

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VALVE CORPORATION,
Petitioner,

v.

IMMERSION CORPORATION,
Patent Owner.

IPR2024-00557
Patent 10,665,067 B2

Before MICHAEL R. ZECHER, CHRISTOPHER L. OGDEN, and
MATTHEW J. McNEILL, *Administrative Patent Judges*.

OGDEN, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

Valve Corporation (“Petitioner”) filed a Petition (Paper 2, “Pet.”) under 35 U.S.C. §§ 311–319 requesting *inter partes* review (“IPR”) of claims 1–8, 11, 12, and 15–21 of U.S. Patent No. 10,665,067 B2 (Ex. 1001, “the ’067 patent”). Immersion Corporation (“Patent Owner”) filed a Patent Owner Response (Paper 12, “PO Resp.”), Petitioner filed a Reply to the Patent Owner Response (Paper 16, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 17, “PO Sur-reply”).

We held an oral hearing in this proceeding on May 9, 2025, and the transcript is entered into the record. Paper 33 (“Tr.”).

This is a final written decision under 35 U.S.C. § 318(a) as to whether the claims challenged in the IPR are unpatentable. For the reasons below, we conclude that all the challenged claims are unpatentable.

II. BACKGROUND

A. THE ’067 PATENT (EX. 1001)

The ’067 patent describes “[s]ystems and methods for integrating haptics overlay in augmented reality” (“AR”). Ex. 1001, code (57). The ’067 patent acknowledges prior art solutions to the problem of providing haptic feedback in the virtual reality (“VR”) context, but suggests that “[i]n AR space, it is difficult to provide a haptic effect to the user.” *Id.* at 1:14–21.

Figure 2, reproduced below, illustrates an embodiment addressing this problem:

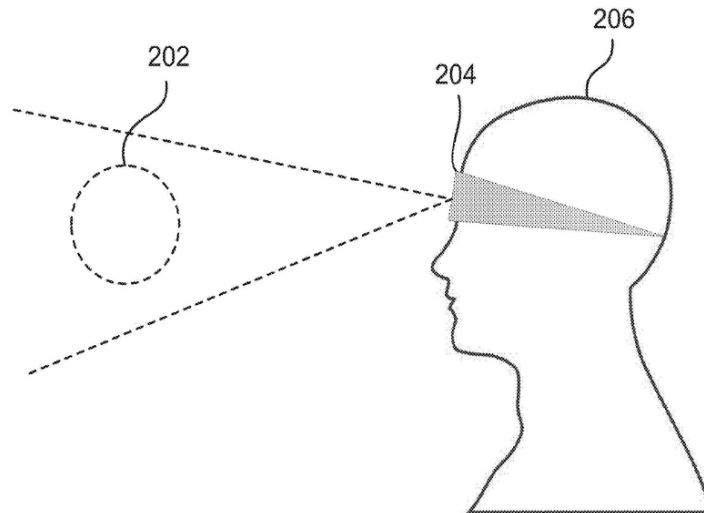


Figure 2

Figure 2 depicts user 206 using wearable AR device 204 and interacting with proxy object 202. Ex. 1001, 5:25–26. According to the '067 patent, “any type of AR display system may be used,” and “proxy object 202 may take the form of any object, including, but not limited to, a shoe, a bag, an article of clothing, an electronic device, a display, or an interface object.” *Id.* at 5:28, 5:34–37. The system also includes the ability to sense conditions of proxy object 202 and to generate and output haptic effects to one or more haptic output devices. *Id.* at 5:29–32.

Haptic output devices may include, for example, actuators and motors that may be integrated into proxy object 202 to provide various effects such as heating, cooling, stiffness, or force feedback. Ex. 1001, 4:23–46, 5:66–6:1. These effects may be selected based on the data from sensors that track characteristics of the haptic output device such as “location, path, velocity, acceleration, [or] pressure,” as well as “audio and video characteristics.” *Id.* at 4:47–66. According to the '067 patent, “[d]ifferent haptic effects may be

selected based on various combination[s] of these features.” *Id.* at 4:66–67. Also, “[a]ny suitable number, type, or arrangement of sensors can be used,” and may include “cameras, lasers, radars, accelerometers, gyrometers, pressure sensors, magnetic sensors, light sensors, microphones, capacitive sensors, touch sensors, tracking sensors, or any combination of such sensors.” *Id.* at 4:1–6.

B. CHALLENGED CLAIMS AND GROUNDS

Independent claim 1 is as follows:

- [1PRE] 1. A system comprising:
 - [1A] a proxy object comprising one or more haptic output devices;
 - [1B] a display configured to output a visual effect onto a surface of the proxy object;
 - [1C] a sensor for tracking a position of the proxy object; and
 - [1D] a processor configured to:
 - [1D1] determine a modified visual effect based in part on data received from the sensor;
 - [1D2] determine a haptic effect based in part on data received from the sensor;
 - [1D3] transmit a display signal associated with the modified visual effect to the display, the modified visual effect to be displayed on the proxy object via the display;
 - [1D4] transmit a haptic signal associated with the haptic effect to the one or more haptic output devices; and
 - [1D5] output the haptic effect using the one or more haptic output devices.

Ex. 1001, 10:41–58 (Petitioner’s reference numbers added); *accord* Pet. 91.

Petitioner argues three grounds for IPR, as summarized in the following table (*see* Pet. 4):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–8, 11, 12, 15–21	102(a)(1)–(2), 103 ¹	Banerjee ²
1–8, 11, 12, 15–21	102(a)(1)–(2), 103	Meglan ³
1–8, 11, 12, 15–21	102(a)(1)–(2), 103	Rogers ⁴

C. DECLARATORY TESTIMONY

Petitioner submits a declaration by Gregory F. Welch, Ph.D. Ex. 1003; *see also* Ex. 1004 (Dr. Welch’s curriculum vitae). Patent Owner submits a declaration by Robert Akl, D.Sc. Ex. 2007; *see also* Ex. 2008 (Dr. Akl’s curriculum vitae).

D. RELATED PROCEEDINGS

As a related matter, the parties identify *Immersion Corp. v. Valve, Inc.*, No. 23-cv-00712 (W.D. Wash. filed May 15, 2023; stayed Apr. 4, 2024). Pet. ix; Paper 22, 1 (Patent Owner’s Updated Mandatory Notices).

