §	Reference(s)/Basis
12	103	Grotmol, Hickman

The Leahy-Smith America Invents Act, Pub. L. No. 112–29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. § 103. Based on the complete record now before us (Ex. 1001, codes (22), (63)), we determine that the ’344 patent has an effective filing date after the effective date of the applicable AIA amendments. We, therefore, refer to the AIA version of 35 U.S.C. § 103. Our analysis would not change under the pre-AIA version of § 103.

II. ANALYSIS—CHALLENGED CLAIMS

A. *Legal Standards*

To prevail in its challenge to Patent Owner’s claims, Petitioner must demonstrate that the claims are unpatentable, and that burden never shifts to the patentee. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). Petitioner must prove unpatentability by a preponderance of the evidence. *See* 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d).

A claim is unpatentable as obvious if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. 35 U.S.C. § 103 (2011). 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) when in evidence, objective evidence of nonobviousness, i.e., secondary considerations.⁴ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

⁴ Patent Owner does not present objective evidence of nonobviousness.

B. Level of Ordinary Skill in the Art

Petitioner asserts a person of ordinary skill in the art, would have [had] at least: (1) a bachelor’s degree in electrical engineering, computer engineering, computer science, systems engineering, or equivalent course work with two to three years of work experience in computer vision, image/video processing, and/or machine learning; or (2) a master’s degree in electrical engineering, computer engineering, computer science, systems engineering, or equivalent course work with a focus in computer vision, image/video processing, and/or machine learning.

Pet. 4 (citing Ex. 1002 ¶¶ 40–42). Patent Owner adopts Petitioner’s proposal. *See* PO Resp. 3.

Patent Owner does not dispute our determination in the 2024 Final Written Decision regarding the level of ordinary skill in the art. *See generally* DR Req. Upon consideration of the full record including the arguments in Patent Owner’s Request for Director Review, we maintain that determination here. More specifically, considering the subject matter of the ’344 patent, the background technical field, and the asserted prior art, we agree with Petitioner’s proposed qualifications for an ordinary level of skill, except we decline to adopt “at least” as that language is vague and open-ended. *See* 2024 Final Dec. 10–11. Accordingly, with that exception, we adopt Petitioner’s assessment of the level of skill for one of ordinary skill in the art.

C. Claim Construction

We construe challenged claim 12 by applying the standard used in federal courts, in other words, “the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b),” which is articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). 37 C.F.R. § 42.100(b) (2020). Under this

standard, the words of a claim generally are given their “ordinary and customary meaning,” which is the meaning the term would have to a person of ordinary skill at the time of the invention, in the context of the entire patent including the specification. *Phillips*, 415 F.3d at 1312– 3.

Claim 12 depends from claim 3, which recites “object representations.” Ex. 1001, 170:11–14. In our 2024 Final Written Decision, we stated the following:

In its preliminary response, Patent Owner provided a proposed construction for “object representation,” which we discussed at the institution stage. Specifically, Patent Owner asserted the term “object representation” should be construed as “a ‘data structure that includes an object property generated by object processing.’” Prelim. Resp. 10. We maintain our analysis as explained further below.

2024 Final Dec. 12.

Patent Owner does not dispute our analysis regarding the construction for “object representation.” *See generally* DR Req. We do not provide further or modified analysis regarding that term herein.

Petitioner states that it “applies the ordinary and customary meaning of the claim terms” and “explains the meaning of claim terms” in its element-by-element analysis where appropriate. Pet. 4. Here, we give the terms of claim 12 their ordinary and customary meaning and do not provide an express construction of any term. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. Unpatentability of Claim 12 as Obvious over Grotmol and Hickman

Petitioner asserts that claim 12 would have been obvious over Grotmol and Hickman. Pet. 4, 63–65. We begin with overviews of Grotmol and Hickman. We then turn to the parties’ contentions.

1. Grotmol (Ex. 1004)

Grotmol is titled “Apparatus and Methods for Training Path Navigation by Robots.” Ex. 1004, (code 54). Grotmol describes an apparatus and methods for training and operating a robotic device to follow a trajectory. *Id.* at code (57).

More specifically, Grotmol describes exemplary mobile robotic apparatus 160, shown in Figure 1 below. *Id.* at 8:57–61.

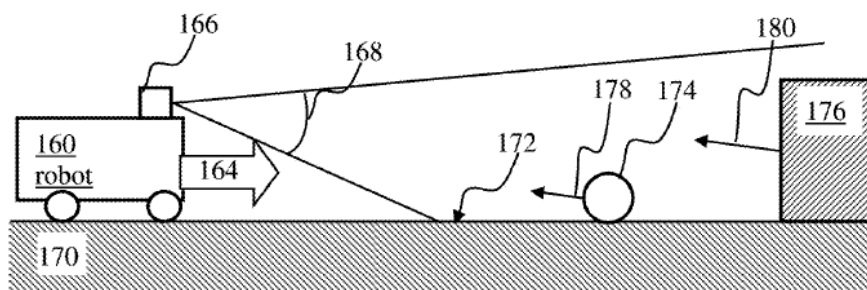


FIG. 1

Figure 1 depicts mobile robotic apparatus 160 that contains sensor component 166. *Id.* at 8:57–61. Sensor component 166 provides “information associated with objects within the field-of-view 168.” *Id.* at 8:64–66. Grotmol’s sensor 166 comprises “a camera configured to provide an output comprising a plurality of digital image frames.” *Id.* at 10:16–20. A user “may train the system to switch between tasks based on the sensory context.” *Id.* at 10:45–47.

Grotmol further describes a “mechanism for enabling a robot to learn navigating a target trajectory while reducing deviation from a target path.” *Id.* at 38:33–35. The robot comprises robotic vehicle 160, camera 166, and “a controller configured to store a sequence of images obtained during training phase.” *Id.* at 38:36–39. Figure 20A from Grotmol is shown below.

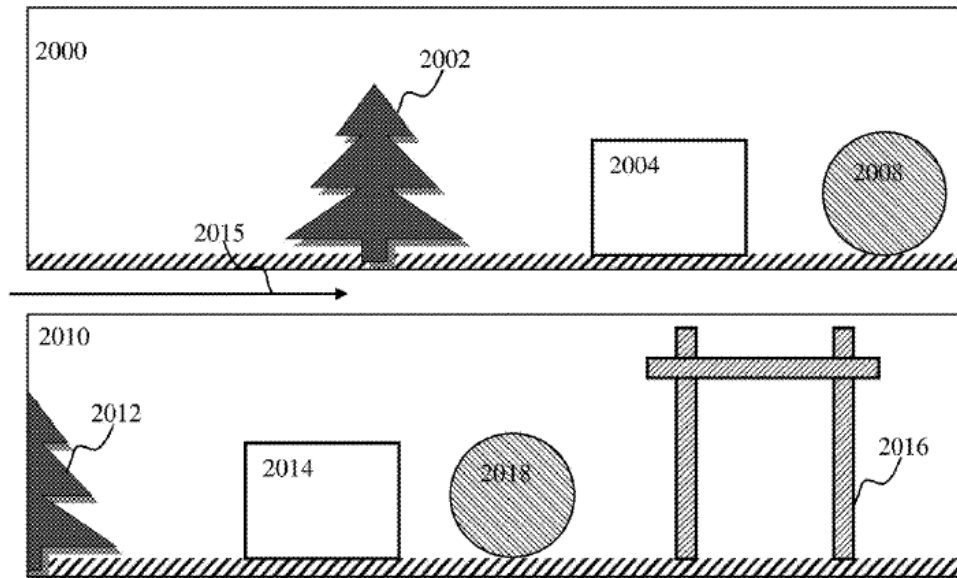


FIG. 20A

Figure 20A illustrates images 2000, 2010 obtained with a camera 166 mounted on a robotic vehicle 160. *Id.* at 38:43–54. Grotmol explains that image 2000 comprises “representations [of] one or more objects, e.g., a tree 2002, a rectangle, a ball 2008, and/or other objects.” *Id.* at 38:56–58. Grotmol further explains that image 2010 is obtained after execution of a turn and representations of objects are shifted “relative [to] representations of the same objects in the frame obtained prior to the turn execution.” *Id.* at 38:60–65.

During autonomous operation, the control process of the robot is configured to compare a current or recent image with the one or more images from the training buffer. *Id.* at 39:23–28. “Motor commands issued

by a trainer corresponding to time instances when the images are acquired” also are stored. *Id.* at 39:17–19. Grotmol describes motor commands are obtained “by taking the stored motor commands from the training buffer” that correspond to “the best matching stored image.” *Id.* at 43:5–9.

2. *Hickman (Ex. 1005)*

Hickman is titled “Shared Robot Knowledge Base for Use with Cloud Computing System.” Ex. 1005, code (54). Hickman describes the following:

The advantages of a shared robot knowledge base 306 multiply as robots are deployed around the world. If information about a particular object is “public” and therefore accessible by all robots, then information that a single robot learns about that object and uploads to the shared robot knowledge base 306 may be accessible by other robots all around the world. In operation, many millions or even many billions of robots may ultimately access the shared robot knowledge base 306. As a result, the shared robot knowledge base 306 enables robots to benefit from the collective information learned by many other robots.

Ex. 1005, 11:31–41.

3. *Claim 12*

a) *Overview*

Patent Owner argues that our 2024 Final Written Decision “fails to address multiple limitations of claim 12 that are in dispute” and Patent Owner identifies limitations designated by Petitioner as element 12.2. DR Req. 3. As background, claim 12 depends, indirectly, from independent claim 1. Independent claim 1 is directed to a system with one or more processors for accessing a knowledgebase and performing the “generating or receiving,” “anticipating,” and “executing” recitations in elements 1.5 through 1.7 for autonomous operation of a robotic device. Claim 12 adds to independent claim 1 similar “generating or receiving,” “anticipating,” and

“executing” recitations for autonomous operation of a “third” and “fourth” robotic device.

This further recitation, designated by Petitioner as element 12.2, is the subject of Patent Owner’s Request for Director Review (DR Req. 1, 3–5) and is reproduced in full below.

[12.2] generating or receiving a fourth circumstance representation, wherein the fourth circumstance representation represents a fourth circumstance detected at least in part by one or more sensors of a fourth device;

anticipating the second one or more instruction sets for operating the third device based on at least partial match between the fourth circumstance representation and the third circumstance representation; and

at least in response to the anticipating the second one or more instruction sets for operating the third device, executing the second one or more instruction sets for operating the third device, wherein the fourth device autonomously performs one or more operations defined by the second one or more instruction sets for operating the third device.

Ex. 1001, 172:12–26.

To show that the recitations in element 12.2 above are the same as those in claim 1, except as noted, below is a side-by-side comparison of the recitations in element 12.2 and the corresponding recitations in claim 1.

Claim 12	Disclaimed Claim 1 or Claim 11
The “generating” sub-element in element 12.2 recites “generating or receiving a <i>fourth</i> circumstance representation, wherein the <i>fourth</i> circumstance representation represents a <i>fourth</i> circumstance detected at least in part by one or more sensors of a <i>fourth</i> device.” Ex. 1001, 172:12–15 (emphases	The “generating” sub-element in element 12.2 is similar to element 1.5, which recites “generating or receiving a <i>second</i> circumstance representation, wherein the <i>second</i> circumstance representation represents a <i>second</i> circumstance detected at least in part by: the one or more sensors of the first device,

added to show differences between element 12.2 and element 1.5).	or one <i>or more sensors of a second device</i> .” Ex. 1001, 169:59–63 (emphases added to show differences between element 12.2 and element 1.5).
The “anticipating” sub-element in element 12.2 recites “anticipating the <i>second</i> one or more instruction sets for operating the <i>third</i> device based on at least partial match between the <i>fourth</i> circumstance representation and the <i>third</i> circumstance representation.” Ex. 1001, 172:16–19 (emphases added to show differences between element 12.2 and element 1.6).	The “anticipating” sub-element in element 12.2 is similar to element 1.6, which recites “anticipating the <i>first</i> one or more instruction sets for operating the <i>first</i> device based on at least partial match between the <i>second</i> circumstance representation and the <i>first</i> circumstance representation.” Ex. 1001, 169:64–67 (emphases added to show differences between element 12.2 and element 1.6).
The “executing” sub-element in element 12.2 recites “at least in response to the anticipating the <i>second one or more instruction sets for operating the third device</i> , executing the <i>second</i> one or more instruction sets for operating the <i>third</i> device, wherein the <i>fourth</i> device autonomously performs one or more operations defined by the <i>second</i> one or more instruction sets for operating the <i>third</i> device.” Ex. 1001, 172:20–26 (emphases added to show differences between element 12.2 and element 1.7).	The “executing” sub-element in element 12.2 is similar to element 1.7, which recites “at least in response to the anticipating, executing the <i>first</i> one or more instruction sets for operating the <i>first</i> device, wherein the <i>first</i> device or the <i>second</i> device autonomously performs one or more operations defined by the <i>first</i> one or more instruction sets for operating the <i>first</i> device.” Ex. 1001, 170:1–6 (emphases added to show differences between element 12.2 and element 1.7).

In its Preliminary Response, Patent Owner stated that it disclaimed independent claim 1 of the ’344 patent. Prelim. Resp. 1 (citing Ex. 2004; 37 C.F.R. § 42.107(e)). Nonetheless, because other challenged claims depend from claim 1, we provided a full element-by-element analysis of disclaimed

claim 1 in our Institution Decision. Inst. Dec. 24–28. We stated “Patent Owner is cautioned that any arguments not raised in the response may be deemed waived.” Paper 21, 9. Patent Owner did not dispute Petitioner’s contentions for claim 1 in its Patent Owner Response. *See generally* PO Resp. Claim 12 depends from claim 3, which depends from claim 1 and, therefore includes all recitations in claim 1. Although claim 3 was not the subject of Patent Owner’s disclaimer (Prelim. Resp. 1; Ex. 2004), Patent Owner also did not dispute Petitioner’s element-by-element analysis for claim 3. *See generally* PO Resp.; PO Sur-reply. Patent Owner has not disputed Petitioner’s element-by-element analysis for either claim 1 or claim 3 at any time during this proceeding.

With respect to claim 12, Patent Owner’s arguments are best understood to not pertain to features that are the same as the features recited in claims 1 and 3 based on bold and italics emphases provide in the Patent Owner Response and Sur-reply. PO Resp. 52–59; PO Sur-reply 24–25. In its Request for Director Review, after its statement that our 2024 Final Written Decision “fails to address multiple limitations of claim 12 that are in dispute,” Patent Owner reproduces the recitations in element 12.2 without the same bold and italics. DR. Req. 3.

In an overabundance of caution, therefore, although claims 1 and 3 are not the subject of this remand and we do not revisit our findings and determinations regarding those claims, we begin our additional explanation regarding element 12.2 by providing additional explanation relating to Grotmol’s disclosures of the features that are identically recited in claims 1 and 12.2. For those features, Petitioner relies on Grotmol’s autonomous

robotic system, which is described with respect to exemplary mobile robotic apparatus 160, shown in Figure 1 below. Ex. 1004, 8:57–61.

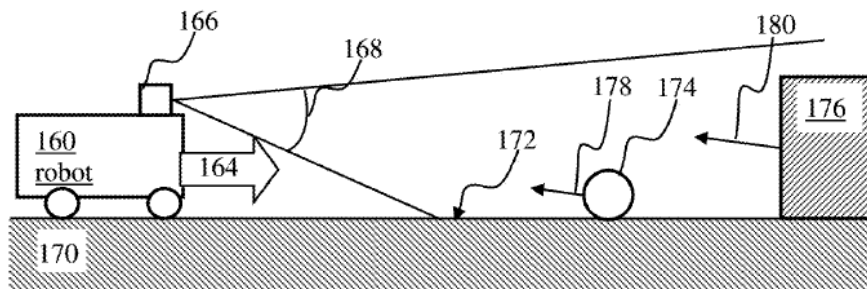


FIG. 1

Figure 1 depicts mobile robotic apparatus 160 that contains sensor component 166, which provides “information associated with *objects* within the field-of-view 168.” *Id.* at 8:57–66 (emphasis added). Petitioner argues that “an image” or “an image of a scene” in Grotmol corresponds to a “circumstance representation” recited in the claims of the ’344 patent. Pet. 13, 17–18, 24–25, 64–65 (citing, e.g., Ex. 1004, code (57), 8:57–9:13, 10:23–26, 38:36–39, 39:14–41).

