

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MOTHERSON INNOVATIONS CO., LTD.,
Petitioner,

v.

MAGNA MIRRORS OF AMERICA, INC.,
Patent Owner.

IPR2020-00777
Patent 10,261,648 B2

Before SALLY C. MEDLEY, SHEILA F. McSHANE, and JESSICA C.
KAISER, *Administrative Patent Judges*.

KAISER, *Administrative Patent Judge*.

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

I. INTRODUCTION

On March 31, 2020, Motherson Innovations Co., Ltd. (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 1–13 and 15–36 of U.S. Patent No. 10,261,648 B2, which issued on April 16, 2019 (Ex. 1001, “the ’648 patent”). Paper 1 (“Pet.”). Magna Mirrors of America, Inc. (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). Taking into account the arguments presented in these papers, we determined the information presented in the Petition established that there was a reasonable likelihood that Petitioner would prevail with respect to at least one challenged claim, and we instituted this *inter partes* review as to all challenged claims on October 7, 2020. Paper 7 (“Dec.”).

During the course of the trial, Patent Owner filed a Patent Owner Response (Paper 11, “PO Resp.”); Petitioner filed a Reply to the Patent Owner Response (Paper 13, “Pet. Reply ”); and Patent Owner filed a Sur-reply (Paper 14, “PO Sur-reply”). An oral hearing was held on July 13, 2021, and a transcript of the hearing is included in the record. Paper 20 (“Tr.”).

For the reasons discussed in detail below, we determine that Petitioner has shown by a preponderance of the evidence that claims 1, 2, 5, 8–11, 15, 16, 26, and 34–36 of the ’648 patent are unpatentable, but has not shown by a preponderance of the evidence that claims 3, 4, 6, 7, 12, 13, 17–25, and 27–33 of the ’648 patent are unpatentable.

II. BACKGROUND

A. *The ’648 Patent (Ex. 1001)*

The ’648 patent describes an exterior rearview mirror assembly for a vehicle, e.g., a side mirror, mounted on the exterior of a vehicle. Ex. 1001,

code (57), 58:49–52. Typically, exterior rearview mirror assemblies include a mirror casing (or housing) which holds a mirror reflective element. *Id.* at 70:4–6. Further, the position of the mirror reflective element can be adjusted so that the driver of the vehicle can see a particular “rearward field of view” in the mirror reflective element. *See id.* at 61:57–59.

One “typical known exterior mirror construction” has the mirror reflective element “disposed in or housed in a mirror casing 764 (and is inboard of the open end of the mirror casing and not attached thereto) and is adjustable relative to the mirror.” Ex. 1001, 70:4–11; *see id.* at Fig. 68B. That is, the mirror reflective element itself is adjusted (or repositioned), while the mirror casing is not repositioned. *See id.* In the ’648 patent, the mirror assembly, instead, has its mirror reflective element “disposed at and attached to or otherwise fixed relative to the mirror casing 744, such that, during adjustment, the reflective element and mirror casing move in tandem.” *Id.* at 70:17–23; *see id.* at 71:45–57. That is, the mirror casing and the attached mirror reflective element are repositioned together to adjust the rearward field of view in the mirror reflective element, rather than only repositioning the mirror reflective element.

Figure 56 shows such a mirror assembly and is reproduced below.