¹ 35 U.S.C. § 103 (2012), Leahy–Smith America Invents Act (“AIA”), Pub. L. No. 112-29 §§ 102, 103, sec. (n)(1), 125 Stat. 284, 287, 293 (2011) (effective Mar. 16, 2013). Petitioner applies the AIA version of the statute. *See* Pet. 4. Patent Owner does not dispute this.

² Banerjee et al., US 2017/0108930 A1, published Apr. 20, 2017 (Ex. 1011).

³ Meglan et al., US 2012/0045742 A1, published Feb. 23, 2012 (Ex. 1012).

⁴ Rogers et al., US 2017/0354864 A1, published Dec. 14, 2017 (Ex. 1010).

III. ANALYSIS

A. LEVEL OF ORDINARY SKILL IN THE ART

The level of ordinary skill in the pertinent art at the time of the invention is a factor in how we construe patent claims. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc). It is also one of the factors we consider when determining whether a patent claim is obvious over the prior art. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

To assess the level of ordinary skill, we construct a hypothetical “person of ordinary skill in the art,” from whose vantage point we assess obviousness and claim interpretation. *See In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998). This legal construct “presumes that all prior art references in the field of the invention are available to this hypothetical skilled artisan.” *Id.* (citing *In re Carlson*, 983 F.2d 1032, 1038 (Fed. Cir. 1993)).

Petitioner argues that a person of ordinary skill in the art would have had “a bachelor’s degree in electrical engineering, computer science, or a related field, plus at least two years of industry experience or graduate-level experience with human–computer interaction.” Pet. 6 (citing Ex. 1003 ¶ 39).

Patent Owner argues that a person of ordinary skill in the art “would have had a bachelor’s degree in electrical engineering or computer science (or an equivalent degree), and two years of practical or industry experience in the field of human computer interaction (HCI), including implementation of computer-based systems and software for providing haptic feedback effects to a user.” PO Resp. 9 (citing Ex. 2007 ¶ 30).

The parties agree that formal education could substitute for practical or industry experience, and vice versa. Pet. 6; PO Resp. 9.

The parties' proposed levels of ordinary skill appear to be substantially the same, are both supported by testimonial evidence, and appear to be consistent with the asserted prior art and the types of problems and solutions addressed in the '067 patent. *See, e.g.*, Ex. 1001, 1:7–53. Although Patent Owner's proposed level is more specific about the nature of the practical or industry experience, neither party has argued that the differences between the parties' proposed levels of ordinary skill would affect the outcome. We adopt Petitioner's proposed level of ordinary skill for this decision.

B. CLAIM CONSTRUCTION

In an IPR, we construe a patent claim “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b). This generally includes “construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” *Id.* The ordinary and customary meaning of a claim term “is its meaning to the ordinary artisan after reading the entire patent” and “as of the effective filing date of the patent application.” *Phillips*, 415 F.3d at 1313, 1321.

There are only two circumstances in which a construction departs from the ordinary and customary meaning: “1) when a patentee sets out a definition and acts as [their] own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution.” *Thorner v. Sony Comput. Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012). Any such special meaning of a term “must be

sufficiently clear in the specification that any departure from common usage would be so understood by a person of experience in the field of the invention.” *Multiform Desiccants Inc. v. Medzam Ltd.*, 133 F.3d 1473, 1477 (Fed. Cir. 1998).

Petitioner argues that we need not construe any claim terms explicitly. Pet. 7–9 (citing Ex. 1001, 3:1–4, 5:60–62; Ex. 1003 ¶¶ 77–80; Ex. 1006, 4–5). Patent Owner argues that we should construe two claim terms, which we address below.

1. “*A Proxy Object Comprising One or More Haptic Output Devices*” (Limitation 1A)

First, Patent Owner argues that we should construe “a proxy object comprising one or more haptic output devices” in limitation 1A to mean “a physical object that acts as a proxy for a virtual object and that itself contains inside a haptic output device, e.g., an actuator.” PO Resp. 10.

As evidence for the first part of this proposed construction, Patent Owner argues that, in the ’067 patent disclosure, proxy objects are consistently physical objects in the real world which act as proxies for virtual objects in the simulated world seen through a display. PO Resp. 11–12 (citing Ex. 1001, 2:39–52, 3:3–4, 5:34–37, Figs. 2, 3; Ex. 2007 ¶ 34).

Petitioner does not appear to specifically contest this part of Patent Owner’s proposed construction, and it does not appear to be material to the issues raised during trial. *See* Pet. Reply 3–5. Therefore, we need not address this part of the proposed construction. *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))).

For the second part of the proposed construction, Patent Owner argues that the claim language recites a proxy object “comprising” haptic output devices, thus the haptic output devices “must be contained inside the proxy object.” PO Resp. 12 (citing Ex. 1001, 10:42–43; Ex. 2007 ¶ 35). Patent Owner argues that this is consistent with embodiments in the ’067 patent in which haptic output devices (such as actuators) are “integrated into a proxy object” or “contained in [a] proxy object.” *Id.* at 12–13 (emphasis omitted) (quoting Ex. 1001, 2:37–38; and then quoting *id.* at 5:67–6:1) (citing Ex. 1001, 2:53–57, 6:26–29; Ex. 2007 ¶ 36); *see also* Pet. Reply 3–5 (Petitioner’s arguments against the proposed construction); PO Sur-reply 1–3 (Patent Owner’s additional arguments supporting its proposed construction).

In addition, Patent Owner contends that we should look to the surrounding claim language, which suggests that the plain and ordinary meaning of “proxy object” includes three criteria: (1) it “must contain the haptic output devices—i.e., the proxy object that acts as a proxy for a virtual object must directly contain the haptic output device” as Patent Owner interprets limitation 1A; (2) “the proxy object’s position is tracked by a sensor and haptic feedback is based on this position sensor data and is produced inside the proxy object” as Patent Owner interprets limitation 1C; and (3) “the proxy object must have a modified visual object displayed onto its surface” as Patent Owner interprets limitation 1D3. PO Resp. 19–20 (citing Ex. 2007 ¶ 64); *see also* PO Sur-reply 8–9 (citing *Apple Inc. v. MPH Techs. Oy*, 28 F.4th 254 (Fed. Cir. 2022)).