The “generating,” “anticipating,” and “executing” sub-elements of element 12.2 are disclosed by Grotmol in connection with its disclosures relating to mobile robotic apparatus 160. For instance, the “generating,” “anticipating,” and “executing” features are disclosed by Grotmol’s description of its mobile robotic apparatus 160 receiving “additional digital pictures from the camera over time,” determining a “similarity metric,” obtaining “stored motor commands from the training buffer that may correspond to the *best matching* stored image,” and executing the motor commands. *See, e.g.*, 2024 Final Dec. 23–25 (citing, e.g., Ex. 1004, 2:29–41, 3:12–15, 3:35–39, 28:19–24, 33:21–32, 34:56–62, 38:36–39, 39:13–41,

40:64–41:18, 43:4–11). We provide additional explanation below in connection with our discussion of element 12.2.

With respect to the element 12.2, Petitioner relies on the combination of Grotmol and Hickman in light of the differences between element 12.2 and the corresponding recitations in claim 1. As we explained, more specifically, in our 2024 Final Written Decision

Petitioner relies on Grotmol’s teaching of an “autonomous robotic system.” [Pet.] 8, 55 (citing, e.g., Ex. 1004, code (57), 33:12–58). Petitioner argues that Hickman “discloses a ‘shared robot knowledge base [that] is updated based on robot experiences so that any particular robot may benefit from the prior experiences of other robots.’” *Id.* (citing Ex. 1005, code (57)).

2024 Final Dec. 65.

Hickman’s disclosures are persuasive with respect to, for example, the recitation of “third” device and “fourth” device in claim 12. Hickman’s shared robot knowledge base is illustrated in Figure 3, reproduced below.

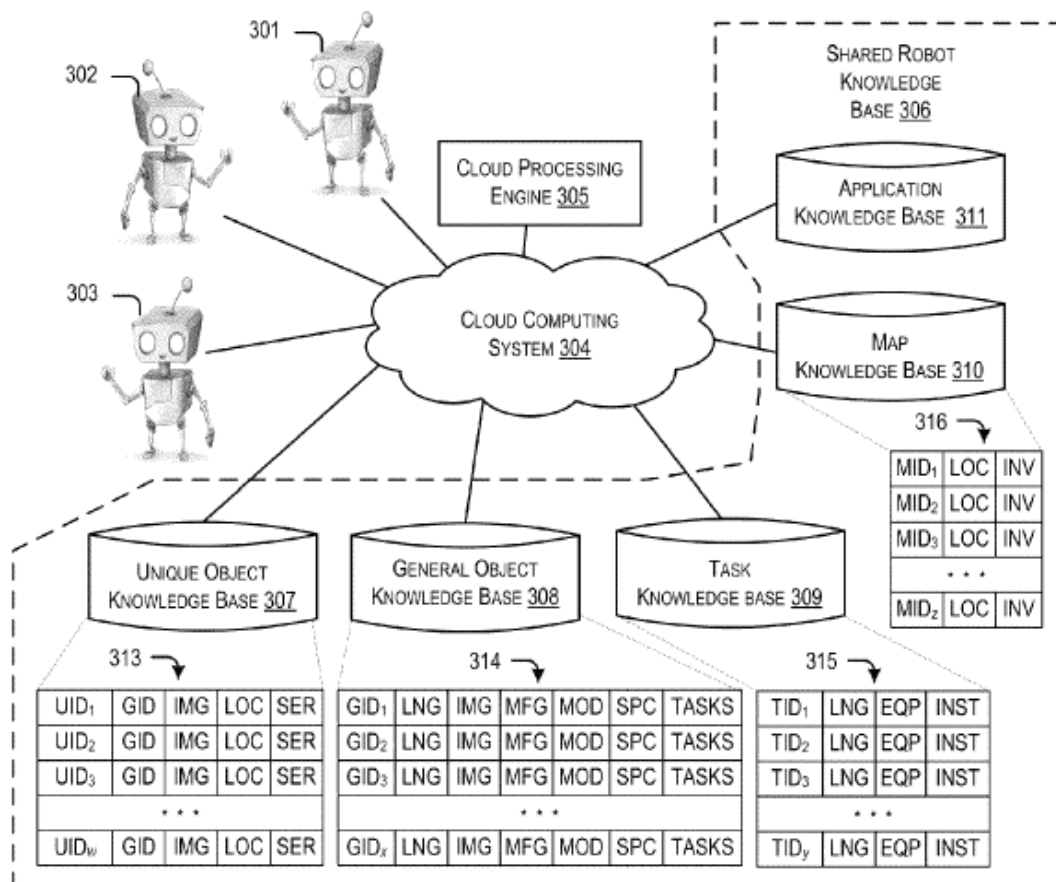


FIGURE 3

Figure 3, above, illustrates, among other things, multiple robots 301, 302, 303 interacting with a cloud computing system 304 having a shared robot knowledge base 306. Ex. 1005, 10:37–40.

To the extent Patent Owner argues that Grotmol fails to disclose the features that are the same as the features recited in claims 1 and 3, we maintain our findings and determinations in our 2024 Final Written Decision. 2024 Final Dec. 20–27. We also adopt Petitioner’s arguments and evidence for claims 1 and 3 as our own. Pet. 11–25. Because Petitioner’s contentions for claims 1 and 3 were not disputed by Patent Owner, our adoption of those contentions is sufficient and no further analyses or

explanation is needed. *In re Nuvasive, Inc.*, 841 F.3d 966, 974 (Fed. Cir. 2016) (“Although the Board did not make findings as to whether any of the other claim limitations ... are disclosed in the prior art, it did not have to: NuVasive did not present arguments about those limitations to the Board.”); *cf. LG Elecs., Inc. v. Conversant Wireless Licensing S.A.R.L.*, 759 F. App'x 917, 925 (Fed. Cir. 2019) (nonprecedential) (“The Board is not required to address undisputed matters or arguments about limitations with which it was never presented.”) (internal quotation omitted).

We also maintain our findings in our Final Written Decision regarding the differences as compared to claim 1, including those findings and determinations set forth in a section of the 2024 Final Written Decision titled “Overview—Claims 6, 11, and 12” (*id.* at 65–67) and in the sections titled “Claim 12” and “Conclusion—Claims 6, 11, and 12” (*id.* at 83–86). Further, based on the complete record now before us, including Patent Owner’s Request for Director Review, for the reasons given in our 2024 Final Written Decision and our additional reasons given herein, we determine that Petitioner has shown by a preponderance of the evidence that the Grotmol and Hickman combination teaches the limitations of claim 12.

Patent Owner’s Request for Director Review disputes our findings and determinations regarding the limitations of claim 12 that are not recited in claim 11. DR Req. 1, 3–5 (citing, e.g., PO Resp. 52–59; PO Sur-reply 24–25). Patent Owner’s Request for Director Review does not discuss or cite to arguments Patent Owner made regarding Petitioner’s reasons to combine (*see, e.g.*, PO Resp. 34–41, 62) or our findings and determinations regarding those arguments in our 2024 Final Written Decision (2024 Final Dec. 67–73). The citation in Patent Owner’s Request for Director Review, however,

refers to arguments that that Hickman “does not disclose or suggest (and further *teaches away* from).” *See, e.g.*, PO Resp. 52 (emphasis added). We maintain our findings in our 2024 Final Written Decision as to why we are persuaded by Petitioner’s reasons to combine and why Patent Owner’s arguments do not undermine Petitioner’s showing. 2024 Final Dec. 67–73. Herein, we also include additional explanation regarding why Hickman does not teach away from Petitioner’s proposed combination. Based on the complete record now before us, including Patent Owner’s Request for Director Review, for the reasons given in our 2024 Final Written Decision and our additional reasons given herein, we determine that Petitioner’s reasons to combine are persuasive and not undermined by Patent Owner’s arguments.

We provide additional explanation in accordance with the instructions in the Acting Director’s Decision. Specifically, below we start by discussing arguments in the Patent Owner’s Response regarding element 12.1 that Patent Owner cited in its Request for Director Review. DR Req. 4 (citing, *e.g.*, PO Resp. 52–53). We then turn to element 12.2 and discuss the arguments raised in Patent Owner’s Request for Director Review. DR Req. 1, 3–5 (citing, *e.g.*, PO Resp. 53–59, PO Sur-reply 24–25).

b) Element 12.1

Element 12.1 is reproduced below.

The system of claim 3, wherein the knowledgebase further includes a third circumstance representation correlated with a second one or more instruction sets for operating a third device, and wherein the third circumstance representation represents a third circumstance detected at least in part by one or more sensors of the third device, and wherein the one or more processors are further configured to perform at least.

Id. at 172:3–11.

Petitioner argues the following:

Limitation [12.1] includes the same limitations regarding the knowledgebase including an additional circumstance representation correlated with an instruction set as claim 11. Accordingly, Grotmol in combination with Hickman renders obvious limitation [12.1] for the same reasons as described above for claim 11. Decl. ¶¶ 245-247, 248.

Pet. 63.

We agree with Petitioner. As discussed above in our overview of claim 12 and further below, we find that the combination of Grotmol’s teachings of autonomous operation of a robot including accessing memory storing correlations of circumstance representations with instruction sets and Hickman’s teachings of shared robot knowledge bases teaches element 12.1. In its Request for Director Review, Patent Owner does not discuss with specificity claim 11 or element 12.1, but Patent Owner cites to pages in its Patent Owner Response and Sur-reply that include argument relating to element 12.1. *See* DR Req. 4 (citing PO Resp. 52–53).

We addressed Patent Owner’s arguments in our 2024 Final Written Decision. As we explained in our 2024 Final Written Decision

Patent Owner also argues that neither Grotmol nor Hickman discloses all features recited in claim 12. *See, e.g., id.* at 52–54 (arguing Grotmol “discloses one user operating one device in one learning process” and “Hickman discloses a single object information that is not a circumstance representation”) (emphasis omitted), 55 (arguing “the simple knowledgebase in Hickman never mentions, let alone discloses anything like the concept of a correlation with an instruction set for operating a third device”), 56–57 (arguing “neither reference discloses the specifically claimed devices operating using correlations in the claimed manner.”). One cannot show non-obviousness by

attacking references individually where the rejections are based on combinations of references. *Merck*, 800 F.2d at 1097; *Keller*, 642 F.2d at 426.

2024 Final Dec. 85. Upon consideration of the full record including the arguments in Patent Owner's Request for Director Review, Patent Owner's arguments are unavailing.

Patent Owner argues that the explanation is a "highly general statement." DR Req. 5. Below we address the arguments Patent Owner directs us to (DR Req. 4 (citing PO Resp. 52–53) and provide additional explanation as to why Patent Owner's arguments attacking Grotmol and Hickman individually do not undermine Petitioner's showing.

In its Patent Owner Response, Patent Owner first argues the following:

In addition, Grotmol and Hickman first fail to disclose *a third circumstance representation correlated with a second one or more instruction sets for operating a third device*. Ex. 2007, ¶¶148-158. As discussed above with respect to claim 11 in Ground 2 and claim 11 in Ground 3, Grotmol discloses *one user operating one device in one learning process* and even when loaded into a second device, this is still knowledge of *one user operating one device in one learning process* that does not disclose *a correlation that includes instruction sets for operating a third device*. *Id.* On the other hand, Hickman discloses storing images and instructions *separately in separate knowledgebases* (see Ex. 1005, Fig. 3) that is not a correlation as well as *single object information* that is *not a circumstance representation*. Hence, Hickman does not disclose or suggest (and further teaches away from) *any* correlations including *any* circumstance representations correlated with *any* instruction sets, let alone the claimed *third circumstance representation correlated with a second one or more instruction sets for operating a third device*. *Id.*

PO Resp. 52–53.

We start with Patent Owner’s argument regarding Grotmol’s deficiency. We find that Patent Owner’s argument that Grotmol does not disclose instruction sets for operating a third device does not undermine Petitioner’s argument because Petitioner relies on Hickman for this teaching. *See, e.g.*, Pet. 63 (arguing that “Grotmol in combination with Hickman renders obvious limitation [12.1] for the same reasons as described above for claim 11”), *id.* at 62 (citing Ex. 1005, code (57), 23:36–48, 26:21–27:21) (relying on Hickman’s disclosure of “shared robot knowledge bases”).

Furthermore, Petitioner’s argument is well-supported by Hickman. For instance, Hickman discloses “shared robot knowledge bases” in which shared robot knowledge bases are “updated based on robot experiences so that any particular robot may benefit from prior experiences of other robots.” Ex. 1005, code (57). And the evidence of record shows that it would have been obvious to combine Grotmol and Hickman so that Hickman’s shared robot knowledgebase includes Grotmol’s training configurations for multiple robots (i.e., first, second, third, and fourth devices). Ex. 1002 ¶ 247; *see* Pet. 62–63. Upon consideration of the full record including the arguments in Patent Owner’s Request for Director Review, we maintain our findings in our 2024 Final Written Decision regarding Hickman’s teachings. *See* 2024 Final Dec. 65–67 (explaining that claim 12 recites “additional features relating to” a third and fourth device and finding that “Patent Owner’s arguments mischaracterize the Petition and Dr. Janet’s deposition testimony” and that “the Petition includes detailed, well-supported reasons to combine the asserted art and an element-by-element analysis”), 85–86 (explaining “we addressed many of Patent Owner’s other arguments above in our overview . . . *See* §§ II.F.2–3” and finding “that the combination of Grotmol

and Hickman teaches all elements recited in claim 12”). We find Petitioner’s has shown that Hickman teaches “a second one or more instruction sets for operating a third device.”

We also find that Patent Owner’s argument that Hickman “does not disclose or suggest (and further teaches away from) *any* correlations including *any* circumstance representations correlated with any instruction sets” (PO Resp. 46) does not undermine Petitioner’s argument because Petitioner relies on Grotmol for this teaching. *See, e.g.*, Pet. 63 (arguing that “Grotmol in combination with Hickman renders obvious limitation [12.1] for the same reasons as described above for claim 11”), *id.* at 61 (citing Ex. 1004, 33:24–35) (relying on Grotmol’s disclosure of “training a robot wherein images (circumstance representations) detected by a camera during operation of the robot are correlated with motor commands (instructions)”). Petitioner similarly relies on Grotmol for disclosing a circumstance representation correlated with one or more instruction sets for operating a device in its arguments that Grotmol anticipates claims 1 and 3. Pet. 12–15, 23–25. Patent Owner does not dispute Petitioner’s arguments regarding claims 1 and 3. *See generally* PO Resp.