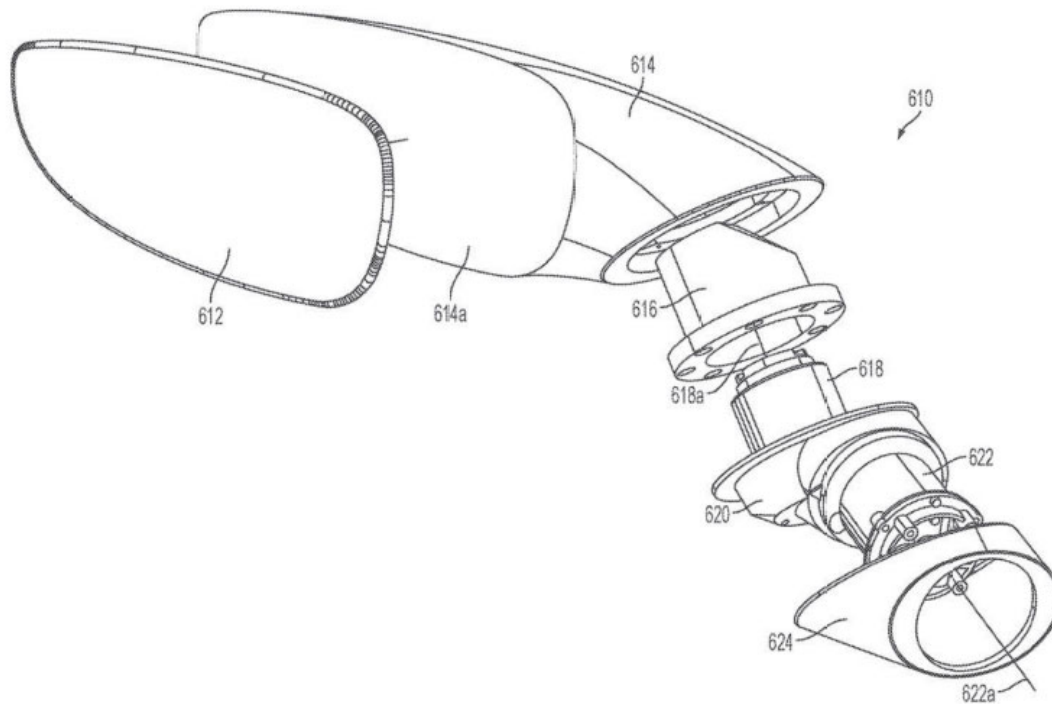


FIG. 56

Figure 56 is an exploded perspective view of an exterior rearview mirror assembly for “an exterior rearview mirror assembly that is configured for mounting at a side region of a vehicle.” Ex. 1001, 5:6–8, 58:50–52. Starting at the leftmost element, “exterior rearview mirror assembly 610 comprises a reflective element 612,” e.g., a mirror. *Id.* at 58:56–64. Reflective element 612 “is attached at a rear attaching portion 614a of a mirror head housing 614.” *Id.* at 58:58–65. For example, reflective element 612 can be “adhered or otherwise fixedly attached” to rear attaching portion 614a (of mirror head housing 614). *Id.* at 58:65–67. Furthermore, “the front perimeter edge regions of the reflective element [can be] curved or rounded or beveled to provide a smooth or continuous transition between the generally planar front surface of the reflective element and the side walls or surfaces of the mirror housing.” *Id.* at 58:67–59:6; *see id.* at 34:57–36:22, Figs. 32–34, 37–39.

Continuing clockwise in Figure 56, mirror head housing 614 and affixed reflective element 612 are attached to a series of brackets and rotating actuators. Specifically, “mirror head housing 614 is attached at an inner bracket or mounting element 616” which is then “attached at a first actuator 618.” *Id.* at 59:7–9. First actuator 618 can be driven rotationally, and, accordingly, “imparts a rotation of bracket 616 and mirror head housing 614 about a first pivot axis 618a.” *Id.* at 59:9–12. Still following the components clockwise, first actuator 618 “is attached to or mounted at an outer bracket 620 that is mounted to or attached to a second actuator 622.” *Id.* at 59:12–14. Second actuator 622 can also be driven rotationally and so, “imparts of rotation of bracket 620 and first actuator 618 and bracket 616 and mirror head housing 614 about a second pivot axis 622a.” *Id.* at 59:12–18. Finally, “second actuator 622 . . . is attached at or disposed at or in an outer cover 624” and “outer cover 624 is disposed at or attached to or mounted at the side portion of the vehicle (and pivotally or rotatably mounted thereat, such as via the actuator 622) when the exterior mirror assembly is normally mounted at the side of the vehicle.” *Id.* at 59:13–22.