Patent Owner also argues that, during the prosecution of the application leading to the '067 patent, the applicant “amended the claim scope and disavowed proxy objects that were ‘mechanically coupled’ to the haptic output device containing the actuator.” PO Resp. 13 (citing Ex. 1002, 280–88). According to Patent Owner, the applicant “distinguished the claim scope from the Gonzales reference [applied by the Examiner] which taught an alleged ‘proxy’ object with modified visual overlaid effects that did *not* directly contain the haptic output device.” *Id.* at 13–14 (citing Ex. 1002,⁵ 287). Instead, according to Patent Owner, “the haptic output device in Gonzales was inside the [augmented reality] glove (which had no overlays) that made contact with the alleged ‘proxy’ object that had visual overlaid effects.” *Id.* at 13 (citing Ex. 1002, 287; Ex. 2007 ¶¶ 35–39).

Patent Owner also points to an earlier proposed amendment, which was not entered during prosecution, in which the applicant changed the phrase “mechanically coupled to the proxy object” to “within the proxy object.” PO Resp. 13 (emphasis omitted) (citing Ex. 1002, 258). According to Patent Owner, a person of ordinary skill in the art would have understood this to be a disclaimer of proxy objects that are merely mechanically coupled to (“e.g., appended to and/or connected to”) a haptic output device that contains an actuator. *Id.* (citing Ex. 2007 ¶¶ 37–39).

In its Reply, Petitioner argues that the proposed amendment during prosecution changing “mechanically couples” to “within” was withdrawn in favor of the broad “comprising” language of the issued claims, so it could

⁵ Patent Owner mistakenly references Exhibit 2001.

not be a clear disavowal of claim scope. Pet. Reply 4–5 (citing Ex. 1002, 258, 272–73, 280, 295).

In its Sur-reply, Patent Owner argues that, even though the amendment proposed during prosecution was not entered, the applicant “distinguished the claimed arrangement from arrangements where the proxy object is external to the haptic output device,” both in the proposed narrowing amendment and in the later arguments distinguishing Gonzales. PO Sur-reply 2–3 (citing Ex. 1002,⁶ 124, 280, 287).

As to whether a proxy object must contain a haptic output device “inside” it, the evidence does not support Patent Owner’s position. First, the plain language of independent claim 1 states that the proxy object “compris[es]” the one or more haptic output devices. Ex. 1001, 10:42–43. This is broader than the “within” language of the non-entered amendment. *See* Ex. 1002, 258. Not only does the evidence fail to show clear disclaimer (*see United States v. Telectronics, Inc.*, 857 F.2d 778, 782–83 (Fed. Cir. 1988)), the adoption of broader “comprising” language shows an intent for the claims not to be limited to systems in which the proxy object contains haptic output devices “inside” it.

We also do not agree with Patent Owner that the applicant’s attempts during prosecution to distinguish Gonzales are a clear disclaimer of claim scope. The applicant argued that Gonzales’s AR glove, which contained haptic output actuators in it (*see, e.g.*, Ex. 1008 ¶¶ 80–82, Fig. 3B), was not a “proxy object” as recited in the claims because “the virtual objects and/or visible alterations to the vehicle [the user is sitting in while wearing the

⁶ Once again, Patent Owner mistakenly references Exhibit 2001.

glove] are not overlaid on the AR glove . . . [a]nd the physical portions of the vehicle were visible alterations are overlaid do not include any feedback devices.” Ex. 1002, 287. Thus, the issue raised during prosecution was not whether the AR glove comprised haptic output devices—which it clearly did even under Patent Owner’s proposed construction—but whether the AR glove had modified visual effects displayed on it as per limitation 1D3.

Although we agree with Patent Owner that the term “proxy object” should be read in the context of claim 1 as a whole (*see* PO Resp. 19–20; PO Sur-reply 8–10), we disagree that a person of ordinary skill in the art would simply incorporate limitations 1A, 1D, and 1D3 into the meaning of “proxy object.” *See* PO Resp. 19–20; PO Sur-reply 8–10. If the ordinary and customary meaning of “proxy object” already included limitations 1A, 1C, and 1D3, these limitations would have been superfluous. *See Apple, Inc. v. Ameranth, Inc.*, 842 F.3d 1229, 1237 (Fed. Cir. 2016) (“The Board was correct to not include in its construction of ‘menu’ features of menus that are expressly recited in the claims Construing a claim term to include features of that term already recited in the claims would make those expressly recited features redundant.”).

For the above reasons, we decline to adopt Patent Owner’s proposed construction of “a proxy object comprising one or more haptic output devices” as meaning “a physical object that acts as a proxy for a virtual object and that itself contains inside a haptic output device, e.g., an actuator.” PO Resp. 10. Instead, we conclude that no explicit construction is necessary beyond the ordinary and customary meaning.

2. *“Determine a Haptic Effect Based in Part on Data Received from the Sensor” (Limitation 1D2)*

Next, Patent Owner argues that we should construe the term “determine a haptic effect based in part on data received from the sensor” in limitation 1D2 to mean “determine a haptic effect based in part on position data of the proxy object received from the sensor that tracks a position of the proxy object.” PO Resp. 14 (citing Ex. 2007 ¶ 40).

Patent Owner points out that limitation 1C states that the sensor is “for tracking a position of the proxy object.” PO Resp. 14 (emphasis omitted) (quoting Ex. 1001, 10:46). Thus, Patent Owner argues that “the type of sensor data in claim element 1D2 must refer back to the specific sensor data type—i.e., position data—in [limitation] 1C.” *Id.* at 14–15 (cleaned up) (citing Ex. 2007 ¶ 40).

Patent Owner acknowledges that the ’067 patent “broadly discloses various types of sensors and data types (e.g., location, velocity, acceleration, etc.).” PO Resp. 15 (citing Ex. 1001, 4:52–55). Patent Owner also acknowledges that dependent claim 7, which depends from claim 1, states that “the sensor” may comprise one or more sensors including an accelerometer. *Id.* at 15–16.

However, Patent Owner argues that “[c]laim 1 would be read as any of those sensors listed in Claim 7 for tracking a position of the proxy object.” PO Resp. 16–17 (emphasis omitted) (citing Ex. 2007 ¶¶ 41–43; *Alcon Research, LTD. v. Apotex Inc.*, 687 F.3d 1362, 1367 (Fed. Cir. 2012)). According to Patent Owner, “to the extent additional sensor data types such as velocity and acceleration are taken into account for determining haptic effects in claim 1,” a person of ordinary skill in the art would have

understood that such data is used (even if indirectly) to calculate position, and it is only the “position data” that is used to determine the recited haptic effect. *Id.* at 17 (citing Ex. 2007 ¶ 44).