Furthermore, Petitioner’s argument is well-supported by Grotmol. For instance, Grotmol discloses “a trained configuration configured to enable autonomous operation . . . [that] may be stored.” Ex. 1004, 33:24–35. Grotmol also discloses “[d]uring training, images (e.g., raw and/or pre-processed) may be stored in a memory buffer” and “[m]otor commands issued by a trainer corresponding to time instances when the images are acquired may be stored.” Ex. 1004, 39:13–22 (cited in Pet. 53); *see also* Pet. 54 (arguing claim 11 is unpatentable “[f]or the same reasons discussed

with respect to claim 10”), 63 (arguing element 12.1 is taught “for the same reasons as described above for claim 11”). Grotmol also discloses a “matching process” that compares the image data stored in the training buffer for autonomous operation. Ex. 1004, 39:23–28. And, as discussed above, the evidence of record shows that it would have been obvious to combine Grotmol and Hickman so that Hickman’s shared robot knowledgebase includes Grotmol’s training configuration for multiple robots (i.e., first, second, third, and fourth devices). Ex. 1002 ¶ 247; *see* Pet. 62–63. Upon consideration of the full record including the arguments in Patent Owner’s Request for Director Review, we maintain our findings in our 2024 Final Written Decision regarding Grotmol’s teachings and why Petitioner’s reasons to combine are persuasive and not undermined by Patent Owner’s argument or evidence. *See* 2024 Final Dec. 65–67 (finding that “Patent Owner’s arguments mischaracterize the Petition and Dr. Janet’s deposition testimony,” Petitioner “explains that it relies on Grotmol’s teachings of an ‘autonomous robotic system,’ and that “the Petition includes detailed, well-supported reasons to combine the asserted art and an element-by-element analysis”), 69–70 (explaining why Patent Owner’s argument that “Hickman teaches away” is unavailing), 85–86 (explaining “we addressed many of Patent Owner’s other arguments above in our overview and discussion of Petitioner’s reasoning to combine Grotmol and Hickman. *See* §§ II.F.2–3,” finding “that the combination of Grotmol and Hickman teaches all elements recited in claim 12” and explaining that we “are persuaded by a preponderance of the evidence that Petitioner provides sufficiently articulated reasoning with rational underpinning to support Petitioner’s modification of Grotmol and Hickman” in the manner recited in claim 12).

We find Petitioner has shown that Grotmol teaches correlating a circumstance representation with one or more instruction sets for operating a robotic device.

Patent Owner next argues the following:

Grotmol and Hickman next fail to disclose that ***the third circumstance representation represents a third circumstance detected at least in part by one or more sensors of the third device***. Ex. 2007, ¶¶149-158. Petitioner argues that Grotmol discloses a circumstance detected by the sensor of another robot correlated with instructions for operating that robot. Petition, 63-65. But Grotmol discloses one user operating one device in one learning process and even when loaded into a second device, this is still knowledge of ***one user operating one device in one learning process*** that does not disclose ***detecting a circumstance with a sensor of a third device***. *Id.* On the other hand, Hickman discloses ***a single object information that is not a circumstance representation***. Hence, Hickman does not disclose or suggest (and further teaches away from) ***any circumstance representations***, let alone the claimed ***third circumstance representation represents a third circumstance detected at least in part by one or more sensors of the third device***. *Id.*

PO Resp. 53.

We also find that the aforementioned disclosures in Grotmol discussed with respect to element 12.1 teach that the circumstance representation represents a circumstance (object) detected at least in part by one or more sensors (camera) of the robotic device. Patent Owner's argument is that Grotmol's disclosures are limited to one device and Grotmol does not teach a third device. As explained above, Petitioner relies on Hickman for that teaching. Patent Owner also argues that Hickman does not teach a circumstance representation representing a circumstance detected by sensors. As explained above, Petitioner relies on Grotmol for that teaching. We find that Patent Owner's arguments attack Grotmol and

Hickman individually, but Petitioner relies on the combination of Grotmol and Hickman. Upon consideration of the full record including the arguments in Patent Owner's Request for Director Review, we maintain our findings in our 2024 Final Written Decision. 2024 Final Dec. 64–73, 83–86.

Regarding Patent Owner's statement that "Hickman does not disclose or suggest (and further teaches away from)" (PO Resp. 53), as we explained in our 2024 Final Written Decision,

Patent Owner's arguments that Hickman teaches away are unavailing. "A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the [inventor]." *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994); *see also In re Mouttet*, 686 F.3d 1332, 1333–134 (Fed. Cir. 2012) ("[A] reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discourage from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.").

We find that the organization of Hickman's knowledge bases does not undermine Petitioner's proposed combination of Grotmol and Hickman because the proposed combination simply integrates Hickman's teaching of sharing knowledge between different robots through a cloud computing system. Even to the extent that Petitioner's proposed combination incorporates the specific organization of Hickman's knowledge bases, Patent Owner's arguments are not consistent with Hickman's disclosures, which includes description of a general knowledge base and description of different implementations, including implementations in which task data is stored in the same knowledge base as image data and implementations in which fields are expanded in the unique object knowledgebase. *See, e.g.,* Ex. 1005, 12:5–18, 15:28–37, 18:34–19:34, Fig. 3. Patent Owner's responsive arguments to the contrary in its Sur-reply (PO Sur-reply 20–23) are conclusory and Patent Owner's argument that the single knowledge base "is a critical part of the

claimed invention” is contrary to the recitations in claims 6, 11, and 12, which do not prohibit multiple knowledge bases or require the structure Patent Owner argues.

2024 Final Dec. 69–70.

Based on the complete record now before us, including Patent Owner’s arguments in its Director Review Request, Patent Owner does not identify any specific portion of Hickman that criticizes, discredits, or otherwise discourages storing an image correlated with an instruction set in the shared robot knowledgebase. *See, e.g.*, DR Req. 1, 3–5; PO Resp. 52–59; PO Sur-reply 24–25. 19. Furthermore, as set forth in our 2024 Final Written Decision, contrary to Patent Owner’s arguments, Hickman teaches its shared robot knowledgebase storing an image correlated with an instruction set. For example, Hickman teaches that general object knowledge base 308 in Figure 3 includes “image data (IMG)” correlated with “task data (TASKS).” Ex. 1005, 15:28–34. Hickman also teaches that, in some embodiments, “the task data (TASKS) includes robot instruction code for performing tasks” and does “not require a separate task knowledge base 309.” *Id.* at 19:23–33.

Based on the arguments and evidence of record, we find that the combination of Grotmol and Hickman teaches element 12.1. We maintain our findings in our 2024 Final Written Decision that the combination of Grotmol and Hickman discloses the recitations in element 12.1. 2024 Final Dec. 64–73, 83–86. We also maintain our findings in the 2024 Final Written Decision that a person of ordinary skill in the art would have combined Grotmol and Hickman’s teachings in the manner recited in claim 12 for the reasons given by Petitioner. *Id.* The discussion herein provides further explanation consistent with the instructions in the Acting Director’s

Decision as to why we find that Petitioner's contentions are consistent with and supported by the combined teachings of Grotmol and Hickman and why we find Patent Owner's arguments do not undermine Petitioner's showing.

c) Element 12.2

Element 12.2 is reproduced below.

generating or receiving a fourth circumstance representation, wherein the fourth circumstance representation represents a fourth circumstance detected at least in part by one or more sensors of a fourth device;

anticipating the second one or more instruction sets for operating the third device based on at least partial match between the fourth circumstance representation and the third circumstance representation; and

at least in response to the anticipating the second one or more instruction sets for operating the third device, executing the second one or more instruction sets for operating the third device, wherein the fourth device autonomously performs one or more operations defined by the second one or more instruction sets for operating the third device.

Id. at 172:12–26.

As we discuss above, independent claim 1 is directed to a system with one or more processors for accessing a knowledgebase and performing the “generating or receiving,” “anticipating,” and “executing” recitations in elements 1.5 through 1.7 for autonomous operation of a robotic device. *See* § II.D.3.a. As we further explain, the limitations recited in element 12.2 are for performing similar “generating or receiving,” “anticipating,” and “executing” recitations in elements 1.5 through 1.7 for autonomous operation of the “fourth” robotic device. *Id.* We also provide a side-by-side comparison of all the further recitations in claim 12 as compared to the

recitations in claims 1 or 11 showing that the recitations are the same, except as noted. *Id.*

In its Preliminary Response, Patent Owner stated that it disclaimed independent claim 1 of the '344 patent. Prelim. Resp. 1 (citing Ex. 2004; 37 C.F.R. § 42.107(e)). We provided a full element-by-element analysis of disclaimed claim 1 in our Institution Decision (Inst. Dec. 24–28) and we stated “Patent Owner is cautioned that any arguments not raised in the response may be deemed waived.” Paper 21, 9. Patent Owner did not dispute Petitioner’s contentions for claim 1 in its Patent Owner Response (*see generally* PO Resp.) and has not disputed Petitioner’s contentions for claim 1 at any time during this proceeding.

For element 12.2, Petitioner relies on its contentions for “Grounds 1 and 2,” which includes undisputed contentions showing the similar “generating or receiving,” “anticipating,” and “executing” recitations in elements 1.5 through 1.7 are disclosed in Grotmol. Pet. 61, 64–65 (relying on contentions “described above for claim 11 and limitation [12.1]”), 61 (relying on contentions “described above for Grounds 1 and 2”), 4 (stating that “Ground 1” is “Anticipation of claims 1–5, 7–9, and 13–20 based on Grotmol”). As we explain above (§ II.D.3.a), for claim 1, Petitioner relies on Grotmol’s autonomous robotic system, which is described with respect to exemplary mobile robotic apparatus 160, shown in Figure 1 below. Ex. 1004, 8:57–61.

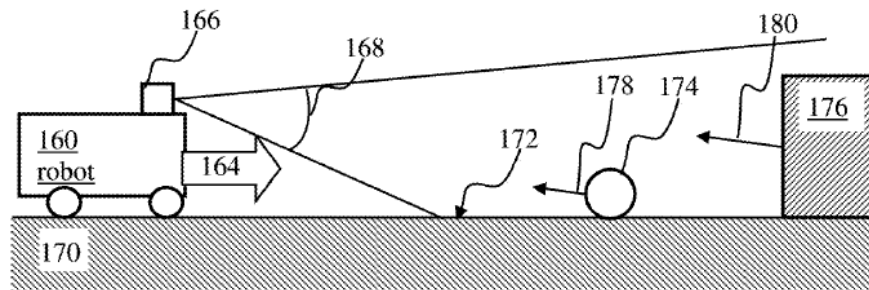


FIG. 1

Figure 1 depicts mobile robotic apparatus 160 that contains sensor component 166, which provides “information associated with *objects* within the field-of-view 168.” *Id.* at 8:57–66 (emphasis added). We explain in our 2024 Final Written Decision that elements 1.5, 1.6, and 1.7 corresponding to the “generating,” “anticipating,” and “executing” sub-elements of element 12.2 are disclosed by Grotmol. For instance, we explained that we are persuaded by Grotmol’s disclosures of its mobile robotic apparatus 160 receiving “additional digital pictures from the camera over time,” determining a “similarity metric,” obtaining “stored motor commands from the training buffer that may correspond to the *best matching* stored image,” and executing the motor commands. *See, e.g.,* 2024 Final Dec. 23–25 (citing, e.g., Ex. 1004, 2:29–41, 3:12–15, 3:35–39, 28:19–24, 33:21–32, 34:56–62, 38:36–39, 39:13–41, 40:64–41:18, 43:4–11). Petitioner’s contentions regarding elements 1.5, 1.6, and 1.7 have not been disputed by Patent Owner at any time during this proceeding.

Although not disputed, below we provide further detail regarding Grotmol and how it discloses elements 1.5, 1.6, and 1.7 and the recitations in the “generating,” “anticipating,” and “executing” sub-elements of element 12.2 that are similar to elements 1.5, 1.6, and 1.7. We start with generating a circumstance representation, wherein the circumstance representation

represents a circumstance detected at least in part by one or more sensors of a device recited in element 12.2. Grotmol discloses that the “robotic apparatus” comprises “a platform, a first sensor, a second sensor, a memory component, and one or more physical processors.” Ex. 1004, 3:27–30 (cited in Pet. 11, 12). Grotmol discloses “exemplary images for use with training of path navigation” that “may be obtained with a variety of sensors, e.g., a video camera, IR camera, RADAR, SONAR, LiDAR, ultrasonic imager, and/or other device.” *Id.* at 38:43–47 (cited in Pet. 13). Grotmol discloses that the “memory component may be configured to store training sets,” each of which may comprise “an instance of the video frame, an instance of the binary signal, and an instance of a motor control indication configured to cause the robot to execute an action.” *Id.* at 3:35–39 (cited in Pet. 12).

We turn to anticipating one or more instruction sets for operating the device based on at least partial match between a circumstance representation that is correlated with one or more instruction sets and the circumstance representation detected in the “generating” sub-element. With respect to a circumstance representation that is correlated with one or more instruction sets, Grotmol discloses “[t]rained behaviors of the robotic device may be configured based on learning of associations between sensory context (e.g., presence of an obstacle in front of the robot vehicle) and a respective action (e.g., right turn) during training.” *Id.* at 33:59–62 (cited in Pet. 14, 16). With respect to anticipating one or more instruction sets for operating a device based on at least partial match between a correlated circumstance representation and a newly detected circumstance representation, Grotmol discloses “[d]uring autonomous operation, control process of the robot may be configured to compare a given (e.g., the most recent, current) image with

one or more [of] the images from the training buffer.” *Id.* at 39:23–26 (cited in Pet. 15, 17–18). Grotmol discloses “[i]n some implementations, the matching process may comprise comparing the given image to every image in the training buffer” and, in other implementations, the robot may use prior information and to reduce computational requirements “the given image may be compared to a subset of images from the training buffer.” *Id.* at 39:26–41 (cited in Pet. 19). Grotmol discloses determining a “similarity metric” and that “[a]n image corresponding to the lowest norm [pixel-wise difference between the overlapping regions] may be referred to as the best match.” *Id.* at 41:7–18 (cited in Pet. 19–20). Grotmol further discloses obtaining “stored motor commands from the training buffer that may correspond to the best matching stored image.” *Id.* at 43:4–11 (cited in Pet. 14, 19).

We now turn to at least in response to the anticipating one or more instruction sets for operating the device, executing the one or more instruction sets for autonomous device operation recited in element 12.2. Grotmol discloses “[i]n some implementations, the control signal [associated with a training set selected using a similarity measure] may be configured to cause the robot to execute the action.” Ex. 1004, 3:12-13. Grotmol also discloses “motor commands at a given time step may be obtained by taking the stored motor commands from the training buffer that may correspond to the best matching stored image.” *Id.* at 43:4–11. Grotmol discloses that a trained configuration may be configured “to enable autonomous operation (e.g., without user input).” *Id.* at 33:24–26.

Petitioner also addresses the differences between element 12.2 and the corresponding recitations in claim 1. We identify the differences using italics

as emphasis in the sub-elements of element 12.2, as we did in the table above (§ II.D.3.a).

The “generating” sub-element in element 12.2 recites “generating or receiving a *fourth* circumstance representation, wherein the *fourth* circumstance representation represents a *fourth* circumstance detected at least in part by one or more sensors of a *fourth* device.” Ex. 1001, 172:12–15 (emphases added). Petitioner argues that “the combination of Grotmol and Hickman” renders obvious a “knowledgebase [that] can be shared to perform autonomous operation of any number of . . . devices.” Pet. 64–65 (citing Ex. 1004, 33:27-32; Ex. 1005, 11:31-41; Decl. ¶¶ 245-247, 248). Petitioner’s citation to Hickman refers to “knowledge base 306” (Ex. 1005, 11:31–41), which is illustrated in Figure 3.