With such an assembly and mounting design, the driver of a vehicle is able to adjust his or her rearward and/or sideward field of view, which is reflected in the assembly’s reflective element. *Id.* at 59:23–26; *see id.* at 67:55–67. Specifically, “the mirror head is adjustable about the first and second axes (via selective actuation of one or both actuators) to adjust the rearward field of view for the driver of the vehicle.” *Id.* at 59:23–26, 66:48–52. The actuators rotate their respective brackets, thereby adjusting the position of the mirror head attached to the brackets. *Id.* at 59:26–39. And, because the mirror head and reflective element are attached, adjusting the position of the mirror head via the actuators adjusts the position of the

reflective element in tandem. *Id.* at 69:5–9, 70:21–23, 71:45–47

(“[A]ctuators adjust the mirror head and the reflective element in tandem (and do not adjust the reflective element relative to the mirror casing).”).

Further, the actuators are relatively positioned to allow the mirror head (and attached reflective element) to be rotated about multiple axes. *See id.* at 59:26–47, 59:55–60:4. For example, “the pivot axes [of the actuators] may be angled relative to one another at an angle of at least about 15 degrees or at least about 30 degrees or more, such as an angle of up to about 90 degrees.” *Id.* at 59:42–46. Further, the multiple axes of rotation include “pitch, yaw and roll axes or about a generally vertical axis and/or other axes non-coaxial with the first or generally vertical axis or the like.” *Id.* at 68:19–22; *see id.* at 68:47–50. And, “[b]ecause of the angled relationship of the axes of rotation of the actuators and the angled interface or mounting interface of the mirror head housing 614 and outer cover 624, the first and second actuators may be operated together or cooperatively operated to laterally adjust the rearward field of view.” *Id.* at 59:55–59. Alternatively, in other embodiments, “the first and second actuators may be operated separately or together or cooperatively operated to vertically and/or laterally adjust the rearward field of view.” *Id.* at 66:63–67:10; *see id.* at 68:42–50. Additionally, “the actuators 618, 622 may operate at different speeds to provide the desired or selected lateral adjustment with limited vertical adjustment (and/or to provide a desired or selected vertical adjustment with limited lateral adjustment and/or to provide a desired or selected vertical and lateral adjustment).” *Id.* at 60:12–17.

B. The Challenged Claims

Of the challenged claims, claims 1, 15, and 26 are independent. Claim 1 is reproduced below.

1. An exterior rearview mirror assembly configured for mounting at an exterior portion of a vehicle, said exterior rearview mirror assembly comprising:

a mirror head;

an exterior mirror reflective element fixedly attached at said mirror head;

an attachment portion configured for attachment at an exterior portion of a vehicle equipped with said exterior rearview mirror assembly;

a multi-axis adjustment mechanism comprising at least one electrically-operable actuator;

wherein said multi-axis adjustment mechanism is operable to move said mirror head, with said exterior mirror reflective element fixedly attached thereto, about multiple axes relative to said attachment portion; and

wherein said exterior mirror reflective element moves in tandem with movement of said mirror head relative to the exterior portion of the body of the equipped vehicle at which said exterior rearview mirror assembly is attached to adjust the rearward field of view of a driver of the equipped vehicle who views said exterior mirror reflective element when operating the equipped vehicle.

Ex. 1001, 76:38–60.

C. Related Proceedings

Petitioner and Patent Owner state that there are no related proceedings involving the '648 patent. Pet. 74, Paper 4, 1.

D. References

Petitioner relies on the following references:

1. “Lupo” (GB 2,244,965 A; published Dec. 18, 1991) (Ex. 1003);
2. “McCabe” (US 7,255,451 B2; issued Aug. 14, 2007) (Ex. 1004); and
3. “Tsuyama” (US 6,270,227 B1; issued Aug. 7, 2001) (Ex. 1005).

E. Testimonial Evidence

Petitioner supports its challenge with a declaration from David R. McLellan. (Ex. 1002, “McLellan Dec.”).

Patent Owner has submitted a declaration from Michael Nranian (Ex. 2001, “Nranian Dec.”) and a First Supplemental Declaration from Mr. Nranian (Ex. 2010, “Nranian Supp. Dec.”). Petitioner cross-examined Mr. Nranian by deposition. Ex. 1020 (“Nranian Dep.”).