In its Reply, Petitioner argues that, although limitation 1C states that the sensor is “for tracking a position,” limitation 1D2 does not expressly limit what kind of information from the sensor (including non-positional information) is used to determine the haptic effect. Pet. Reply 6. Petitioner also argues that dependent claim 7 recites sensors including “a light sensor” to measure luminosity, or “a microphone” to detect sound, that clearly generate non-positional data, and that the recited “sensor” may comprise a combination of different sensors. *Id.* at 6–7 (citing Ex. 1001, 4:1–18, 11:6–9); *see also id.* at 8–9 (arguing that *Alcon Research* simply “stands for the non-controversial proposition that ‘a dependent claim cannot be broader than the claim from which it depends.’” (quoting 687 F.3d at 1367)).

According to Petitioner, “position” is a “non-technical term with a broad ordinary meaning that includes ‘location of a person or thing.’” Pet. Reply 22 (quoting Ex. 1040, 1548) (citing Ex. 1041, 839; Ex. 1042, 1374–75). Petitioner argues that a “sensor for tracking a position” would include a sensor that can simply detect an object’s movement through space, which is a change in position. *Id.* at 22–23 (citing Ex. 1040, 1282; Ex. 1041, 707; Ex. 1042, 1152).

Petitioner also points to a disclosure in the ’067 patent that the processor can use signals from a variety of sensors to identify “characteristics” of the proxy object (not necessarily position) to determine the haptic effect. Pet. Reply 7–8 (citing Ex. 1001, 4:1–17, 4:47–55, 7:67–8:3).

In its Sur-reply, Patent Owner argues that, because limitation 1C requires that the sensor is “for tracking a position,” it would be inconsistent to interpret “data received from the sensor” to mean data other than positional data. PO Sur-reply 3–4 (citing *Rexnord Corp. v. Laitram Corp.*, 274 F.3d 1336, 1342 (Fed. Cir. 2001); *Smith v. Honeywell Int’l, Inc.*, No. 14-cv-665, 2015 WL 3826652, at *19 (E.D. Tex. June 19, 2015); *Power Mosfet Techs., L.L.C. v. Siemens AG*, 378 F.3d 1396, 1410 (Fed. Cir. 2004)). According to Patent Owner, the data used to determine a haptic effect *could* include non-positional data (such as from one of the sensor types in dependent claim 7), but it must *at least* include positional data. *Id.* at 5.

Patent Owner disagrees with Petitioner that detecting “position” can merely involve detecting movement or rotation, and argues, instead, that detecting position must involve detecting a location in free space, such as by tracking its x, y, and z coordinates. PO Sur-reply 6–7 (citing Ex. 2007 ¶ 98). Patent Owner argues that this is consistent with an embodiment in the ’067 patent in which the haptic effect is based on whether there is contact between a wearable device and an object—which can only be determined based on measuring a position in free space. *Id.* at 7–8 (citing Ex. 1001, 6:38–45).

We find persuasive Petitioner’s argument that a person of ordinary skill in the art would not have understood the phrase “based in part on data received from the sensor” in limitation 1D2 (as well as limitation 1D1) to be limited to positional data. First, the only explicit requirement as to the nature of the recited “data” is that it be “received from the sensor.” Ex. 1001, 10:48–51. Although limitation 1C states that the sensor is “for tracking a

position of the proxy object,” limitation 1C says nothing explicit about the data the sensor emits. *Id.* at 10:46.

Moreover, the disclosure of the ’067 patent, including dependent claim 7, clearly discloses that the “sensor” can include multiple sensors, including those that do not track position. Ex. 1001, 4:1–18 (“Any suitable number, type, or arrangement of sensors can be used.”). For example, the “sensor” can measure position, acceleration, magnetic or gyroscopic orientation, pressure, luminosity, or sound. *See id.* at 4:2–22, 4:47–67 (“Different haptic effects may be selected based on various combination[s]” of features such as “location, path, velocity, acceleration, pressure, and/or other characteristics of haptic output device 118 over time.”), 11:6–9 (dependent claim 7).

Although the recited “sensor” would have some positional tracking function, there is nothing in claim 1 nor the ’067 patent disclosure to indicate that the processor must use any data obtained from such tracking to determine a modified visual effect or haptic effect in the context of limitations 1D1 and 1D2. More broadly, the ’067 patent discloses that the processor may determine modified visual effects or haptic effects by analyzing the environment to identify “characteristics” of the proxy object, or by analyzing or monitoring “any movement” of the proxy object. Ex. 1001, 7:52–8:15.

We also do not find credible Patent Owner’s position that “a position of the proxy object” can only involve directly measuring x, y, and z coordinates. *See* PO Sur-reply 6–7. Patent Owner and Dr. Akl concede that position can be determined indirectly with an accelerometer. *See* PO Resp. 17; Ex. 2007 ¶ 44. Yet Dr. Akl’s testimony that a person of ordinary skill in

the art would not have understood an inertial sensor to be “a sensor for tracking a position” is conclusory and lacks supporting facts or data. *See* Ex. 2007 ¶ 98; 37 C.F.R. § 42.65(a) (2022) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”).

For the above reasons, we decline to adopt Patent Owner’s proposed construction of “determine a haptic effect based in part on data received from the sensor” to mean “determine a haptic effect based in part on position data of the proxy object received from the sensor that tracks a position of the proxy object.” PO Resp. 14. Instead, we conclude that the data used to generate a haptic effect need not necessarily be position data generated by the sensor.

C. GROUND BASED ON ROGERS

We focus our analysis on the third ground of the Petition based on Rogers, which applies to all the challenged claims. Petitioner argues that claims 1–8, 11, 12, and 15–21 are unpatentable as anticipated by Rogers or as obvious in view of Rogers. Pet. 4, 67–85.

To show anticipation under § 102, a petitioner must locate every element in a claim, arranged as recited in the claim, in a single prior art reference. *See Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008). The limitations may be present in the reference “either explicitly or inherently.” *In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997). In making this determination, we consider the reference “together with the knowledge of one of ordinary skill in the pertinent art.” *In re Paulsen*, 30

F.3d 1475, 1480 (Fed. Cir. 1994) (citing *In re Samour*, 571 F.2d 559, 562 (CCPA 1978)).