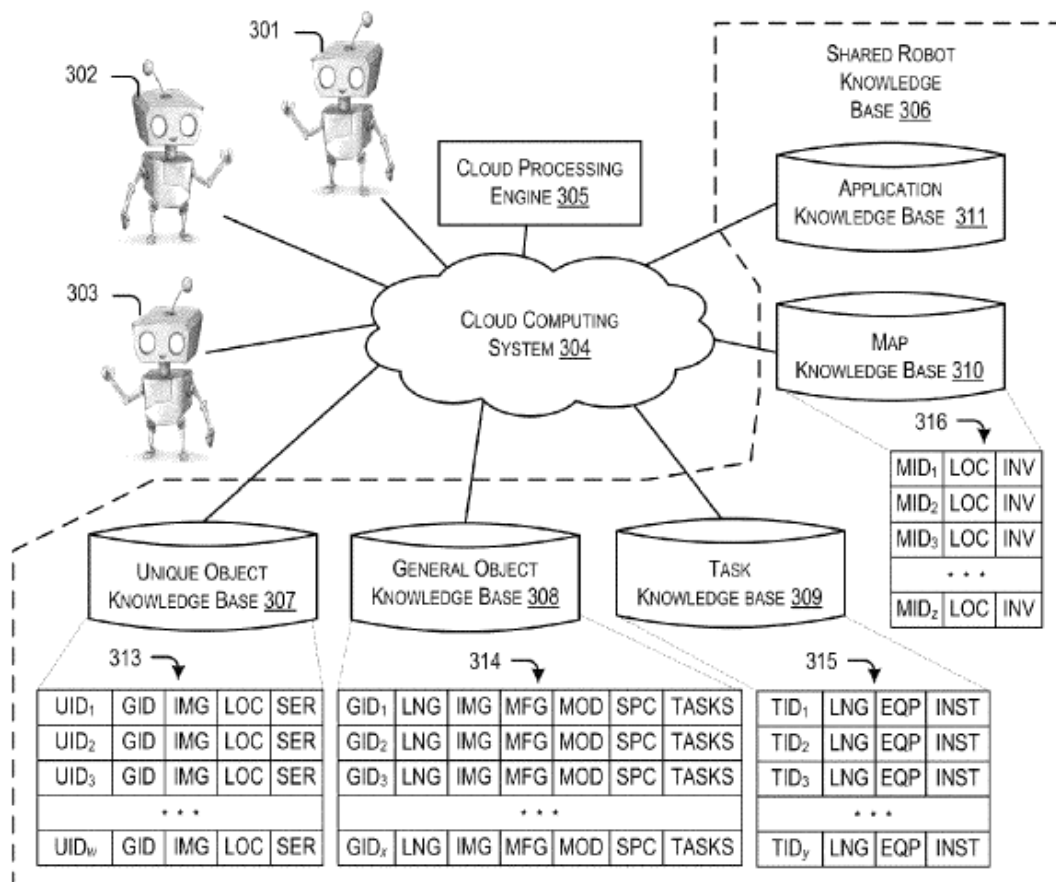


FIGURE 3

Figure 3, above, illustrates, among other things, multiple robots 301, 302, 303 interacting with a cloud computing system 304 having a shared robot knowledge base 306. Ex. 1005, 10:37–40. Hickman teaches deploying robots “around the world” and that the shared robot knowledge base 306 may be accessed by “many millions or even many billions of robots.” *Id.* at 11:31–41. We find Hickman teaches a “*fourth* device” recited in the “generating” sub-element of element 12.2.

The “generating” sub-element in element 12.2 also recites “generating or receiving a *fourth* circumstance representation,” which “represents a *fourth* circumstance” detected by a sensor of the “*fourth* device,” which

corresponds to element 1.5 that is met by Grotmol's disclosure of images of objects generated by a camera discussed immediately above. Element 12.2 differs in requiring an additional, fourth image of a fourth object generated by a camera of a fourth device. The combination of Grotmol's disclosures herein and Hickman's disclosure of many robots teaches all differences in element 12.2 as compared to element 1.5 because each of the many robots operates in different environments and collects image data about the different objects in those environments. *See, e.g.*, Ex. 1005, code (57), 11:31–41. Thus, the combination of Grotmol and Hickman teaches generating or receiving a *fourth* circumstance representation, such as an image acquired during a robot vehicle's operation, that represents a *fourth* circumstance, such as a scene of an environment of the robot, detected at least in part by one or more sensors, such as a camera, of a *fourth* robotic device. Hickman also teaches that its robots collect data about objects. For instance, Hickman discloses “information that a single robot learns about [the] object” is uploaded to shared robot knowledge base 306. *Id.* at 11:31–41. Hickman also discloses collecting “data from a robot about an object the robot has encountered in its environment.” *Id.* at code (57) (cited in Pet. 62, which is referred to in Petitioner's discussion of element 12.2 in Pet. 64).

Furthermore, with respect to “generating or receiving a *fourth* circumstance representation,” which “represents a *fourth* circumstance,” Grotmol describes a robot generating or receiving multiple images. *See, e.g.*, Ex. 1004, code (57) (describing storing “*the sequence of images* of a visual scene seen when following a trajectory during training in an ordered buffer”), 39:13–14 (emphasis added) (describing that “[d]uring training, *images . . .* may be stored in a memory buffer (training buffer)”) (discussed

with respect to claims 1 and 3 in 2024 Final Dec. 18–19, 21, 23, 26–27 and again with respect to claim 12 in 2024 Final Dec. 84). Grotmol’s disclosures of generating or receiving multiple images are described with respect to Grotmol’s Figure 20A, which illustrates how two different images acquired during autonomous operation of a robot differ.

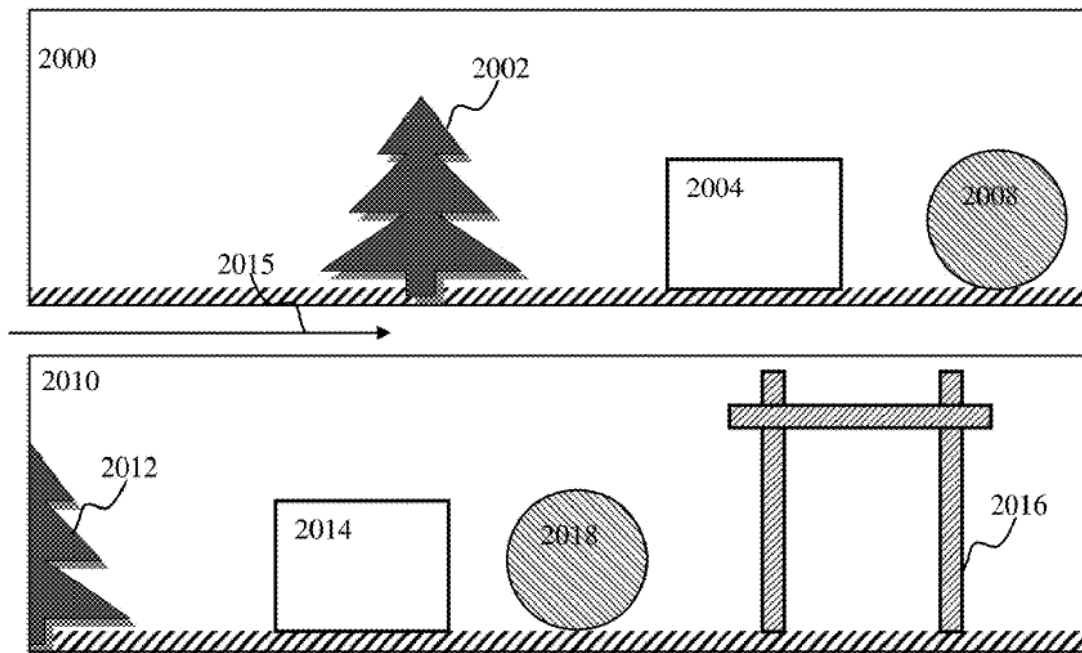


FIG. 20A

Figure 20A, above, shows image 2000 having tree 2002, rectangle 2004, and ball 2008 and image 2010 acquired after motion of vehicle 160 that shows shifted tree 2012, rectangle 2014, and ball 2018, as well as object 2016. Ex. 1004, 38:56–62, Fig. 20A (discussed in 2024 Final Dec. 18–19).

The “anticipating” sub-element in element 12.2 recites “anticipating the *second* one or more instruction sets for operating the *third* device based on at least partial match between the *fourth* circumstance representation and the *third* circumstance representation” (emphases added to show differences between element 12.2 and element 1.6). We find this sub-element is taught

by the combination of Grotmol and Hickman. In particular, we find persuasive Grotmol's disclosures discussed above and Grotmol's disclosures identified in connection with Petitioner's contentions for element 1.6. We also find persuasive Hickman's disclosure of many robots collecting image data discussed with respect to the "generating" sub-element and Hickman's "instructions" for a robot to interact with an object or execute an application that are stored in shared robot knowledge base 306. Ex. 1005, code (57) (describing sending "instructions to a robot for executing an application based on information stored in the shared robot knowledge base."). Thus, the combination of Grotmol and Hickman teaches anticipating the second one or more instruction sets for operating the third device based on at least a partial match, such as Grotmol's comparison to obtain a similarity measure, between the fourth circumstance representation, that is the image detected by the fourth robotic device, and the third circumstance representation, such as an image stored in the shared knowledgebase. We further note that the recitation of "the second one or more instruction sets for operating the third device" derives antecedent basis from element 12.1, which is identical to claim 11 and is not disputed in Patent Owner's Request for Director Review.

The "executing" sub-element in element 12.2 recites "at least in response to the anticipating *the second one or more instruction sets for operating the third device*, executing the *second* one or more instruction sets for operating the *third* device, wherein the *fourth* device autonomously performs one or more operations defined by the *second* one or more instruction sets for operating the *third* device" (emphases added to show differences between element 12.2 and element 1.7). As discussed herein, Grotmol discloses executing instructions in response to the "anticipating"

sub-element. Regarding “wherein the *fourth* device autonomously performs one or more operations defined by the *second* one or more instruction sets for operating the *third* device,” Hickman discloses that its instructions are updated “based on robot experiences so that any particular robot may benefit from prior experiences of other robots.” Ex. 1005, code (57) (cited in Pet. 62, 64). Hickman further discloses a robot uploading information to the “shared robot knowledge base 306” so that the information is accessible “by other robots all around the world” and, as a result, “the shared robot knowledge base 306 enables robots to benefit from the collective information learned by many other robots.” *Id.* at 11:31–41.

Patent Owner argues that it “developed a full set of arguments for the limitations of claim 12 that are not recited in claim 11 . . . that include 8 pages of analysis of the limitations of claim 12” and Patent Owner’s “sur-reply includes additional analysis.” DR Req. 4 (citing PO Resp. 52–59; PO Sur-reply 24–25). Patent Owner’s arguments include improper attacks of Grotmol and Hickman individually. PO Resp. 52–59; PO Sur-reply 24–25.

As we explained in our 2024 Final Written Decision

Patent Owner also argues that neither Grotmol nor Hickman discloses all features recited in claim 12. *See, e.g., id.* at 52–54 (arguing Grotmol “discloses one user operating one device in one learning process” and “Hickman discloses a single object information that is not a circumstance representation”) (emphasis omitted), 55 (arguing “the simple knowledgebase in Hickman never mentions, let alone discloses anything like the concept of a correlation with an instruction set for operating a third device”), 56–57 (arguing “neither reference discloses the specifically claimed devices operating using correlations in the claimed manner.”). One cannot show non-obviousness by attacking references individually where the rejections are based on combinations of references. *Merck*, 800 F.2d at 1097; *Keller*, 642 F.2d at 426.

2024 Final Dec. 85.

Patent Owner argues that the explanation is a “highly general statement.” DR Req. 5. Below we address the arguments Patent Owner directs us to (DR Req. 1, 3–5 (citing PO Resp. 52–59; PO Sur-reply 24–25)) and provide further explanation as to why Patent Owner’s arguments attacking Grotmol and Hickman individually do not undermine Petitioner’s showing.

In its Patent Owner Response, Patent Owner first argues the following:

Given that Grotmol and Hickman fail to disclose the *third circumstance representation correlated with a second one or more instruction sets for operating a third device* as discussed right above, Grotmol and Hickman especially fail to disclose *the fourth circumstance representation represents a fourth circumstance detected at least in part by one or more sensors of a fourth device* for similar reasons and because it requires an additional fourth device. Ex. 2007, ¶¶150-158.

PO Resp. 53–54.

Above, we discussed Patent Owner’s argument regarding element 12.1, specifically “a *third circumstance representation correlated with a second one or more instruction sets for operating a third device.*” See § II.D.3.b. Patent Owner argues the combination “especially” fails to disclose a “fourth” circumstance representation representing a “fourth” circumstance by sensors of “fourth” device “for similar reasons.” PO Resp. 53–54. As we explained above, we are not persuaded by Patent Owner’s arguments regarding Grotmol’s deficiency in not disclosing a third device because Petitioner relies on Hickman for that teaching and Petitioner’s argument is well-supported by Hickman. See § II.D.3.b. We further find that Hickman provides additional supporting disclosures. Hickman teaches that

the “advantages” of its disclosure “multiply as robots are deployed *around the world*.” Ex. 1005, 11:31–41. Hickman also teaches “many millions or even many billions of robots may ultimately access the shared robot knowledge base 306.” *Id.*

With respect to “the fourth circumstance representation represents a fourth circumstance detected at least in part by one or more sensors of a fourth device” as explained herein, that recitation is similar to element 1.5 and Petitioner’s contentions that Grotmol discloses element 1.5 were not disputed by Patent Owner. As discussed immediately above, Petitioner’s contentions are well-supported by Grotmol’s Figure 1, for example.

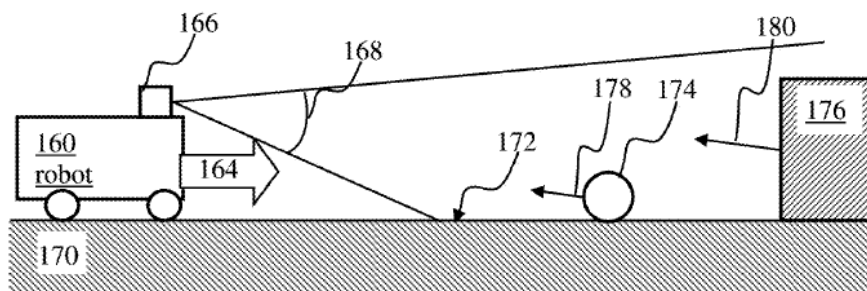


FIG. 1

Figure 1 depicts mobile robotic apparatus 160 that contains sensor component 166, which provides “information associated with *objects* within the field-of-view 168.” Ex. 1004, 8:57–66 (emphasis added). Additionally, Grotmol discloses that the “robotic apparatus” comprises “a platform, a first sensor, a second sensor, a memory component, and one or more physical processors.” Ex. 1004, 3:27–30 (cited in Pet. 11, 12). Grotmol discloses “exemplary images for use with training of path navigation” that “may be obtained with a variety of sensors, e.g., a video camera, IR camera, RADAR, SONAR, LiDAR, ultrasonic imager, and/or other device.” *Id.* at 38:43–47 (cited in Pet. 13). Grotmol discloses that the “memory component may be

configured to store training sets,” each of which may comprise “an instance of the video frame, an instance of the binary signal, and an instance of a motor control indication configured to cause the robot to execute an action.”

Id. at 3:35–39 (cited in Pet. 12).

Patent Owner next argues the following:

Next, Grotmol and Hickman fail to disclose anticipating the second one or more instruction sets ***for operating the third device based on at least partial match between the fourth circumstance representation and the third circumstance representation***. Ex. 2007, ¶¶151–158. Petitioner argues that Grotmol discloses anticipating instructions for a third device using a partial match and that a fourth device performs an operation defined by the instruction set for the third device. Petition, 65. This argument is Petitioner’s own words not supported in Grotmol and is conclusory. Grotmol discloses one user operating one device in one learning process and even when loaded into a second device, this is still knowledge of ***one user operating one device in one learning process*** that does not disclose ***anticipating instruction sets for operating a third device***. Ex. 2007, ¶¶151–158. On the other hand, Hickman discloses ***a single object information that is not a circumstance representation***. Hence, Hickman does not disclose or suggest (and further teaches away from) ***any circumstance representations***, let alone the claimed ***fourth circumstance representation and the third circumstance representation used in the matching for the anticipation***. Ex. 2007, ¶¶151–158.

PO Resp. 54–55.