F. Grounds Asserted

Petitioner challenges the patentability of claims 1–13 and 15–36 of the ’648 patent on the following grounds:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1, 3, 5–13, 15	103(a) ¹	Lupo
2, 16–17, 19–36	103(a)	Lupo, McCabe
4	103(a)	Lupo, Tsuyama
18	103(a)	Lupo, McCabe, Tsuyama
1, 5, 8–9, 12, 15	103(a)	Tsuyama
2, 16, 19–20, 24– 27, 31, 33, 36	103(a)	Tsuyama, McCabe

III. ANALYSIS

A. Legal Principles

A claim is unpatentable under 35 U.S.C. § 103(a) if “the differences between the subject matter sought to be patented and the prior art are such

¹ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011), amended 35 U.S.C. § 103 effective March 16, 2013. Because the ’648 patent has an effective filing date prior to the effective date of the applicable AIA amendment, we refer to the pre-AIA versions of § 103.

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.” *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in the record, objective evidence of nonobviousness.² *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). In that regard, an obviousness analysis “need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR*, 550 U.S. at 418.

B. Level of Ordinary Skill in the Art

Petitioner asserts a person of ordinary skill in the art “would have possessed at least a bachelor’s degree in mechanical engineering or engineering technology with at least two years of experience in the automotive industry (or equivalent degree or experience).” Pet. 3 (citing Ex. 1002 ¶¶ 34–36). Petitioner also asserts that a “person could also have qualified as a [person of ordinary skill in the art] with some combination of (1) more formal education (such as a master’s degree) and less technical experience, or (2) less formal education and more technical or professional experience.” *Id.* (citing Ex. 1002 ¶¶ 34–36).

Patent Owner asserts, both before and after institution, that a person having ordinary skill in the art “would hold a Master of Science degree in

² Patent Owner does not present any objective evidence of nonobviousness as to the challenged claims.

any kind of engineering relevant to automotive component design (e.g., electrical engineering, mechanical engineering, or optical engineering), as well as 2–3 years of experience in the automotive industry designing components for automobiles.” Prelim. Resp. 7 (citing Ex. 2001 ¶¶ 35–41; Ex. 2002); PO Resp. 1 (citing Ex. 2001 ¶¶ 35–41; Ex. 2002).

In our Decision on Institution, we adopted Patent Owner’s formulation because it is consistent with the record, and we also agreed with Petitioner that more formal education with less technical experience and vice versa could suffice. Dec. 9. Neither party asks us to depart from that formulation, and we continue to apply it here.

C. Claim Construction

In an *inter partes* review, we construe claim terms according to the standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–17 (Fed. Cir. 2005) (en banc). 37 C.F.R. § 42.100(b) (2019). Under that standard, we construe claims “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.* Furthermore, we expressly construe the claims only to the extent necessary to resolve the parties’ dispute. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Ltd.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“[W]e need only construe 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))).

In our Decision on Institution, we discussed the following limitations: (1) “an exterior mirror reflective element fixedly attached at said mirror head”; (2) “yaw” and “roll”; and (3) “rearward field of view.” Dec. 10–15.

Regarding the first limitation, we determined the limitation “is not limited to attachment of the exterior mirror reflective element at a peripheral exterior surface portion of said mirror head” as Patent Owner argued. *Id.* at 10, 14. Regarding “yaw” and “roll,” we did not adopt either party’s proposed construction. *Id.* at 14. We noted that the claims which use the terms “yaw” and “roll” “recite a frame of reference for the yaw and roll adjustment: ‘yaw and roll adjustment of said exterior mirror reflective element relative to the exterior portion of the equipped vehicle at which said exterior rearview mirror assembly is attached.’” *Id.* at 14–15. We further determined that Petitioner’s proposed construction was overbroad, and that Patent Owner’s proposed construction defined “yaw” and “roll” “from the frame of reference of the vehicle as a whole.” *Id.* at 15. We invited the parties to further discuss the construction of “yaw” and “roll” considering the recited frame of reference. *Id.* Regarding “rearward field of view,” we adopted Patent Owner’s proposed construction as a “view of rearwardly approaching or following vehicles.” *Id.*³