A claim is unpatentable as obvious under § 103 if the differences between the claimed subject matter and the prior art are “such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). When a ground in a petition is based on a combination of references, we consider “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *Id.* at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

We base our obviousness inquiry on factual considerations 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 skill in the art, and (4) any objective indicia of obviousness or non-obviousness that may be in evidence.⁷ *See Graham*, 383 U.S. at 17–18.

Considering these principles, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–8, 11, 12, and 15–21 are unpatentable as anticipated by Rogers or as obvious in view of Rogers for the reasons explained below.

⁷ Neither party argues that there are objective indicia of obviousness or non-obviousness, so this factor is not part of our analysis.

1. Overview of Rogers

Rogers describes a gaming controller as shown below in Figure 1:

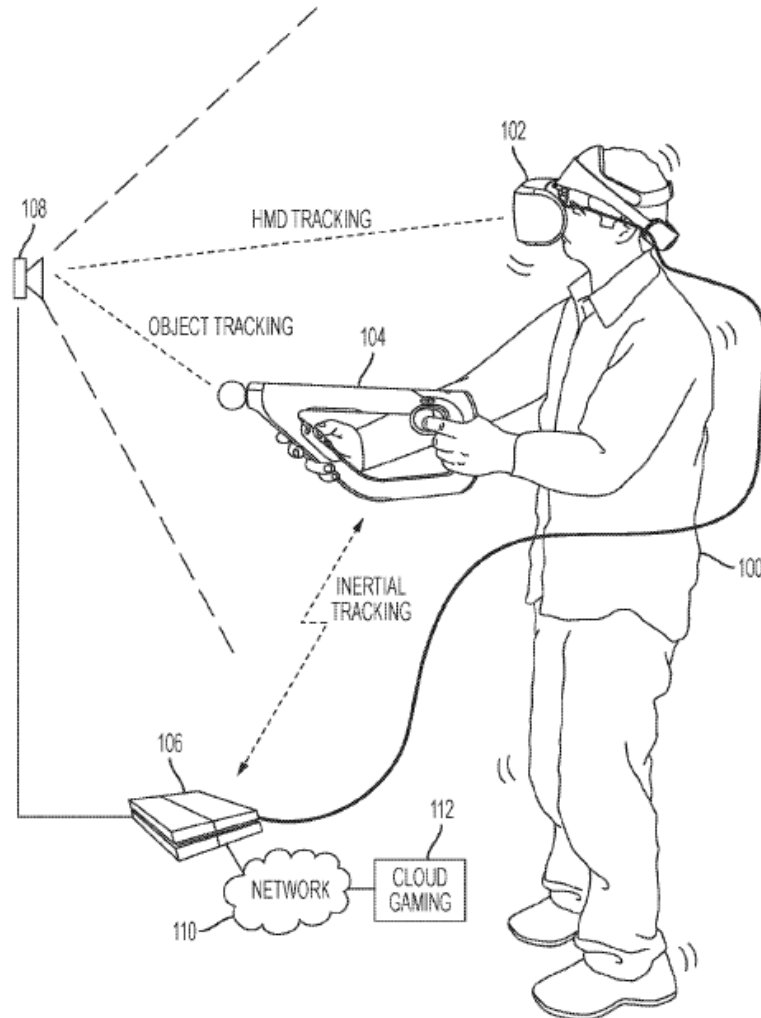


FIG. 1

Figure 1 depicts user 100 wearing head-mounted display (“HMD”) 102 connected to computer 106. Ex. 1010 ¶¶ 42–43. User 100 operates “directional interface object 104 to provide input for the video game.” *Id.* ¶ 44. Camera 108 also “capture[s] images of the interactive environment in which user 100 is located,” which “can be analyzed to determine the location

and movements of the user 100, the [head-mounted display] 102, and the directional interface object 104.” *Id.*

The location and orientation of directional interface object 104 can also be tracked using internal sensors. Ex. 1010 ¶ 44. For example, it can use an integrated inertial sensor. *Id.* ¶ 52. The system tracks the pointing direction of interface object 104 using “[a] combination of visual tracking . . . and data from inertial sensors in the directional interface object,” and uses this data for interaction with the virtual scene, allowing the user to aim a weapon and shoot at objects. *Id.* ¶ 106.

To provide a haptic effect, directional interface object 104 can include movable weight 800 that moves along a track to “provide sensations of momentum based on events occurring in the VR environment.” Ex. 1010 ¶ 105. “[F]or example, pointing the directional interface object 104 upward, the moveable weight 800 may be caused to move so as to mimic the sensation of weapon reloading mechanics of the virtual weapon.” *Id.* Or “the movable weight [800] may be caused to move when the user fires a virtual weapon . . . providing a kickback sensation similar to that of an actual weapon.” *Id.*

2. *Claim 1*

(a) Preamble (1PRE)

The preamble of claim 1 recites “[a] system comprising” a set of limitations. Ex. 1001, 10:41.

Petitioner argues that Rogers discloses a system, and thus meets the preamble. Pet. 69 (citing Ex. 1010 ¶¶ 18, 21, 42, claim 17, Fig. 1; Ex. 1003 ¶ 281).

Patent Owner does not specifically contest Petitioner’s arguments. *See* PO Resp.

We agree with Petitioner that Rogers discloses the preamble for the reasons provided in the Petition; thus, we need not decide whether the preamble is limiting.

(b) Limitation 1A

Limitation 1A recites that the claimed system comprises “a proxy object comprising one or more haptic output devices.” Ex. 1001, 10:42–43.

Petitioner argues that Rogers’s interface object 104 meets limitation 1A because “interface object 104 acts as a proxy for a ‘virtual weapon’ counterpart in the virtual environment that moves in correspondence with the real-world interface object 104.” Pet. 70 (citing Ex. 1010 ¶¶ 78–96, 107–109, Figs. 4A–4C, 5A, 10–12; Ex. 1003 ¶¶ 59–62, 282–285). According to Petitioner, interface object 104 also includes haptic output devices, such as movable weight 800, that render different tactile sensations. *Id.* (citing Ex. 1010 ¶¶ 73, 105, 112, Figs. 8, 12; Ex. 1003 ¶¶ 286–288).