We are not persuaded by Patent Owner’s arguments that the contentions in the Petitioner are “Petitioner’s own words not supported in Grotmol” and that Petitioner’s contentions are “conclusory.” *Id.* As we explained in our 2024 Final Written Decision, Patent Owner’s argument in that regard “mischaracterize[s] the Petition” and “[i]n contrast to Patent Owner’s arguments . . . the Petition includes detailed, well-supported”

element-by-element analysis, much of which pertains to recitations that are similar to recitations in claim 1, with the element 12.2 recitations pertaining to third and fourth robotic devices. 2024 Final Dec. 66–67.

We also are not persuaded by Patent Owner’s argument that the Petition is deficient because Grotmol’s disclosure is limited to “***one user operating one device in one learning process***” and does not disclose anticipating instruction sets for operating “***a third device.***” PO Resp. 54–55. We find that Patent Owner’s argument (*id.*) does not undermine Petitioner’s argument because Petitioner relies on Hickman for the teaching of a “third” device. *See, e.g.*, Pet. 64 (arguing element 12.2 is taught by the combination Grotmol and Hickman for the reasons “described above for claim 11 and limitation [12.1]”), 63 (arguing that “Grotmol in combination with Hickman renders obvious limitation [12.1] for the same reasons as described above for claim 11”), *id.* at 62 (citing Ex. 1005, code (57), 23:36–48, 26:21–27:21).

Furthermore, Petitioner’s argument is well-supported by Hickman as discussed herein and our 2024 Final Written Decision. For instance, Hickman discloses “shared robot knowledge bases” in which shared robot knowledgebases are “updated based on robot experiences so that any particular robot may benefit from prior experiences of other robots.” Ex. 1005, code (57). Hickman provides additional disclosures of multiple robotic devices sharing instruction sets. *See, e.g., id.* at Fig. 3, 11:31–41.

We also find unavailing Patent Owner’s argument that “Hickman does not disclose or suggest (and further teaches away from) ***any circumstance representations***, let alone” the claimed circumstance representations used in the matching for the anticipation. PO Resp. 53–54. Patent Owner’s argument (*id.*) does not undermine Petitioner’s argument because Petitioner relies on

Grotmol for this teaching. *See, e.g.*, Pet. 64 (arguing element 12.2 is taught by the combination Grotmol and Hickman for the reasons “described above for claim 11 and limitation [12.1]”), 63 (arguing that “Grotmol in combination with Hickman renders obvious limitation [12.1] for the same reasons as described above for claim 11”); *see also id.* at 65 (citing Ex. 1004, code (57), 39:13–41). We are not persuaded by Patent Owner’s arguments regarding Hickman’s teaching away for the reasons given in our 2024 Final Written Decision. 2024 Final Dec. 67–73.

Regarding Patent Owner’s statement that “Hickman does not disclose or suggest (and further teaches away from)” (PO Resp. 54), as we explained in our 2024 Final Written Decision,

Patent Owner’s arguments that Hickman teaches away are unavailing. “A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the [inventor].” *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994); *see also In re Mouttet*, 686 F.3d 1332, 1333–134 (Fed. Cir. 2012) (“[A] reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discourage from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.”).

We find that the organization of Hickman’s knowledge bases does not undermine Petitioner’s proposed combination of Grotmol and Hickman because the proposed combination simply integrates Hickman’s teaching of sharing knowledge between different robots through a cloud computing system. Even to the extent that Petitioner’s proposed combination incorporates the specific organization of Hickman’s knowledge bases, Patent Owner’s arguments are not consistent with Hickman’s disclosures, which includes description of a general knowledge base and description of different implementations, including implementations in which task data is stored in the same

knowledge base as image data and implementations in which fields are expanded in the unique object knowledgebase. *See, e.g.*, Ex. 1005, 12:5–18, 15:28–37, 18:34–19:34, Fig. 3. Patent Owner’s responsive arguments to the contrary in its Sur-reply (PO Sur-reply 20–23) are conclusory and Patent Owner’s argument that the single knowledge base “is a critical part of the claimed invention” is contrary to the recitations in claims 6, 11, and 12, which do not prohibit multiple knowledge bases or require the structure Patent Owner argues.

2024 Final Dec. 69–70.

Based on the complete record now before us, including Patent Owner’s arguments in its Director Review Request, Patent Owner does not identify any specific portion of Hickman that criticizes, discredits, or otherwise discourages storing an image correlated with an instruction set in the shared robot knowledgebase. *See, e.g.*, DR Req. 1, 3–5; PO Resp. 52–59; PO Sur-reply 24–25. 19. Additionally, as set forth in our 2024 Final Written Decision, contrary to Patent Owner’s arguments, Hickman teaches its shared robot knowledgebase storing an image correlated with an instruction set. For example, Hickman teaches that general object knowledge base 308 in Figure 3 includes “image data (IMG)” correlated with “task data (TASKS).” Ex. 1005, 15:28–34. Hickman also teaches that, in some embodiments, “the task data (TASKS) includes robot instruction code for performing tasks” and does “not require a separate task knowledge base 309.” *Id.* at 19:23–33.

Furthermore, Petitioner’s argument is well-supported by Grotmol. For instance, Grotmol discloses “[d]uring autonomous operation, control process of the robot may be configured to compare a given (e.g., the most recent, current) image with one or more [of] the images from the training buffer.” Ex. 1004, 39:23–26 (cited in Pet. 15 17–18). Grotmol discloses “[i]n some implementations, the matching process may comprise comparing the given

image to every image in the training buffer” and, in other implementations, the robot may use prior information and to reduce computational requirements “the given image may be compared to a subset of images from the training buffer.” *Id.* at 39:26–41 (cited in Pet. 19). Grotmol discloses determining a “similarity metric” and that “[a]n image corresponding to the lowest norm [pixel-wise difference between the overlapping regions] may be referred to as the best match.” *Id.* at 41:7–18 (cited in Pet. 19–20). Grotmol further discloses obtaining “stored motor commands from the training buffer that may correspond to the best matching stored image.” *Id.* at 43:4–11 (cited in Pet. 14, 19).

Patent Owner also argues the following:

Finally, Grotmol and Hickman fail to disclose that in response to the anticipating, executing the second one or more *instruction sets for operating the third device*, wherein *the fourth device autonomously performs* one or more operations defined by the second one or more *instruction sets for operating the third device*. Ex. 2007, ¶¶152–158. Given that Grotmol and Hickman fail to disclose *the anticipating of instruction sets as particularly claimed*, they must also fail to disclose the claimed *execution of the anticipated instruction sets and performance of operations defined by those anticipated instruction sets*. *Id.* Also, regardless of the anticipation, Grotmol and Hickman do not teach the particular claimed limitations involving *instruction sets for operating the specific third device and that the specific fourth device autonomously performs operations defined by the instruction sets for operating the specific third device*. *Id.*

PO Resp. 54–55.

We find Patent Owner’s arguments unavailing because, for the reasons given herein, we find that the combination of Grotmol and Hickman teaches the anticipating sub-element of element 12.2. Regarding Patent Owner’s argument that “Grotmol and Hickman do not teach the particular

claimed limitations involving *instruction sets for operating the specific third device and that the specific fourth device autonomously performs operations defined by the instruction sets for operating the specific third device*” (*id.*), as we explain herein and as we explained in our 2024 Final Written Decision, Hickman teaches a fourth robotic device autonomously performing operations defined by the instruction sets for operating the third robotic device. *See, e.g.*, 2024 Final Dec. 65–66, 84–85 (citing, *e.g.*, Ex. 1005, code (57), 11:31–41). Hickman, for example, teaches “information in the shared robot knowledge bases is updated based on robot experiences so that any particular robot may benefit from prior experiences of other robots.” Ex. 1005, code (57). Hickman also teaches “information that a single robot learns about that object and uploads to the shared robot knowledge base 306 may be accessible by other robots all around the world” and “the shared robot knowledge base 306 enables robots to benefit from the collective information learned by many other robots.” *Id.* at 11:34–41.

In its remaining arguments identified in its Request for Director Review (PO Resp. 56–59; PO Sur-reply 24–25 (cited in DR Req. 3–5)), Patent Owner reproduces element 12.2 with certain portions emphasized and then states that either Grotmol or Hickman does not teach the emphasized language. Patent Owner’s arguments that Grotmol alone does not teach certain recitations in element 12.2, for example, the “third” and “fourth” device, are unavailing because Petitioner relies on Hickman for those teachings. Patent Owner’s arguments that Hickman alone does not teach certain recitations in element 12.2, for example, that the correlation must include one or more instruction sets and that a circumstance representation must represent a circumstance detected in part by sensors of the robotic

device, are unavailing because Petitioner relies on Grotmol for those teachings. Certain of those recitations are recited in claim 1, which was disclaimed by Patent Owner. Ex. 2004; Prelim. Resp. 1.

We further note that Patent Owner’s reproduction of the recitations in element 12.2 in its Patent Owner Response does not provide further argument. Given the strength of the prior art teachings in Grotmol and Hickman and Petitioner’s detailed mapping of that prior art to the elements of claim 12, we find that Patent Owner does not undermine Petitioner’s showing. Although not directly applicable in this *inter partes* proceeding, we note that in an *ex parte* proceeding, merely listing claim limitations and concluding the claims distinguish over the cited prior art does not qualify as the provision of a substantive argument, and, therefore, is unpersuasive of Examiner error. *See In re Lovin*, 652 F.3d 1349, 1357 (Fed. Cir. 2011) (holding that the Board had reasonably interpreted 37 C.F.R. § 41.37(c)(1)(vii), the precursor to present § 41.37(c)(1)(iv) that applies here, as requiring “more substantive arguments in an appeal brief than a mere recitation of the claim elements and a naked assertion that the corresponding elements were not found in the prior art”). Patent Owner also argues that the Petition includes “discussion of high level concepts” without explaining how the claim elements are taught. PO Resp. 55–59. Patent Owner also repeats arguments from its discussion of Petitioner’s reasons to combine. We addressed those arguments in our 2024 Final Written Decision. 2024 Final Dec. 64–73, 83–86. Upon consideration of the full record now before us, we find that Petitioner provides a detailed, element-by-element analysis that is well-supported. We provide additional explanation herein,

including highlighting teachings in the prior art that support Petitioner's position.

We maintain our findings in our 2024 Final Written Decision regarding why we are persuaded that the combination of Grotmol and Hickman discloses the recitations in element 12.2. 2024 Final Dec. 64–73, 83–86. We also maintain our findings in the 2024 Final Written Decision regarding why we are persuaded that a person of ordinary skill in the art would have combined Grotmol and Hickman's teachings in the manner recited in claim 12 for the reasons given by Petitioner. *Id.* The discussion herein provides further explanation consistent with the instructions in the Acting Director's Decision as to why we find that Petitioner's contentions are consistent with and supported by the combined teachings of Grotmol and Hickman and why we find Patent Owner's arguments do not undermine Petitioner's showing.

d) Conclusion—Claim 12

For the reasons given, we determine that Petitioner demonstrates by a preponderance of the evidence that the combination of Grotmol and Hickman teaches the features recited in dependent claim 12. For the reasons given, we also are persuaded by a preponderance of the evidence that Petitioner provides sufficiently articulated reasoning with rational underpinning to support Petitioner's modification of Grotmol and Hickman. We find that Patent Owner's argument and evidence do not undermine Petitioner's showing.

Based on the arguments and evidence of record, we determine that Petitioner has proved, by a preponderance of evidence, that claim 12 is unpatentable as obvious over the combination of Grotmol and Hickman.

III. ANALYSIS—PROPOSED SUBSTITUTE CLAIMS

Patent Owner filed a Motion to Amend. MTA. Patent Owner’s Motion to Amend requests “[i]n the event the Board finds any of original claims 6, 7, 10, 11, 12, or 16 unpatentable . . . the Board grant this motion to amend and issue the corresponding substitute claims [among 23, 24, 26, 27, 28, and 29].” MTA 1. The Motion to Amend also submits that “[c]laims 4, 5, and 9 are hereby cancelled” and requests that “the Board issue claims 21, 22, and 25 as substitutes for claims 4, 5, and 9, respectively,” noting that “[Patent Owner] does not condition its request regarding claims 21, 22, and 25 on any condition.” *Id.* at 1 n.1, 24. For the reasons given in our 2024 Final Written Decision with respect to claims 6, 7, 10, 11, and 16 and the reasons discussed above with respect to claim 12, we have determined that Petitioner has proved, by a preponderance of evidence, that claims 6, 7, 10, 11, 12, and 16 of the ’344 patent are unpatentable. We, therefore, proceed to address Patent Owner’s Motion to Amend in accordance with the instructions in the Acting Director’s Decision.

Proposed substitute claim 21 is illustrative⁵ and is reproduced below with Patent Owner’s annotations showing in underlined language subject matter added to the corresponding original claim, and bracketed text added at the beginning of each claim element to correspond with designation of claim elements.

21. A system comprising:
[21.1]one or more processors configured to perform at
least:

⁵ The parties agree that proposed substitute claims 22–29 were amended to recite the same amended features recited in claim 21. *See* MTA 21–23; Opp. MTA 19–25.

[21.2]accessing a memory that stores at least a knowledgebase that includes a first circumstance representation correlated with a first one or more instruction sets for operating a first device, wherein the first circumstance representation represents a first circumstance detected at least in part by one or more sensors of the first device, and wherein at least a portion of the first circumstance representation or at least a portion of the first one or more instruction sets for operating the first device is learned in a learning process that includes operating the first device at least partially by a user;

[21.3]generating or receiving a second circumstance representation, wherein the second circumstance representation represents a second circumstance detected at least in part by: the one or more sensors of the first device, or one or more sensors of a second device;

[21.4]anticipating the first one or more instruction sets for operating the first device based on at least partial match between the second circumstance representation and the first circumstance representation; and

[21.5]at least in response to the anticipating, executing the first one or more instruction sets for operating the first device, wherein the first device or the second device autonomously performs one or more operations defined by the first one or more instruction sets for operating the first device;

[21.6]wherein the first circumstance representation includes a first one or more object representations, and wherein the second circumstance representation includes a second one or more object representations;

[21.7]wherein the second circumstance representation represents the second circumstance detected at least in part by the one or more sensors of the first device, and wherein the first device autonomously performs the one or more operations defined by the first one or more instruction sets for operating the first device;

[21.8] wherein the first one or more object representations of the first circumstance representation comprise a first object representation and a second object representation;

[21.9] wherein the first object representation includes a first data structure generated at least by:

[21.10] processing one or more digital pictures to detect: a type of a first object, a location of the first object, and a size of the first object; and

[21.11] in response to the processing, generating the first data structure that includes: a label indicating the detected type of the first object, a coordinate indicating the detected location of the first object, and a computer model indicating the detected size of the first object;

[21.12] wherein the second object representation includes a second data structure generated at least by:

[21.13] processing one or more digital pictures to detect: a type of a second object, a location of the second object, and a size of the second object; and

[21.14] in response to the processing, generating the second data structure that includes: a label indicating the detected type of the second object, a coordinate indicating the detected location of the second object, and a computer model indicating the detected size of the second object;

[21.15] wherein the first data structure and the second data structure are correlated with the first one or more instruction sets for operating the first device.

MTA App. A 1–3.

A. Legal Standard

Petitioner bears the burden of persuasion to show that any proposed substitute claim is unpatentable by a preponderance of the evidence.

Lectrosonics, Inc. v. Zaxcom, Inc., IPR2018-01129, Paper 15 (PTAB Feb. 15, 2019) (precedential); 37 C.F.R. § 42.121(d)(2). “Before considering the patentability of any substitute claims, however, the Board first must determine whether the motion to amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121.”