In its trial briefing, Patent Owner proposes constructions for the following claim limitations: (1) “exterior mirror reflective element fixedly attached at said mirror head”; (2) “a bracket to which said exterior mirror reflective element is fixedly attached”; (3) “wherein the outermost front perimeter edge of said exterior mirror reflective element is rounded”; and (4) “yaw” and “roll.” PO Resp. 1–37. In its Reply, Petitioner addresses the

³ In its Response, Patent Owner also proposed the same construction. PO Resp. 24. As noted, in our Decision on Institution, we preliminarily agreed with that construction (Dec. 15), and during trial, Petitioner did not dispute it (Pet. Reply 4). We continue to adopt Patent Owner’s undisputed proposed construction of this term.

same limitations. Pet. Reply 1–17. For purposes of this decision, we address all of these terms below.

1. “*exterior mirror reflective element fixedly attached at said mirror head*”

In its Petition, Petitioner does not propose a construction for the limitation “exterior mirror reflective element fixedly attached at said mirror head,” but instead proposes that the limitation “fixedly attached” means “securely fastened, either directly or indirectly, and not readily detachable.” Pet. 5–6 (citing Ex. 1002 ¶¶ 48–49). Prior to institution, Patent Owner argued that we should construe the term “an exterior mirror reflective element fixedly attached at said mirror head” to mean that the mirror reflective element is “fixedly attached to a peripheral exterior surface portion of said mirror head.” Prelim. Resp. 8 (citing Ex. 2001 ¶¶ 42–45, 75–88) (emphasis omitted). In our Decision on Institution, we preliminarily determined that this claim phrase is not limited in the way Patent Owner contends, and we did not further construe it at that stage of the proceeding. Dec. 10–14.

During trial, the issue as to this claim phrase largely remains the same. In its Response, Patent Owner contends, as it did prior to institution, that the “exterior mirror reflective element fixedly attached at said mirror head” means “fixedly attached to a *peripheral exterior surface portion* of said mirror head.” PO Resp. 1 (citing Ex. 2001 ¶¶ 42–45, 75–88). Patent Owner contends that the embodiment depicted in Figure 58A of the Specification informs the meaning of the claim language at issue. *Id.* at 1–2 (citing Ex. 1001, Fig. 58A; *Phillips*, 415 F.3d at 1315–16). Patent Owner further contends that all exterior mirror embodiments in the Specification support the interpretation that “[t]he mirror reflective element is an element separate

from the mirror head, and is attached to a particular peripheral exterior surface portion of the mirror head, rather than recessed inward within the mirror head.” *Id.* at 2–3 (citing Ex. 1001, Figs. 56, 56A, 68A; Ex. 2001 ¶¶ 78–85). Patent Owner contends the ’648 patent describes how the exterior mirror reflective assembly attached at the mirror head provides “a smooth or continuous transition between the generally planar front surface of the reflective element and the side walls or surfaces of the mirror housing,” and that the Specification further distinguishes the configuration of the ’648 patent from known exterior mirror constructions, as depicted in Figure 68B, which dispose or house the mirror reflective element within the mirror casing, “inboard of the open end of the mirror casing and not attached thereto.” *Id.* at 3–4 (citing Ex. 1001, 58:56–59:6, 70:4–32, Fig. 68B; Ex. 2001 ¶¶ 82–83). Patent Owner argues this “allows for space within the mirror casing that previously was occupied by the mirror actuators of known or conventional mirror assemblies.” *Id.* at 5 (citing Ex. 1001, 70:24–27; Ex. 2001 ¶¶ 83–84); *see also id.* (contrasting the “known construction” as depicted in Figure 68B with that of the present invention as depicted in Figure 68A).

Addressing the Decision on Institution, Patent Owner disagrees that the ’648 patent “‘does not make a distinction between’ attachment at the peripheral exterior surface of the mirror head and ‘inward from that surface.’” *Id.* at 6 (citing Dec. 13). Patent Owner contends the “’648 [patent] makes a clear distinction between (i) a ‘frameless reflective element’ . . . and (ii) a mirror reflective element having a bezel . . . at the perimeter region of the front surface of the reflective element” and that the frameless reflective element of the ’648 patent provides the benefit of an enhanced viewing area. *Id.* (citing Ex. 1001, 72:46–48, 60–67; Ex. 2010

¶¶ 5–6; Ex. 2011, 18–19). Patent Owner also contends the recitation of “attached *at*” as opposed to the prepositional “to” “indicat[es] a location in particular place or position.” *Id.* at 7.