Patent Owner does not specifically contest whether Rogers discloses limitation 1A. *See* PO Resp. 35–47.

For the reasons given in the Petition, Petitioner has shown by a preponderance of the evidence that Rogers discloses limitation 1A.

(c) Limitation 1B

Limitation 1B recites that the claimed system comprises “a display configured to output a visual effect onto a surface of the proxy object.” Ex. 1001, 10:44–45.

Petitioner argues that Rogers’s HMD 102 meets limitation 1B because HMD 102 includes a display that can show virtual hands that grip a virtual weapon in the context of a game, which are overlayed on the surface of interface object 104 in captured video. Pet. 70–72 (citing Ex. 1010 ¶¶ 42–43, 60, 63, 68–70, 96–97, 100, 107–109, 119–131, Figs. 2A-2, 3, 10–11; Ex. 1006, 4–5 (Patent Owner’s position in the parallel litigation); Ex. 1003 ¶¶ 289–298).

Patent Owner does not specifically contest whether Rogers discloses limitation 1B. *See* PO Resp. 35–47.

For the reasons given in the Petition, Petitioner has shown by a preponderance of the evidence that Rogers discloses limitation 1B.

(d) Limitation 1C

Limitation 1C recites that the claimed system comprises “a sensor for tracking a position of the proxy object.” Ex. 1001, 10:46.

Petitioner argues that Rogers’s camera 108 and an inertial sensor in directional interface object 104, together, are the “sensor” of limitation 1C. Pet. 72–73 (citing Ex. 1010 ¶¶ 44, 52, 81, 103, 111, Fig. 1, claim 9; Ex. 1001, 4:1–18 (“Any suitable number, type, or arrangement of sensors can be used.”); Ex. 1003 ¶¶ 299–303).

Patent Owner does not dispute that Rogers’s camera 108 is a sensor according to limitation 1C. PO Resp. 43 (“[T]he camera is responsible for tracking location”); Pet. Reply 19 (arguing that this issue is undisputed).

However, Patent Owner argues that Rogers’s interface object 104 does not include a sensor according to limitation 1C because its sensors, which may include a magnetometer, an accelerometer, and a gyroscope, can only

track movement, not position. PO Resp. 41 (citing Ex. 1010 ¶¶ 16, 18, 111). While acknowledging that camera 108 and the sensors in interface object 104 track position and orientation *in combination*, Patent Owner contends that interface object 104 only tracks orientation and leaves the tracking of position to camera 108, which visually tracks the location of a light on interface object 104. *Id.* at 42–44 (citing Ex. 1010 ¶¶ 16, 18, 44, 111, Fig. 1; Ex. 2007 ¶¶ 98–99); *see also* PO Sur-reply 25 (arguing the same).

In its Reply, Petitioner argues that Rogers explicitly discloses that inertial data generated by the sensors in interface object 104 are used “to determine a position of a virtual object.” Pet. Reply 23 (emphasis omitted) (quoting Ex. 1010, claim 17). Alternatively, Petitioner argues that (as Patent Owner allegedly concedes) inertial data can be used indirectly to track an object’s absolute position. *Id.* (citing PO Resp. 17 (A person of ordinary skill in the art “would understand that an accelerometer can indirectly determine the position of an object by measuring its acceleration over time”))).

In its Sur-reply, Patent Owner contends that Rogers’s claim 17 “makes no mention of *haptics*. Instead, it determines a position for *visual* purposes: ‘to determine a position of a virtual object *that is rendered* in the view of the virtual environment.’” PO Sur-reply 26 (quoting Ex. 1010, claim 17).

We find Petitioner’s arguments persuasive. Claim 17 of Rogers explicitly discloses an embodiment in which both “captured images” from the camera and “inertial data” from an inertial sensor are used “to determine a *position* of a virtual object.” Ex. 1010, claim 17 (emphasis added). Thus, the evidence of record does not support Patent Owner’s position that, in the combination of camera 108 and interface object 104, position tracking relies solely on images from camera 108 and does not rely on inertial data from

interface object 104. This is consistent with Patent Owner’s admission that acceleration data can be used, at least indirectly, to track position. PO Resp. 17.

In any event, Petitioner’s argument does not rely on either camera 108 or interface object 104, separately, to meet the recited “sensor” of limitation 1C, but on the combination of the two. *See* Pet. 72–73. As indicated in claim 7, the recited “sensor” can comprise a combination of sensors such as a “camera, . . . an accelerometer, a gyrometer, . . . [and] a magnetic sensor.” Ex. 1001, 11:6–9. Petitioner persuasively shows that this combination is (at least as one of its functions) “for tracking a position of the proxy object” as recited in limitation 1C.

Thus, Petitioner has shown by a preponderance of the evidence that Rogers discloses limitation 1C.

(e) Limitation 1D

Limitation 1D recites “a processor configured to” perform certain steps as indicated in limitations 1D1–5. Ex. 1001, 10:47.

Petitioner argues that Rogers’s computer 106 discloses a processor that performs limitations 1D1–5. Pet. 73–74 (citing Ex. 1010 ¶¶ 3, 18, 43, 63, 68–70, 135, 147, 153, Figs. 1, 3; Ex. 1003 ¶¶ 304–308).

Patent Owner does not dispute that Rogers discloses a processor. *See* PO Resp. 35–47.

We agree with Petitioner that Rogers discloses a processor as part of its system, and as discussed below, we determine that Rogers discloses each of steps 1D1–5.

(1) *Limitation 1D1*

Limitation 1D1 states that the processor is configured to “determine a modified visual effect based in part on data received from the sensor.”

Ex. 1001, 10:48–49.

Petitioner argues that Rogers discloses a modified visual effect in that it “modifies the appearance of both the virtual object corresponding to interface object 104 and the virtual hands that hold it” based on tracking and orientation data from camera 108 and the sensors in interface object 104. Pet. 74–77 (citing Ex. 1010 ¶¶ 18, 43–45, 52–55, 55, 63, 68–71, 106–109, Figs. 1, 10–11; Ex. 1016, 7–10; Ex. 1003 ¶¶ 309–314).

Patent Owner does not contest that Rogers discloses determining a modified visual effect based on image data from camera 108. *See* PO Resp. 45 (“Petitioner has only shown that modified visual effects are based on position sensor data”). But Patent Owner argues that the sensors in interface object 104 do not participate in that determination, making a similar argument as for limitation 1C. *Id.* at 45–47 (citing Ex. 1010 ¶¶ 18, 43–45, 52–55, 68–70, 106–109; Ex. 2007 ¶¶ 103–105); *supra* Section III.C.2(d).