Lectrosonics, Paper 15 at 4–8. Patent Owner bears the burden of persuasion to show by a preponderance of the evidence that the motion to amend complies with these requirements. 37 C.F.R. § 42.121(d)(1). Specifically, a

patent owner must make an initial showing to demonstrate the following: (1) that a “reasonable number of substitute claims” have been proposed for each challenged claim (35 U.S.C. § 316(d)(1)(B)); (2) that the proposed amendments respond to a ground of unpatentability involved in the trial (37 C.F.R. § 42.121(a)(2)(i)); and (3) the amendments do not seek to enlarge the scope of the claims and do not introduce new matter (35 U.S.C. § 316(d)(3)). *Lectrosonics*, Paper 15 at 4–8.

B. The Acting Director’s Decision

The Acting Director’s Decision instructs us on remand “to consider Patent Owner’s arguments as to . . . proposed substitute claim 21” and “[r]egardless of the Board’s disposition on remand, the Board should explain more fully its findings as to . . . proposed substitute claim 21.” DR Dec. 2. The Acting Director’s Decision refers to “two limitations in proposed substitute claim 21” and states that the Acting Director remands “to the Board for consideration of the arguments made in Patent Owner’s request for Director Review.” *Id.* at 1–2. Patent Owner’s Request for Director Review refers to only our analysis of limitations 21.10 and 21.15 in our unpatentability analysis of claim 21. *See generally* DR Req. This Decision, therefore, pertains to only limitations 21.10 and 21.15, as well as similar recitations in proposed substitute claims 22–29. We maintain all other findings and determinations in our 2024 Final Written Decision regarding the proposed substitute claims and Patent Owner’s Motion to Amend including, for example, our determination that Patent Owner’s motion to amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121. 2024 Final Dec. 89–91. We also maintain our findings regarding Petitioner’s reasons to combine the asserted prior art

in the manner recited in the proposed substitute claims, including our findings as to why we found Petitioner’s reasons persuasive and why we found that Patent Owner’s arguments do not undermine Petitioner’s showing. *Id.* at 92–97.

*C. Obviousness of Proposed Substitute Claim 21 over
Grotmol and Hickman*

1. Element 21.10

Patent Owner argues that we erred regarding “processing one or more digital pictures to detect: . . . a location of the first object, and a size of the first object” recited in element 21.10. Claim 21 is a proposed substitute for claim 4, which was cancelled. 2024 Final Dec. 114. Claim 4 depended from claim 3, which depends from disclaimed claim 1. Disclaimed claim 1 recites accessing memory that stores data about objects in a robot’s environment. Element 21.10 recites more specific detail regarding how the data stored in memory is obtained. Specifically, element 21.10 recites “processing one or more digital pictures to detect: a type of a first object, a location of the first object, and a size of the first object.” MTA App. A 2–3.

The issue before us relating to element 21.10 is whether the asserted prior art teaches detecting two of the three items of data, specifically “a location of the first object, and a size of the first object.” Patent Owner argues “*the Panel never found or discussed proper prior art disclosures regarding processing digital pictures to detect these specific claimed things (location and size of the first object).*” DR Req. 7.

Petitioner groups its arguments for element 21.10 with its arguments for elements 21.9 and 21.11. Petitioner argues that the combination of Grotmol and Hickman teaches elements [21.9]–[21.11]. Opp. MTA 20–22

(citing, e.g., Ex. 1005, 6:60–67, 10:41–56, 11:9–24:64, Fig. 3; Ex. 1010 ¶¶ 88–90).

Regarding element 21.10, in our 2024 Final Written Decision, we identified teachings in the prior art of processing digital pictures to detect size and location of an object. For example, we stated the following:

We turn to Patent Owner’s arguments that neither Grotmol nor Hickman teach “processing one or more digital pictures to detect: a type of a first object, a location of the first object, and a size of the first object.” Reply MTA 4–5; Sur-sur-reply MTA 6. We disagree and instead find that Petitioner’s arguments are consistent with and supported Grotmol’s and Hickman’s teachings. For instance, Hickman discloses a robot interacting with an object, collecting data via sensors, and entering data obtained from that interaction into the shared robot knowledge base. Ex. 1005, 3:16–26 (describing that “robots may enter data into the shared robot knowledge base,” including, for example, “data about objects they encounter”), 3:46–55 (describing a robot “interacting with [an] object” and determining that “the object weighs more or less than indicated” by received data associated with the object) 6:60–67 (describing a robot collecting “data via one or more sensors” and uploading “the data to the cloud computing system 102”). Hickman also discloses its cloud system receiving and processing images from robots updating its knowledge bases with information as a result of the image processing. Ex. 1005, 25:24–46 (describing “[a]fter obtaining image data associated with the object 405, the robot 404 sends an identification query 406 to the cloud processing engine 402,” which “may include some of the image data associated with the object 405” and “the cloud processing engine 402 may analyze the image data” and may extract “meaningful information from the image via digital image processing techniques”), 13:32–34 (describing that “*image data (IMG)* may be used in connection with object recognition *algorithms executed by the cloud processing engine 305* to identify a ‘unique’ object”) (emphases added). Additionally, Grotmol discloses detecting locations and sizes of objects in images acquired by the robot. Ex. 1004, 39:13–17 (describing storing images in memory and performing

preprocessing operations including “*feature* extraction”) (emphasis added), 28:19–25 (describing that “[a]s used herein the term *feature* may be used to describe one or more integer or floating point values *characterizing the input*, e.g., the presence or absence of an edge, corner, shape, texture, color, object, *at particular locations in the image*”) (emphases added), 10:26–32 (describing that a context may include “state of the environment (e.g., *object size, location*)”), 31:23–27 (describing in “*vision based* robotic navigation” the “*size* of a target,” such as “a ball 174 in FIG1” may be used for “feature scaling” that is “within a visual frame” and may contribute to a “*distance* determination”) (emphases added).

2024 Final Dec. 104–106.

Regarding “processing one or more digital pictures to detect” “a size” and “a location” of “the first object,” we agree with Petitioner (Sur-reply MTA 1, 3–4) that Grotmol expressly teaches this recitation. Grotmol, for example, discloses that in “implementations of robotic vehicle navigation,” the “output of the sensor 166 in FIG. 1 may comprise representations of one or more objects” such that robot vehicle navigation may be configured based on “state of the environment (e.g., *object size, location*).” Ex. 1004, 10:23–32 (cited in Pet. 13; Sur-reply MTA 3) (emphasis added); *see also id.* at 31:23–37 (describing using the “*size* of a target,” such as “a ball 174 in FIG. 1” for robotic vehicle navigation) (cited in Pet. Sur-reply 3) (emphasis added).

Hickman also discloses processing one or more digital pictures to detect information. For instance, Hickman describes “[a]fter obtaining image data associated with the object 405, the robot 404 sends an identification query 406 to the cloud processing engine 402,” which “may include at least some of the image data associated with the object 405” and “the cloud processing engine 402 may analyze the image data” and may extract

“meaningful information from the image via digital image processing techniques.” Ex. 1005, 25:24–46. Hickman also discloses that “*image data (IMG)* may be used in connection with object recognition *algorithms executed by the cloud processing engine 305* to identify a ‘unique’ object.” *Id.* at 13:32–34 (emphasis added). Hickman also discloses a robot collecting data and entering data obtained from its interaction with an object into the shared robot knowledge base. *Id.* at 3:16–26 (describing that “robots may also enter data into the shared robot knowledge base,” including, for example, “data about objects they encounter”), 3:46–55 (describing a robot “interacting with [an] object” and determining that “the object weighs more or less than indicated” by received data associated with the object), 6:60–67 (describing a robot collecting “data via one or more sensors” and uploading “the data to the cloud computing system 102”).

Additionally, Petitioner’s arguments regarding detecting size of an object are supported by Hickman’s disclosure of its data structure 314. Hickman discloses data structure 314 of the general object knowledge base 308 including “specification data (SPC)” corresponding to an “individual general object identifier (GID).” *Id.* at 18:4–7. Hickman describes that the specification data “may include physical attributes associated with the particular ‘type’ of object,” such as “physical dimensions (height, width, depth, shape, volume, area, etc.).” *Id.* at 18:8–14. Petitioner provides persuasive arguments regarding the obviousness of storing detected object size in data structure 314. *See, e.g.,* Sur-reply MTA 3–4 (arguing that Hickman’s knowledge bases 307–309 store location and size data and that combining those teachings with the teachings of detecting size and location of objects by robots and uploading that information to knowledge bases

“would have been straightforward and obvious”); *see also id.* at 2 (arguing that “Hickman provides significant flexibility in the design and arrangement of data in its knowledge bases”). Petitioner’s other arguments regarding reasons why a person of ordinary skill would have combined the teachings of Grotmol and Hickman are persuasive for the reasons given in our 2024 Final Written Decision. 2024 Final Dec. 92–97.

Furthermore, Petitioner’s arguments regarding detecting location of an object are supported by Hickman’s disclosure that data structure 313 of unique object knowledge base 307 includes “location data (LOC)” corresponding “to a particular unique object identifier (UID).” Ex. 1005, 13:64–14:6. Hickman discloses that location data “corresponds to the location of the unique object” and “may include GPS [Global Positioning System] coordinates and/or other location-based information.” *Id.* Hickman further discloses, for example, that “location data (LOC) corresponding to a ‘unique’ car may include GPS coordinates indicating the last recorded location of the car” and “location data (LOC) corresponding to a ‘unique’ musical instrument may include GPS coordinates and links to map information” that describe the location of the musical instrument in a closet. *Id.* at 14:15–27.

Patent Owner argues “[i]t is unclear why the Panel disavowed its own clearly explained and well-supported reasoning from the PG, because the FWD does not address this change in course.” DR Req. 6–7. In the 2024 Final Written Decision, we stated the following:

In our Preliminary Guidance, we stated “[w]e find Petitioner’s contentions and evidence insufficient to demonstrate that Hickman teaches “*processing one or more digital pictures to detect . . . a size of a first object*” recited in claim element [21.10] and “*generating the first data structure that includes . . .*

a computer model indicating the detected size of the first object” recited in claim element [2.11].” PG 7. We further stated the following:

We find Petitioner’s contentions unpersuasive, based on the current record, because Hickman does not teach or suggest detecting “a size” of the first and second objects recited in claim element [2.10]. Instead, Hickman describes that “image data received from the robot” is analyzed “to determine whether the object in the image data received from the robot corresponds to a general object identifier (GID) in the general object knowledgebase 308,” which “corresponds to a particular ‘type’ of object.” Ex. 1005, 17:1–16. Physical attribute data is stored in connection with the GID. *Id.* at 18:4–14 (describing data stored in connection with the GID as including “physical dimensions (height, width, depth, shape, volume, area, etc.)”), 18:15–16 (describing that a “type” of “coffee mug” might have “a height (6 inches)” and “width (4 inches)”). Thus, based on the record before us, we are not persuaded that Hickman’s physical attribute data is detected.

Id. at 7–8. We also discussed Petitioner’s contentions regarding a combination of Hickman’s specification data and model data made in connection with element [2.11] and stated that we found those contentions “unpersuasive, based on the current record.” *Id.* at 8–9.

2024 Final Dec. 99.

We explained in our 2024 Final Written Decision that subsequent to our Preliminary Guidance, Petitioner provided persuasive arguments and evidence. *Id.* at 101. In particular, we noted the following:

In its Sur-reply, Petitioner argues that the analysis in our Preliminary Guidance was “incorrect.” Sur-reply MTA 1. Petitioner, more specifically, argues as follows:

GHC further discloses and renders obvious that the object size (“physical dimensions”)

provided by the SPC field and the object coordinates provided by the LOC field can be “detected” by processing digital pictures. For example, Hickman explains that data in its knowledge bases can be entered and updated automatically by authorized robots. TESLA1005, 3:8–11, 3:16–26, 3:46–55, 5:7–12, 10:53–56, 11:20–30. Hickman’s cloud system receives images from robots or information about objects detected in images and uses that information to update its knowledge bases. TESLA1005, 25:24–46, FIG. 4. Further, in the combination, Grotmol’s robots share images and their features and training sets with Hickman’s cloud system. Opposition, 13–16. Grotmol expressly teaches that the image features that would be sent to Hickman’s cloud include locations and sizes of objects detected in images acquired by the robot. TESLA1004, 10:31–32 (“object size, location”), 39:13–17, 28:19–25, 4:9–11, 10:26–32, 31:23–27, 48:65–67, FIG. 10A (depicting image feature extractors). Detecting the size and location of objects from digital pictures is thus expressly disclosed in Grotmol and would have been straightforward and obvious to implement in the GHC. Hickman similarly confirms that its robots too can detect the information that it sends to the cloud system, including object location and size information for updating the knowledgebases. TESLA1005, FIG. 3, 6:60–67, 10:41–56, 11:9–24:64.

Sur-reply MTA 3–4.

2024 Final Dec. 100–101.

In its Request for Director Review, Patent Owner argues the following:

[T]he FWD first turns to the claimed location and size at the bottom of page 105. FWD at 105–106 (“Additionally, Grotmol discloses detecting locations and sizes of objects in images

acquired by the robot.”). But the specific portions of Grotmol cited by the FWD simply do not disclose processing digital pictures to detect location and size of the first object. PO specifically argued this point. MTA Sur-Sur-Reply (Paper 44) at 6 (“Petitioner’s citations of Grotmol say nothing about these features. Grotmol discloses comparing images based on image features (corners, edges, etc.), but not processing object properties such as type/location/size. And neither Grotmol nor Hickman discloses or suggests processing images to detect such object properties.”). At the top of page 106, the FWD mentions Grotmol’s feature extraction, citing Ex. 1004 (Grotmol) at 39:13–17, 28:19–25, but even the FWD noted that Grotmol’s features refer to values characterizing the input image, *e.g.*, “the presence or absence of an edge, corner, shape, texture, color, object, at particular locations in the image.” FWD at 106. But edges, corners, and other features quoted by the Panel are image features, not object location and size, as PO noted its MTA Sur-Sur-Reply. The FWD also cites Grotmol 10:26–32 regarding “state of the environment (*e.g.*, object size, location)” and Grotmol 31:23-27 regarding “size of a target” and “distance determination.” FWD at 106. But none of these equates to disclosing or suggesting ***processing digital pictures to detect the*** location and size of the first object. MTA Reply (Paper 34) at 4-5.; *see also* PG at 8.

DR Req. 7–8.

We find that Patent Owner’s arguments are not supported by Grotmol’s disclosures, considered as a whole. Grotmol’s disclosures regarding feature extraction teach processing digital images to detect and extract features. Ex. 1004, 39:13–17 (describing storing images in memory and performing preprocessing operations including “*feature* extraction”) (emphasis added), 28:19–25 (describing that “[a]s used herein the term *feature* may be used to describe one or more integer or floating point values *characterizing the input*, *e.g.*, the presence or absence of an edge, corner, shape, texture, color, object, *at particular locations in the image*”)

(emphases added). Grotmol describes extracting features “at particular locations in the image,” which teaches processing a digital image, and those features that are extracted by processing the image include “an edge” or “corner,” which may define a limit of an object. *Id.* at 28:19–25. Contrary to Patent Owner’s arguments, we must consider Grotmol’s disclosures as a whole, including the aforementioned disclosures in Grotmol of processing digital images and detecting items within an image.

With respect to the express disclosures in Grotmol of detecting size and location of an object (Ex. 1004, 10:26–32 (describing that a context may include “state of the environment (e.g., object size, location)”), 31:23–30 (describing in “vision based robotic navigation” the “size of a target,” such as “a ball 174 in FIG. 1” may be used for “feature scaling” that is “within a visual frame” and may contribute to a “distance determination”)), Patent Owner argues only that none of these equates to disclosing or suggesting processing digital pictures to detect the location and size of the first object. DR Req. 8. We disagree for the reasons given above quoting our 2024 Final Written Decision (2024 Final Dec. 104–106), and we provide the following additional explanation as to why we are persuaded by Petitioner’s contentions.