Patent Owner further disputes our determination in the Decision on Institution that the “frameless” appearance is “an optional feature of the invention.” *Id.* at 8 (citing Dec. 13). Patent Owner contends that because the ’648 patent does not describe the exterior mirror reflective element disposed within the housing of the mirror head, “the ‘frameless’ look is a necessary benefit of the ‘present invention.’” *Id.* Thus, Patent Owner contends that the claim language of the ’648 patent is not broader than the disclosed embodiment that attaches the reflective element at the periphery of the mirror head. *Id.* (citing *SuperGuide Corp. v. DirecTV Enters., Inc.*, 358 F.3d 870, 875 (Fed. Cir. 2004)). Patent Owner supports this contention by explaining the Specification “describes the features of the ‘present invention’ as a whole, [which] limits the scope of the invention.” *Id.* at 9 (quoting *Verizon Services Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1308 (Fed. Cir. 2007)) (citing *SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1343 (Fed. Cir. 2001); *Schriber-Schroth Co. v. Cleveland Trust Co., Chrysler Corp.*, 305 U.S. 47, 57 (1938)).

Patent Owner also contends the Board should narrowly construe this limitation to require attachment of the mirror reflective element at the periphery of the mirror head in order to preserve the validity of the actual invention. *Id.* at 9–10 (citing *Smith v. Snow*, 294 U.S. 1, 14 (1935); *Ruckus Wireless, Inc. v. Innovative Wireless Solutions*, 824 F.3d 999, 1004 (Fed. Cir. 2016); *Modine Mfg. Co. v. U.S. Int’l Trade Comm’n*, 75 F.3d 1545, 1556 (Fed. Cir. 1996); *Phillips*, 415 F.3d at 1327). Patent Owner further

contends the Board “should not have adopted the broader meaning that impermissibly captures the very prior art that the ’648 invention sought to overcome.” *Id.* at 10 (citing *Ruckus Wireless, Inc.*, 824 F.3d at 1004).

In addition, Patent Owner argues that claim 2 of the ’648 patent supports Patent Owner’s construction. *Id.* at 10–11. Specifically, Patent Owner relies on Figure 68A in tandem with claim 2’s recitation that the “outermost front perimeter edge of [the] exterior mirror reflective element is rounded.” *Id.* at 10 (citing Ex. 1001, 76:61–64). Patent Owner contends Figure 68A depicts the rounded front perimeter edge of the mirror reflective element is exposed such that the edge is “contactable by a person,” and that “no part of [the] mirror casing or shell [] overlap[s] onto or over the outermost glass surface of [the] mirror reflective element.” *Id.* Thus, Patent Owner argues that the outermost front perimeter edge of the reflective element is rounded in claim 2 because it is exposed and contactable. *See id.* at 11 (citing Ex. 2001 ¶ 88).

In its Reply, Petitioner asserts that Patent Owner’s proposed construction attempts to improperly import a limitation from the Specification into the claims. Pet. Reply 2 (citing PO Resp. 1). Petitioner contends that the ’648 patent describes both embodiments where the exterior reflective element is fixedly attached at a peripheral exterior surface of the mirror head and embodiments where the reflective element is *not* attached to an external periphery of the mirror head. *Id.* (citing Dec. 13). For example, Petitioner argues that the disclosure of the ’648 patent supports “that the mirror reflective element may be fixedly attached to either a surface or a mounting portion of the mirror head.” *Id.* (citing Ex. 1001, 71:53–59).