In its Reply, Petitioner argues, as it did in the context of limitation 1C, that the sensors in Rogers’s interface object 104 participate in position tracking along with camera 108. Pet. Reply 25–26 (citing Ex. 1010 ¶¶ 18, 106, claim 17, Figs. 10–11).

As we discuss above in the context of limitation 1C, we find Petitioner’s argument persuasive that the sensors in interface object 104, both individually and in conjunction with camera 108, are used to track the position of the proxy object. *See supra* Section III.C.2(d). We also find

Petitioner’s argument persuasive that this positional data is used to determine a modified visual effect over interface object 104.

Thus, Petitioner has shown by a preponderance of the evidence that Rogers discloses limitation 1D1.

(2) *Limitation 1D2*

Limitation 1D2 states that the processor is configured to “determine a haptic effect based in part on data received from the sensor.” Ex. 1001, 10:50–51.

Petitioner argues that “the direction that interface object 104 points is determined from camera 108’s images and internal sensor data,” and this directional information is used to create a haptic effect: for instance, “when a user reloads their corresponding virtual weapon by, for example pointing the directional interface object 104 upward, the moveable weight 800 may be caused to move so as to mimic the sensation of weapon reloading mechanics in the virtual weapon.” Pet. 77 (quoting Ex. 1010 ¶ 105) (citing Ex. 1010 ¶ 73, Fig. 3; Ex. 1003 ¶¶ 315–319).

Patent Owner argues that, when the user reloads the weapon, Rogers “does not use sensor data tracking the position of the alleged proxy object, nor would it need to because that use case depends on tilting the weapon in the upward direction rather than location of the weapon.” PO Resp. 44. According to Patent Owner, Petitioner “does not provide any support showing that both camera 108 (for tracking position) and the inertial sensor are employed for this weapon reload use case.” *Id.* (citing Ex. 2007 ¶ 100); *see also id.* at 38–40 (citing Ex. 1010 ¶¶ 44, 105, claim 9, Fig. 1; Ex. 2007, ¶¶ 94–96).

Petitioner disagrees. According to Petitioner, Rogers discloses that “[a] combination of visual tracking of the trackable object and data from inertial sensors in the directional interface object can be utilized as input to determine the pointing direction of the virtual weapon in the VR environment.” Pet. Reply 20 (emphasis omitted) (quoting Ex. 1010 ¶ 106) (citing Ex. 1003 ¶¶ 311, 318). Thus, Petitioner argues that a person of ordinary skill in the art would have understood that Rogers uses both camera 108 and the inertial sensors in interface object 104 to determine whether the weapon is pointing upward, and thus Rogers uses data from both sensors in determining the weapon-reloading haptic effect. *Id.* (citing Ex. 1010 ¶¶ 52, 81, 113); *see also id.* at 21 (citing Ex. 1010 ¶ 47 (disclosing that the online gaming provider, which generates haptic effects, receives inputs from both camera 108 and interface object 104)).

In its Sur-reply, Patent Owner argues that, when Rogers discloses using data from camera 108 to determine the pointing direction of the virtual weapon, this is only in the context of shooting or aiming the weapon, for which there are no haptic effects.⁸ PO Sur-reply 23–24 (citing Ex. 1010 ¶¶ 105–106). Patent Owner contends that, when reloading the weapon, the position of the weapon is irrelevant and a person of ordinary skill in the art would have understood that the reloading effect only relies on Rogers’s inertial sensors in interface object 104. *Id.* at 24–26 (citing Ex. 2007 ¶ 99). Patent Owner also argues that, to the extent that Rogers’s claim 17 discloses

⁸ As Petitioner pointed out during the hearing, Rogers discloses another haptic effect in the form of a “kickback sensation” to simulate the shooting of a gun. Tr. 30:19–31:2 (citing Ex. 1010 ¶ 105). We need not decide whether this haptic effect separately meets limitation 1D2.

using both the camera and inertial sensors for tracking position, this would be for visual purposes and not for generating a haptic effect. *Id.* at 26 (citing Ex. 1010, claim 17).

As we discuss above in the context of limitation 1C, we find Petitioner’s argument persuasive that the recited “sensor” includes both camera 108 and the inertial sensors in interface object 104. *See supra* Section III.C.2(d). Because Petitioner takes the position that both sensors, together, function as the “sensor,” it is immaterial which part of the sensor (e.g., the camera, the magnetometer, the accelerometer, or the gyroscope) generates data used to determine the haptic effect as recited in limitation 1D2. Patent Owner does not dispute that the “reloading” haptic effect uses data from the inertial sensors inside interface object 104, which, in accordance with Petitioner’s claim mapping, is part of the recited “sensor.” Thus, Rogers discloses limitation 1D2.

Alternatively, we find persuasive Petitioner’s argument that a person of ordinary skill in the art would have had used both the camera data and the inertial sensor data in determining the “reloading” haptic effect. Pet. 77; Pet. Reply 19–22; Ex. 1003 ¶ 318; Tr. 31:3–10. This is evident in light of Rogers’s disclosures (1) that both sets of data are used to determine the pointing direction of interface object 104 in at least some contexts (Ex. 1010 ¶ 106); and (2) that the “reloading” haptic effect is based on the pointing direction (Ex. 1010 ¶ 105). *See Intel Corp., v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1380 (Fed. Cir. 2023) (“[If] there’s a known technique to address a known problem using prior art elements according to their established functions, then there is a motivation to combine.” (internal quotation omitted)).

Thus, Petitioner has shown by a preponderance of the evidence that Rogers discloses limitation 1D2, and alternatively that limitation 1D2 would have been obvious based on Rogers's disclosures.

(3) *Limitations 1D3–5*

Limitations 1D3–5 state that the processor is configured to

- [1D3] transmit a display signal associated with the modified visual effect to the display, the modified visual effect to be displayed on the proxy object via the display;
- [1D4] transmit a haptic signal associated with the haptic effect to the one or more haptic output devices; and
- [1D5] output the haptic effect using the one or more haptic output devices.

Ex. 1001, 10:52–58.