Grotmol teaches that “sensor component 166 may comprise a camera configured to provide an output comprising a plurality of digital image frames.” Ex. 1004, 10:16–22. Grotmol also teaches that “output of sensor 166 in FIG. 1 may comprise representations of one or more objects,” so that “[t]he tasks of the robot may be configured based on . . . state of the environment (e.g., object size, location).” Ex. 1004, 10:23–34; *see* Sur-reply MTA 3–4. Thus, Grotmol teaches processing the sensor component’s digital

pictures to detect an object's size and location. In light of the strength of the prior art supporting Petitioner's arguments and detailed claim element mapping, we find that Patent Owner's argument does not undermine Petitioner's showing.

We find that a person of ordinary skill in the art, reading Grotmol as a whole, would have understood that Grotmol teaches detecting "size" and "location" of an object for autonomous robot navigation. *See Sundance, Inc. v. DeMonte Fabricating Ltd.*, 550 F.3d 1356, 1361 n.3 (Fed. Cir. 2008) ("What a prior art reference discloses or teaches is determined from the perspective of one of ordinary skill in the art."); *In re Hedges*, 783 F.2d 1038, 1041 (Fed. Cir. 1986) (noting that when evaluating claims for obviousness, "the prior art as a whole must be considered").

In its Request for Director Review, Patent Owner next argues the following:

The FWD then cites disclosures of Hickman, including citation to Ex. 1005 (Hickman) at 13:64–14:6 regarding "location of the unique object" and citation to Hickman 14:15–27 regarding "location data ... [that] may include GPS coordinates." FWD at 106. The FWD further cites Hickman 18:10–14 regarding "physical dimensions (height, width, depth, shape, volume, area, etc.)." FWD at 106–107. But again, none of that discloses ***processing digital pictures to detect the*** location and size of the first object.

Dr. Req. 8–9.

Patent Owner's arguments discuss certain of Hickman's disclosures without considering the combined teachings of Hickman and Grotmol as a whole. As discussed in our 2024 Final Written Decision (2024 Final Dec. 105), in addition to the disclosures above, Hickman also describes that robots "encounter[] an object," "collect information about the object," and

“send the collected data to the shared robot knowledge base for storage and future retrieval.” Ex. 1005, 3:16–26. Hickman further describes that robot 404 obtains “image data associated with the object 405” and that “the cloud processing engine 402 may analyze the image data” to extract “meaningful information from the image via digital image processing techniques.” *Id.* at 25:24–46, FIG. 4. Hickman describes a robot learning a physical attribute, specifically the weight, associated with of the type of object, specifically a “type of hammer,” and storing that data in shared robot knowledge base 306. *Id.* at 11:20–23. Hickman also describes that its data structure 314 used to store data in shared knowledge base 306 includes “many different physical attributes of a particular ‘type’ of object” such as “weight,” as well as “physical dimensions (height, width, depth, shape, volume, area, etc.).” *Id.* at 18:3–14. Thus, Hickman teaches that “meaningful information” includes “physical dimensions (height, width, depth, shape, volume, area, etc.).” *Id.* We find that Patent Owner’s arguments do not undermine Petitioner’s showing in light of the strength of the prior art disclosures identified by Petitioner.

In its Request for Director Review, Patent Owner concludes with the following “the Panel has ignored what is specifically recited in limitation [21.10] and instead used unrelated teachings or extreme generalities to somehow arrive at the claimed elements, without providing/analyzing a mapping of the actual claim elements to prior art.” DR. Req. 9. We disagree. As shown in the 2024 Final Written Decision and again herein, Petitioner has provided a detailed analysis showing that the combination of Grotmol and Hickman teaches element 21.10 and Petitioner’s contentions are well-supported by the cited prior art teachings. Patent Owner’s arguments that the

teachings are “unrelated” and that Petitioner relies on “extreme generalities” mischaracterize Petitioner’s arguments and evidence.

Based on the arguments and evidence of record, including the arguments in Patent Owner Request for Director Review, we find that the combination of Grotmol and Hickman teaches element 21.10. We maintain our findings in our 2024 Final Written Decision as to why we are persuaded that the combination of Grotmol and Hickman discloses the recitations in element 21.10. We also maintain our findings in the 2024 Final Written Decision as to why we are persuaded that a person of ordinary skill in the art would have combined Grotmol and Hickman’s teachings in the manner recited in claim 21 for the reasons given by Petitioner. The discussion herein provides further explanation consistent with the instructions in the Acting Director’s Decision as to why we find that Petitioner’s contentions are consistent with and supported by the combined teachings of Grotmol and Hickman and why we find Patent Owner’s arguments do not undermine Petitioner’s showing.

2. *Element [21.15]*

Element [21.15] recites “wherein the first data structure and the second data structure are correlated with the first one or more instruction sets for operating the first device.” MTA App. A 3. Patent Owner argues that our 2024 Final Written Decision “did not address how the prior art allegedly discloses or suggests that the first and second data structures are correlated with the first one or more instruction sets for operating the first device.” DR Req. 9 (emphasis omitted).

The recitation of “the first data structure” derives antecedent basis from elements 21.9 and 21.11, the latter of which recites “generating the first

data structure.” The recitation of “the second data structure” derives antecedent basis from elements 21.12 and 21.14 and element 21.14 recites “generating the second data structure.” In its Request for Director Review, Patent Owner does not dispute that the prior art teaches generating the first and second data structures. *See generally* DR Req.

The recitation of “the first one or more instruction sets for operating the first device” derives antecedent basis from element 21.2, which recites “accessing a memory that stores at least a knowledgebase that includes a first circumstance representation correlated with a first one or more instruction sets for operating a first device.” Claim 21 is a proposed substitute for cancelled claim 4, which is dependent from claim 3, which depends from claim 1. Proposed claim 21 includes the recitations from claims 1, 3, and 4, and further includes additional features in the proposed amendment to attempt to distinguish over the prior art. MTA 2–3; MTA App. 1–3.

Element 21.2 is substantially similar to part of element 1.3, which recites “*accessing a memory that stores at least a knowledgebase that includes: a first correlation including a first circumstance representation correlated with a first one or more instruction sets for operating a first device*, wherein the first circumstance representation represents a first circumstance detected at least in part by one or more sensors of the first device” (emphasis is of portion of element 1.3 that is substantially the same as element 21.2). As recited in elements 21.6, 21.8, 21.9, and 21.12, the “first circumstance recitation” in element 21.2 comprises the “the first data structure and the second data structure.” None of elements 21.6, 21.8, 21.9,

or 21.12 is the subject of Patent Owner's Request for Director Review. *See generally* DR Req.

In its Preliminary Response, Patent Owner stated that it disclaimed independent claim 1 of the '344 patent. Prelim. Resp. 1 (citing Ex. 2004; 37 C.F.R. § 42.107(e)). Nonetheless, because other challenged claims depend from claim 1, we provided a full element-by-element analysis of disclaimed claim 1 in our Institution Decision. Inst. Dec. 24–28. We stated “Patent Owner is cautioned that any arguments not raised in the response may be deemed waived.” Paper 21, 9. Patent Owner did not dispute Petitioner's contentions for claim 1 in its Patent Owner Response. *See generally* PO Resp. Claim 4 depended from claim 3, which depends from claim 1 and, therefore includes all recitations in claim 1. Although claim 3 was not the subject of Patent Owner's disclaimer (Prelim. Resp. 1; Ex. 2004), Patent Owner also has not disputed Petitioner's element-by-element analysis for claim 3. *See generally* PO Resp.; PO Sur-reply. Patent Owner has not disputed Petitioner's element-by-element analysis for either claim 1 or claim 3 at any time during this proceeding.

In our 2024 Final Written Decision, we addressed Petitioner's contentions for claims 1 and 3 with citations to pertinent evidence and determined that the evidence supports Petitioner's arguments. 2024 Final Dec. 20–27. Because Petitioner's contentions were not disputed by Patent Owner, merely adopting those contentions with no further analysis or explanation would have been sufficient. *In re Nuvasive, Inc.*, 841 F.3d 966, 974 (Fed. Cir. 2016) (“Although the Board did not make findings as to whether any of the other claim limitations . . . are disclosed in the prior art, it did not have to: NuVasive did not present arguments about those limitations

to the Board.”); *cf. LG Elecs., Inc. v. Conversant Wireless Licensing S.A.R.L.*, 759 F. App'x 917, 925 (Fed. Cir. 2019) (nonprecedential) (“The Board is not required to address undisputed matters or arguments about limitations with which it was never presented.”) (internal quotation omitted). Nonetheless, we discussed Petitioner’s contentions for claims 1 and 3. 2024 Final Dec. 20–27.

Claims 1 and 3 are not the subject of this remand and we do not revisit our findings and determinations regarding claims 1 and 3 here. We do, however, set forth those findings and determinations in light of the substantial similarity between the undisputed recitations in claims 1 and 3 and element 21.2, in light of the arguments in Patent Owner’s Request for Director Review disputed element 21.15, which derives antecedent basis from element 21.2.

With respect to element 1.3, in our 2024 Final Written Decision, we stated the following:

Petitioner argues that Grotmol discloses element [1.3] by describing a memory component that stores training sets, images of scenes from a robot vehicle’s operation, and motor controls. Pet. 12–16 (citing, e.g., Ex. 1004, code (57), 3:27–39, 8:66–9:3, 9:8–22, 10:23–26, 33:59–62, 38:36–58, 39:13–28, 43:5–9; Ex. 1002 ¶¶ 165–172). Petitioner argues that Grotmol’s disclosure corresponds to the elements of claim 1 as follows: (1) Grotmol’s “training sets” correspond to “multiple correlations” recited in the claim; (2) Grotmol’s “image of [a] scene from a robot vehicle’s operation” corresponds to a “circumstance representation” recited in claim 1; and (3) Grotmol’s “motor control indication configured to cause the robot to execute an action” corresponds to “[one or more] instruction set[s] for operation of a first device” recited in claim 1. *Id.* at 13 (citing Ex. 1004, 3:31–39, 8:66–9:3, 10:23–26, 38:36–58, 39:13–22).

Petitioner’s argument is supported by the evidence cited in the Petition. For instance, regarding a “circumstance

representation,” we find that Grotmol’s disclosures relied on by Petitioner describe that “the output provided by the sensor component 166 may comprise *a stream of pixel values* associated with one or more digital images.” Ex. 1004, 9:1–3 (emphasis added); *see also id.* at 8:31–32 (describing a sensor component that provides “a signal conveying a video frame comprising *a plurality of pixels*” (emphasis added)). We also find that Grotmol discloses “a first one or more instruction sets.” *See, e.g.*, Ex. 1004, 3:27–39 (describing a “self-contained robotic apparatus” that includes a “memory component” that is configured “to store training sets,” which include “an instance of a motor control indication configured to cause the robot to execute an action”), 10:23–26 (describing that “tasks of the robot may be configured based on a context”), 39:13–22 (describing that “[d]uring training images (e.g., raw and/or pre-processed) may be stored in a memory buffer” and “[m]otor commands issued by a trainer corresponding to time instances when images are acquired may be stored”).

2024 Final Dec. 21–22.

With respect to claim 3, from which cancelled claim 4 depended, in our 2024 Final Written Decision, we stated the following:

Petitioner argues that Grotmol discloses claim 3 by describing images comprising representations of objects, including trees, rectangles, and balls. Pet. 23–25 (citing Ex. 1004, 8:57–9:13, 9:41–52, 38:54–39:12, Fig. 20A; Ex. 1002 ¶¶ 165–173, 184–188). Petitioner, more specifically, argues the following:

Grotmol discloses that images 2000 and 2010 may “comprise representations of visual field that may be obtained at times $t_1 < t_2$, respectively.” Ex. 1004, 38:54–56. These same images 2000 and 2010 may “comprise *representations [of] one or more objects*, e.g., a tree 2002, a rectangle, a ball 2008, and/or other objects.” Ex. 1004, 38:56–65; *see also id.*, 38:65–39:12 (referring to objects shown within images 2000 and 2010 as “object representations” and “representations”).

Pet. 24. In connection with claim 3, Petitioner also identifies Grotmol's disclosure of implementations of "object recognition," in which sensor component 166 provides an output comprising a stream of pixels associated with one or more digital images that is analyzed. *Id.* at 25 (citing Ex. 1004, 8:57–9:13, 9:41–52). Petitioner's argument is supported by the evidence cited in the Petition.

2024 Final Dec. 26–27.

With respect to element 21.8, Petitioner argues the following:

In Grotmol, the "***first circumstance representation***" includes various types of data including, but not limited to, a collection of object representations, such as images of objects in a training set detected by one or more robot sensors, and data structures related to the objects and images. TESLA1004, FIGS. 20A, 20B; 38:43–39:12. For example, as illustrated in Grotmol's FIGS. 20A, 20B, image 2000 is an example part of a "***first circumstance representation***" and "may comprise representations one or more objects, e.g., a tree 2002, a rectangle, a ball 2008, and/or other objects," any two of which are part of the "***first object representation***" and the "***second object representation***," respectively. TESLA1004, FIG. 20A, 38:43–39:12.

Opp. MTA. 19–20; *see also* Pet. 13 (arguing with respect to element 1.3 that Grotmol's "image of [a] scene from a robot vehicle's operation" corresponds to a "circumstance representation"). Patent Owner does not dispute that Petitioner's arguments and evidence show that the element 21.8 is taught by the asserted prior art. *See generally* Reply MTA; Sur-sur-reply MTA; DR Req.

Our 2024 Final Written Decision included a summary of Grotmol's disclosures. As shown in that summary, the scene illustrated in Figure 20A includes multiple objects including a tree, a rectangle, and a ball. Ex. 1004, Fig. 20A. As discussed with respect to element 1.3, Grotmol discloses that information relating to those objects is correlated in a training buffer to

instructions that are used for autonomous vehicle operation. *See, e.g.*, Ex. 1004, 3:27–39 (describing a “self-contained robotic apparatus” that includes a “memory component” that is configured “to store training sets,” which include “an instance of a motor control indication configured to cause the robot to execute an action”), 10:23–27 (describing that “tasks of the robot may be configured based on a context”), 39:13–22 (describing that “[d]uring training images (e.g., raw and/or pre-processed) may be stored in a memory buffer” and “[m]otor commands issued by a trainer corresponding to time instances when the images are acquired may be stored”).

Part of our summary of Grotmol in our 2024 Final Written Decision with additional details regarding Grotmol’s disclosures is reproduced below.

Grotmol further describes a “mechanism for enabling a robot to learn navigating a target trajectory while reducing deviation from a target path.” *Id.* at 38:33–35. The robot comprises robotic vehicle 160, camera 166, and “a controller configured to store a sequence of images obtained during training phase.” *Id.* at 38:36–39. Figure 20A from Grotmol is shown below.

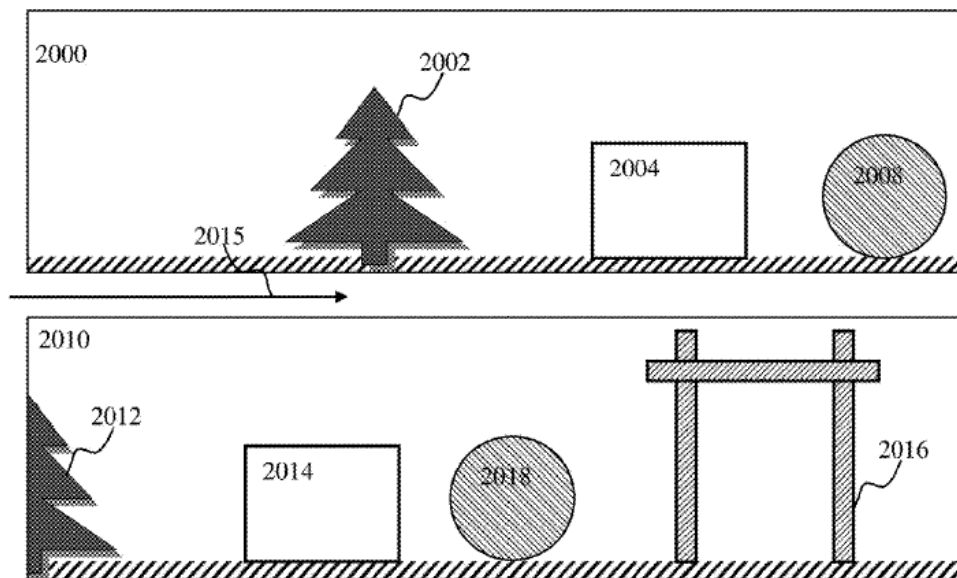


FIG. 20A

Figure 20A illustrates images 2000, 2010 obtained with a camera 166 mounted on a robotic vehicle 160. *Id.* at 38:43–54. Grotmol explains that image 2000 comprises “representations [of] one or more objects, e.g., a tree 2002, a rectangle, a ball 2008, and/or other objects.” *Id.* at 38:56–58. Grotmol further explains that image 2010 is obtained after execution of a turn and representations of objects are shifted “relative [to] representations of the same objects in the frame obtained prior to the turn execution.” *Id.* at 38:60–65.