Petitioner next points to the Specification’s disclosure relating to interior mirrors and how “[o]ptionally, the mirror assembly may include a

conventional bezel.” *Id.* (citing Ex. 1001, 33:64–66). Petitioner contends this disclosure of an optional bezel also applies to the exterior rearview mirror assembly of the present invention, since “aspects of the [interior] mirror assemblies . . . may be incorporated in or associated with an exterior rearview mirror assembly that is configured for mounting at a side region of a vehicle.” *Id.* (citing Ex. 1001, 58:49–52). As an example, Petitioner points to Figure 40 as depicting “a thin flat bezel or cover element [] may partially overlap a perimeter region of the front surface of the mirror substrate [] (such as a front substrate of an electro-optic or electrochromic reflective element or such as a prismatic substrate of a prismatic reflective element).” *Id.* at 2–3 (citing Ex. 1001, 36:23–28, Fig. 40).

Petitioner further contends that Mr. Nranian’s (Patent Owner’s expert) deposition testimony “regarding claim construction [is] not credible and should be disregarded.” *Id.* at 3. Specifically, Petitioner argues Mr. Nranian used an improper approach of “look[ing] at the product specifically or the prior art or whatever you’re saying reads on the claims” to discern what the claim term means. *Id.* (citing Ex. 1020, 105:3–13; *Wilson Sporting Goods Co. v. Hillerich & Bradsby Co.*, 442 F.3d 1322, 1330 (Fed. Cir. 2006)).

In its Sur-reply, Patent Owner argues Petitioner’s reliance on Figure 40 as depicting a bezel that contradicts Patent Owner’s proposed construction is misplaced. PO Sur-reply 2. Specifically, Patent Owner contends “[w]hether a bezel covers a portion of the mirror reflective element is separate from how the reflective element is attached to the mirror head.” *Id.* According to Patent Owner, the bezel is described as “a separate, stand-alone piece that can be ‘attach[ed]’ to the ‘mirror casing’” and “is not described as a portion of the mirror head.” *Id.* (citing Ex. 1001, 36:23–47).

Patent Owner also contends that Petitioner’s arguments ignore the “rounded edge” limitation that is added in claim 2. *Id.* at 3. Patent Owner relies upon the doctrine of claim differentiation to assert that because claim 1 is silent regarding the outermost front perimeter edge of the exterior mirror reflective element, claim 1 necessarily encompasses both rounded and non-rounded edges and that “[o]ne of skill in the art would know that a non-rounded exposed edge would be unsafe but for the use of a protective element.” *Id.* (citing Ex. 2010 ¶¶ 21–22).

Patent Owner also addresses Petitioner’s arguments about the credibility of Mr. Nranian’s testimony. *Id.* at 3–4. Patent Owner contends that Petitioner mischaracterizes Mr. Nranian’s testimony. *Id.* (citing Ex. 1020, 103:13–15, 103:22–23, 104:11–13, 105:3–13). Instead, Patent Owner contends Mr. Nranian applied the correct legal standard and testified that “you look at . . . the claim terms, the specification, the prosecution history, and the extrinsic evidence in that order . . . to interpret what these claim terms mean[.]” *Id.* at 4 (quoting Ex. 1020, 101:22–102:18).

After having reviewed the claim language, the arguments, and the evidence, we determine that “an exterior mirror reflective element fixedly attached at said mirror head” does not require the mirror reflective element to be fixedly attached to a peripheral exterior surface portion of the mirror head as Patent Owner contends.

Turning first to the claim language, claim 1 provides further context when describing the adjustment operation by reciting the “multi-axis adjustment mechanism is operable to move the mirror head, with said exterior mirror reflective element fixedly attached thereto . . . wherein said exterior mirror reflective element moves in tandem with movement of said mirror head.” Ex. 1001, 76:42–43, 76:49–54. Thus, independent claim 1

recites a particular attachment between the mirror reflective element and the mirror head (i.e., “an exterior mirror reflective element fixedly attached at said mirror head”) and also recites those two structure move in tandem with each other. Thus, the language of claim 1 recites a fixed attachment between the mirror reflective element and the mirror head and further describes the movement between those two elements as being “in tandem.” Notably, nothing in the claim language recites the attachment of the mirror reflective element at or to a peripheral exterior surface portion of the mirror head.