Petitioner argues that Rogers's computer 106 transmits a display signal, transmits a haptic signal, and outputs the haptic effect as recited in these limitations. Pet. 78–79 (citing Ex. 1010 ¶¶ 18, 43, 63, 70, 73, 105, Fig. 3; Ex. 1006, 4–6, 10; Ex. 1003 ¶¶ 320–329).

Patent Owner does not specifically contest whether Rogers discloses these limitations. *See* PO Resp. 35–47.

For the reasons given in the Petition, we determine that Petitioner has shown, by a preponderance of the evidence, that Rogers discloses limitations 1D3–5.

1. *Claims 2–8, 11, 12, and 15–21*

Of the remaining challenged claims, claims 11 and 21 are independent and include limitations generally like those of independent claim 1; claims 2–8 further limit independent claim 1 and claims 12 and 15–20 further limit

independent claim 11. Ex. 1001, 10:59–12:41. Petitioner presents arguments addressing each of the limitations in claims 2–8, 11, 12, and 15–21, with support from the record and the testimony of Dr. Welch. *See* Pet. 79–85.

As one example, claim 2 depends from claim 1 and further recites “a wearable device comprising one or more second haptic output devices.” Ex. 1001, 10:59–61. Petitioner argues that Rogers’s HMD 102 is a wearable device and it comprises “second haptic output devices” such as “tactile feedback hardware.” Pet. 79–80 (citing Ex. 1010 ¶¶ 5, 42, 73, 119–131, Fig. 1; Ex. 1003 ¶¶ 330–333).

Patent Owner does not separately address Petitioner’s arguments and evidence for independent claims 1, 11, and 21. *See* PO Resp. 35–47. Also, Patent Owner does not specifically contest Petitioner’s arguments and evidence about any of the dependent claims. *See* PO Resp. 48.

Having reviewed Petitioner’s uncontested arguments and evidence explaining how Rosenberg discloses or teaches each of the limitations of claims 2–8, 11, 12, and 15–21, we agree with and adopt Petitioner’s analysis. *See* Pet. 79–85.

2. *Conclusion for Ground Based on Rogers*

For the above reasons, we determine that Petitioner has shown, by a preponderance of the evidence, that Rogers discloses or teaches all the limitations of each of the challenged claims, and that a person of ordinary skill in the art would have had reason to combine the features described in Rogers in the manner recited in each of the claims. We therefore determine that claims 1–8, 11, 12, and 15–21 are unpatentable under §102 as anticipated by Rogers and under § 103 as obvious over Rogers.

D. OTHER GROUNDS

In its first and second grounds, Petitioner argues that claims 1–8, 11, 12, and 15–21 are unpatentable under §§ 102(a)(1)–(2) and 103 as anticipated by or obvious over Banerjee or Meglan. Pet. 4, 9–67.

As we discuss above, we hold that each of the above claims is unpatentable as anticipated and obvious based on Rogers. *Supra* Section III.C. Thus, we need not decide whether these claims are also unpatentable based on Banerjee or Meglan. *Cf. In re Gleave*, 560 F.3d 1331, 1338 (Fed. Cir. 2009) (not reaching other grounds of unpatentability after affirming a ground based on anticipation); *see also Beloit Corp. v. Valmet Oy*, 742 F.2d 1421, 1423 (Fed. Cir. 1984) (explaining that an administrative agency is at liberty to reach a decision based on a dispositive issue because doing so “can not only save the parties, the [agency], and [the reviewing] court unnecessary cost and effort,” but “can greatly ease the burden on [an agency] commonly faced with a . . . proceeding involving numerous complex issues and required by statute to reach its conclusion within rigid time limits”).

Petitioner also argues that, for the ground based on Meglan, certain arguments in Patent Owner’s Sur-reply were untimely. Paper 25. Patent Owner responded to these arguments. Paper 27. Because we do not reach the ground based on Meglan, we need not determine whether Patent Owner’s sur-reply arguments were untimely.

E. OBJECTIONS TO DEMONSTRATIVES

Patent Owner objected to certain demonstrative slides presented in the oral hearing. Paper 31. Each of these slides, other than slide 43, relates to the

grounds based on Banerjee or Meglan, which we do not reach in this decision, so the objections to these slides are moot. *See id.*

Patent Owner objects to slide 43 because it allegedly raises a new and untimely argument. Paper 31, 10. In the slide, Petitioner contends that Patent Owner's Sur-reply allegedly misinterpreted Rogers's disclosure of firing and reloading a virtual gun. *Id.*⁹ We disagree that the slide is untimely, as it simply responds to an argument raised in the Sur-reply. *Id.* Petitioner also previously addressed this issue in its Reply. *See* Pet. Reply 19–20. Patent Owner had an opportunity to further address the issue at the hearing and has not shown that it suffered any prejudice. Therefore, the objection is overruled.

Similarly, Petitioner objected to certain of Patent Owner's demonstrative slides, each of which related to the ground based on Meglan. Paper 32. Because we do not reach the Meglan ground, these objections are moot.

⁹ Petitioner discussed slide 43 briefly during the oral hearing. Tr. 30:19–31:10.

IV. CONCLUSION¹⁰

For the reasons above, Petitioner has shown by a preponderance of the evidence that claims 1–8, 11, 12, and 15–21 of the '067 patent are unpatentable under § 102 as anticipated by Rogers and under § 103 as obvious over Rogers.

In summary:

Claim(s)	35 U.S.C. §	Reference(s)/ Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1–8, 11, 12, 15–21	102(a)(1)–(2), 103	Banerjee ¹¹		
1–8, 11, 12, 15–21	102(a)(1)–(2), 103	Meglan ¹²		
1–8, 11, 12, 15–21	102(a)(1)–(2), 103	Rogers	1–8, 11, 12, 15–21	
Overall Outcome			1–8, 11, 12, 15–21	

¹⁰ Should Patent Owner wish to pursue amendment of claims in a reissue or reexamination proceeding after this decision, we draw 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).

¹¹ As discussed above, we do not reach the alternative grounds based on Banerjee. See *supra* Section III.D.

¹² As discussed above, we do not reach the alternative grounds based on Meglan. See *supra* Section III.D.

V. ORDER

It is

ORDERED that claims 1–8, 11, 12, and 15–21 of the '067 patent are unpatentable; and

FURTHER ORDERED that parties to this proceeding seeking judicial review of our decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

IPR2024-00557
Patent 10,665,067 B2

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