During autonomous operation, the control process of the robot is configured to compare a current or recent image with the one or more images from the training buffer. *Id.* at 39:23–28. “Motor commands issued by a trainer corresponding to time instances when the images are acquired” also are stored. *Id.* at 39:17–19. Grotmol describes motor commands are obtained “by taking the stored motor commands from the training buffer” that correspond to “the best matching stored image.” *Id.* at 43:5–9.

2024 Final Dec. 18–20.

Patent Owner argues that “the Panel fail[ed] to address the ‘correlated’ and the first and second data structures for [21.15]” and the Panel does not address “that the first data structure and the second data structure must **both** be correlated with the first one or more instruction sets for operating the first device as recited in [21.15].” DR Req. 10. As we stated in the 2024 Final Written Decision

Petitioner argues a person of ordinary skill in the art would have understood that in the Grotmol and Hickman combination the first and second data structures are correlated with the first one or more instruction sets for operating the first device. Opp. MTA 24 (citing Ex. 1004, 4:8–11, 8:57–9:3, 12:16–25, 17:21–34; Ex. 1010 ¶ 97). Petitioner also argues that “Hickman teaches that for each detected object, the knowledge base can store a data structure that includes ‘relevant tasks that a robot may perform with the object’ in the task data (TASK) field.” *Id.* (citing Ex. 1005, 2:65–3:8, 15:28–43, 18:34–20:20; FIG. 3).

Petitioner’s arguments are supported by the cited evidence. *See, e.g.*, Ex. 1004, 8:57–9:3 (describing the “sensor

component 166” providing “information associated with objects within the field-of-view 168”), 12:16–25 (describing teaching a “robot one or more possible obstacle avoidance trajectories”), 17:21–34 (describing using “an image of an obstacle (e.g., wall representation in the sensor input 402) combined with rover motion” to generate a context and then “one or more commands [are] configured to avoid a collision between the rover and the obstacle”); *see also id.* at 39:17–19 (describing that “[m]otor commands issued by a trainer corresponding to time instances when the images are acquired may be stored”) (cited in Pet. 13 (in connection with Petitioner’s arguments for element [1.3])).

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To provide additional explanation, we find that Petitioner has made a persuasive showing because Grotmol discloses correlating images of a robot’s environment (circumstance representations) with instruction sets (motor commands). First, Grotmol describes a robot traversing multiple environments and that a robot’s environment includes multiple objects. For instance, Grotmol describes robotic apparatus 160 comprising sensor component 166, which provides “information associated with *objects within the field-of-view 168.*” Ex. 1004, 8:57–9:3 (emphasis added). In an obstacle avoidance implementation, the output of sensor component 166 includes “a stream of pixel values associated with one or *more digital images.*” *Id.* at 8:66–9:3 (emphasis added). Illustrated in Figure 1 is ball 174. *Id.* at Fig. 1. As discussed in connection with element 12.10 (*see* § III.C.1), Grotmol, for example, discloses that in “implementations of robotic vehicle navigation,” the “output of the sensor 166 in FIG. 1 may comprise representations of one or more objects” such that robot vehicle navigation may be configured based on “state of the environment (e.g., *object size, location.*)” Ex. 1004, 10:23–32 (cited in Pet. 13; Sur-reply MTA 3) (emphasis added); *see also id.* at 31:23–37 (describing using the “*size of a target,*” such as “a ball 174 in

FIG. 1” for robotic vehicle navigation) (cited in Pet. Sur-reply 3) (emphasis added). Additionally, as discussed in this sub-section, in Figure 20A of Grotmol, “image 2000 may comprise representations [of] one or more objects, e.g., a tree 2002, a rectangle, a ball 2008, and/or other objects.” *Id.* at 38:56–58.

Second, Grotmol further teaches correlating the first and second data structures with first one or more instruction sets for operating the first device, for example, for autonomous operation of the robotic device. For instance, Grotmol describes a “training buffer” in which “[m]otor commands issued by a trainer corresponding to time instances when the images are acquired may be stored.” Ex. 1004, 39:13–22 (cited in Pet. 13 (in connection with Petitioner’s uncontested arguments for element [1.3])); *see also id.* at 33:59–62 (describing that “[t]rained behaviors of the robotic device may be configured based on learning of associations between sensory context (e.g., presence of an obstacle in front of the robotic vehicle) and a respective action (e.g., right turn) during training”) (cited in Pet. 14, 16, 18, 22); 43:5–9 (describing that “motor commands at a given time step may be obtained by taking the stored motor commands from the training buffer that may correspond to the best matching stored image”) (cited in Pet. 14, 19, 21). As discussed above, Grotmol teaches that an image may include representations of one or more objects. *Id.* at 38:56–58. Thus, Grotmol teaches correlating two data structures with a motor command. As further support for Petitioner’s arguments, Grotmol describes using “an image of an obstacle (e.g., wall representation in the sensor input 402) combined with rover motion” to generate a context and then “one or more commands [are]

configured to avoid a collision between the rover and the obstacle.” *Id.* at 17:21–34.

Third, we also find that Hickman provides additional teachings that support Petitioner’s argument. For example, we agree with Petitioner that Hickman’s TASKS field may store relevant tasks that a robot may perform with the object. MTA Opp. 24; Ex. 1005, 2:65–38, 15:28–43, 18:43–20:20, Fig. 3. We agree with Petitioner that one obvious and straightforward modification would have been to combine tables 313 and 314 into a single table, as set forth in Petitioner’s annotated version of a portion of Hickman’s Figure 5, such that each UID would have a corresponding GID (type) field, a location (LOC) field, and a TASKS field. Pet. MTA Sur-reply 2. Petitioner’s argument is supported by Hickman’s disclosure that it is not limited to the particular arrangement in Figure 3, explaining that “the distribution of the information across the various component knowledge bases shown in FIG. 3 is merely one example of one embodiment” and “[t]he contents of the knowledge bases may be combined into a single common knowledge base or distributed across multiple different knowledge bases in a different fashion than described herein.” Ex. 1005, 10:61–66.

Although not necessary for our determinations herein, we agree with Petitioner’s argument (Opp. MTA 15–16) and find credible Dr. Janet’s testimony that the use of Hickman’s data structures for objects in Grotmol’s images “would better allow for robot queries in the cloud system to be received and processed, and for relevant data to be retrieved from the shared knowledge base.” Ex. 1010 ¶ 78 (citing Ex. 1005, 10:41–56, 11:9–30). Dr. Janet provides the example of receiving information from an image including a specific car model, and then using the information stored in data

structure 313 to identify that car model. *Id.* Thus, as Dr. Janet explains, using Hickman’s data structures to store information about objects in Grotmol’s images “would have improved knowledge sharing and object matching capabilities, thereby improving performance of Grotmol’s system.” *Id.*

Patent Owner’s arguments to the contrary do not overcome Petitioner’s showing. For instance, Patent Owner directs us to its argument below.

[N]o single row, much less two rows, in any of Hickman’s tables includes all of the claimed label, coordinates, and computer model. Thus, there are no first/second data structures in GHC that can be correlated with the recited instruction sets. Even if a row in any of Hickman’s actual tables is considered, Petitioner’s assertion that “[n]othing about Hickman’s in the proposed combination disturbs this fundamental aspect of Grotmol’s teachings” is wrong. MTA Sur-Reply, 6. Since Hickman always operates on a single object instead of in a recited first multi-object circumstance, each of Hickman’s object-related rows only has its own separate TASKS field, whereas [21.15] recites first/second data structures are both correlated with all of the same instruction sets.

DR Req. 10–11 (quoting MTA Sur-Sur-Reply 7–8).

We find Patent Owner’s argument is unavailing because it is not supported by Grotmol’s and Hickman’s teachings considered as a whole. As discussed above, Grotmol teaches correlating an image that includes representations of two objects with a single motor command. Ex. 1004, 38:56–58, 39:13–22. With respect to Patent Owner’s argument regarding a single row of Hickman failing to meet the claim recitation, we provide further explanation above as to why we are persuaded by Petitioner’s proposed modification shown in its annotated version of Figure 5. As we note, Hickman expressly discloses “[t]he shared robot knowledge base 306

may contain additional or fewer knowledge bases than the ones shown in FIG. 3,” “the distribution of the information across the various component knowledge bases shown FIG. 3 is merely one example of one embodiment,” and “[t]he contents of the knowledge bases may be combined into a single common knowledge base.” Ex. 1005, 10:57–11:8.

We find unavailing Patent Owner’s argument that “Grotmol’s image depicting two objects in the same circumstance cannot logically be replaced by two object-related rows of Petitioner’s hypothetical table because the two object-related rows represent objects from different circumstances” and Patent Owner’s characterization of this as a “fundamental aspect of Grotmol’s teachings” that prohibits combining Grotmol’s and Hickman’s teachings. PO Sur-sur-reply 7–8 (emphasis omitted). Instead, we are persuaded by Petitioner’s reasons to combine Grotmol and Hickman and we adopt them as our own. Opp. MTA 13–16. We specifically discuss above why we are persuaded by Petitioner’s arguments that its proposed combination would “better allow for robot queries in the cloud system to be received and processed, and for relevant data to be retrieved from the shared knowledge base.” Opp. MTA 15–16. We also maintain our findings regarding Petitioner’s reasons to combine given in our 2024 Final Written Decision. 2024 Final Dec. 67–73, 92–97. Patent Owner does not cite to any disclosure in Hickman to support its argument that each of Hickman’s rows is a different circumstance and, even to the extent it is true, we are persuaded by Petitioner’s argument and evidence that a person having ordinary skill in the art would have been motivated to combine, for example, the detected size of a ball stored in Hickman’s data structure with an environment

including that ball, such as the environment disclosed in Grotmol having a tree, ball, and rectangle.

We also find unavailing Patent Owner's argument that "Hickman always operates on a single object instead of in a recited first multi-object circumstance." PO Sur-sur-reply 7–8. As further additional explanation, Hickman's disclosures are not limited to simple operations on a single object, but instead, Hickman discloses the robot performing complex operations in an environment. For example, Hickman describes that, "[a]fter receiving the identity of the object and data associated with the object, the robot may use the data associated with the object to interact with the object, e.g., pick up the object, move the object, power on/off the object, open/close doors, drawers, and/or compartments of the object, etc.," and that "[i]f, while interacting with the object, the robot determines that some aspect of the received data associated with the object is inaccurate (e.g., the object weighs more or less than indicated, the force required to open/close a door is greater or less than indicated, etc.), then the robot may send feedback to the cloud computing system." Ex. 1005, 3:42–51. Hickman similarly discloses "[o]ne important aspect of the shared robot knowledge base is that robots may also enter data into the shared robot knowledge base, e.g., data about *objects* they encounter, data about *tasks* they perform, data for *maps associated with their environments*, and data about *robot applications*." *Id.* at 3:15–21.

In its Request for Director Review, Patent Owner states "the FWD did not address PO's arguments presented in the MTA Sur-Sur-Reply regarding limitation [21.15]." DR. Req. 10. We note that Patent Owner has included additional arguments that we previously addressed. For example, Patent Owner argues that Petitioner's Sur-reply includes impermissible new

arguments. *Id.* We maintain our findings in our 2024 Final Written Decision. *See, e.g.,* 2024 Final Dec. 67–73, 92–97, 107–111.

Based on the arguments and evidence of record, including the arguments in Patent Owner Request for Director Review, we find that the combination of Grotmol and Hickman teaches element 21.15. We maintain our findings in our 2024 Final Written Decision as to why we are persuaded that the combination of Grotmol and Hickman discloses the recitations in element 21.15. We also maintain our findings in the 2024 Final Written Decision as to why we are persuaded that a person of ordinary skill in the art would have combined Grotmol and Hickman’s teachings in the manner recited in claim 21 for the reasons given by Petitioner. The discussion herein provides further explanation consistent with the instructions in the Acting Director’s Decision as to why we find that Petitioner’s contentions are consistent with and supported by the combined teachings of Grotmol and Hickman and why we find Patent Owner’s arguments do not undermine Petitioner’s showing.

3. *Conclusion—Proposed Substitute Claim 21*

For the reasons given, we determine that Petitioner demonstrates by a preponderance of the evidence that the combination of Grotmol and Hickman teaches the features recited in proposed substitute claim 21. For the reasons given, we also are persuaded by a preponderance of the evidence that Petitioner provides articulated reasoning with rational underpinning to support Petitioner’s modification of Grotmol and Hickman. We find that Patent Owner’s argument and evidence do not undermine Petitioner’s showing.

Based on the arguments and evidence of record, we determine that Petitioner has proved, by a preponderance of evidence, that proposed substitute claim 21 is unpatentable as obvious over the combination of Grotmol and Hickman.

D. Obviousness of Proposed Substitute Claims 22–29 over Grotmol and Hickman

We turn to Petitioner’s argument that proposed substitute claims 22–25 and 27–29 would have been obvious over Grotmol and Hickman and proposed substitute claim 26 would have been obvious over Grotmol, the knowledge of a person of ordinary skill in the art, and Hickman.

Patent Owner’s amendments to claims 22–29 recite the same features discussed with respect to proposed substitute claim 21. *See generally* MTA App. The issues in Patent Owner’s Request for Director Review for claims 22–29 are the same as those discussed for proposed substitute claim 21. For the same reasons given for proposed substitute claim 21, based on the arguments and evidence of record, we determine that Petitioner has proved, by a preponderance of evidence, that proposed substitute claims 22–25 and 27–29 would have been obvious over Grotmol and Hickman and proposed substitute claim 26 would have been obvious over Grotmol, the knowledge of a person of ordinary skill in the art, and Hickman.

E. Remaining Grounds

In light of our determinations herein, we need not reach Petitioner’s remaining grounds of obviousness.

IV. CONCLUSION⁶

Petitioner has proved by a preponderance of the evidence that claim 12 of the '344 patent is unpatentable. Petitioner also has proved by a preponderance of the evidence that proposed substitute claims 21–29 are unpatentable. The outcome of this Decision is set forth in the tables below. In summary:

Claim Challenged	35 U.S.C. §	References	Claim Shown Unpatentable	Claim Not shown Unpatentable
12	103	Grotmol, Hickman	12	
Overall Outcome			12	

Motion to Amend Outcome	Claims
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in Amendment	21–29
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	21–29
Substitute Claims: Determined Unpatentable	
Substitute Claims: Not Reached	

V. ORDER

In consideration of the foregoing, it is hereby:

⁶ 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. 16,654 (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).

ORDERED that Petitioner has shown by a preponderance of the evidence that claim 12 of the '344 patent is unpatentable;

FURTHER ORDERED that Petitioner has shown by a preponderance of the evidence that proposed substitute claims 21–29 are unpatentable and Patent Owner's request to issue substitute claims 21–29 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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