We do not agree with Patent Owner’s argument that Petitioner’s construction effectively rewrites the claim to recite “fixedly attached *to*” instead of “fixedly attached *at*.” PO Resp. 7. We agree with Patent Owner that “the recitation of ‘attached *at*’ . . . ‘indicat[es] a location in particular place or position.’” *Id.* The claims, however, recite generally “at a mirror head” instead of a more particularized “at some particular surface of the mirror head.” We also do not agree with Patent Owner’s contentions that rely on dependent claim 2 because, as discussed in detail below, we do not adopt Patent Owner’s proposed construction of the additional limitation of claim 2.

We next consider the Specification’s description of the exterior rearview mirror assembly and how the mirror reflective element is attached to the assembly as a whole. Ex. 1001, 68:51–72:23; *see also* Tr. 61:3–20 (Patent Owner noting “the discussion [regarding the exterior mirror reflective element fixedly attached at said mirror head] has to center on Figures 68A and 68B”). In particular, “a mirror casing or shell [] (FIG. 68A) may be readily attached at the mirror attachment element or bracket or to the mirror reflective element itself in order to provide the desired or appropriate appearance or styling of the exterior rearview mirror at the side

of the vehicle and to provide mechanical protection of the reflective element and the like from environmental exposure.” Ex. 1001, 68:62–69:1. The disclosure is not limiting as to the means and structure of attachment between the mirror reflective element and the mirror casing. *Id.* at 69:1–4 (“The mirror casing or shell may be attached via any suitable means, such as via snapping one or more casing portions at the rear of the mirror reflective element and/or bracket.”). When the two are attached, however, “the mirror casing or shell moves in tandem with the [] movement of the mirror reflective element.” *Id.* at 69:5–9.

The Specification’s discussion contrasting “[a] typical known exterior mirror construction” as shown in Fig. 68B with the construction of the mirror of the present invention further emphasizes the “in tandem” movement resulting from the mirror reflective element being attached at the mirror head. *Id.* at 70:4–32. The known mirror construction has the mirror reflective element “disposed in or housed in a mirror casing . . . and not attached thereto[] and is adjustable relative to the mirror casing.” *Id.* at 70:4–8. “In contrast to such known constructions, the present invention provides a mirror assembly that has the reflective element [] disposed at and attached to *or otherwise fixed relative to the mirror casing [], such that, during adjustment, the reflective element and mirror casing move in tandem* about the fulcrum of the mounting device at or near the side of the vehicle.” *Id.* at 70:17–23 (emphasis added). We do not view this description as requiring attachment of the mirror reflective element to a peripheral exterior surface portion of the mirror head. The Specification links the different configurations to whether or not the mirror reflective element moves in tandem with the mirror casing. In addition, the Specification notes that the Figure 68A configuration “allows for space within the mirror casing that was

previously occupied by the mirror actuators of known or conventional mirror assemblies.” *Id.* at 70:23–27. Although Figure 68B depicts reflective element 742 with an exposed edge, it is clear that the extra space in the mirror casing results primarily from moving the actuator outside of the mirror casing. The embodiment in Figure 68B demonstrates that claim 1 encompasses configurations in which the reflective element is attached at the peripheral exterior surface of the mirror head, but it does not support limiting the claim to only such configurations. *Electro Med. Sys., S.A. v. Cooper Life Scis., Inc.*, 34 F.3d 1048, 1054 (Fed. Cir. 1994) (“[A]lthough the specification[] may well indicate that certain embodiments are preferred, particular embodiments appearing in a specification will not be read into the claims when the claim language is broader than such embodiments.”).

We also do not agree with Patent Owner’s contention that we should limit the claim language to a specific embodiment to preserve validity. PO Resp. 9–10. Claims are interpreted in order to preserve validity when, after applying all other available tools of claim construction, a claim is still ambiguous. *Phillips*, 415 F.3d at 1327. As discussed above, the plain claim language and the intrinsic evidence support the construction that the claim term “an exterior mirror reflective element fixedly attached at said mirror head” does not require that the reflective element be fixedly attached “to a peripheral exterior surface portion” of the mirror head, as Patent Owner contends.

For the foregoing reasons, we do not adopt Patent Owner’s proposed construction of “exterior mirror reflective element fixedly attached at said mirror head” as requiring attachment of the mirror reflective element to a peripheral exterior surface portion of the mirror head, and we determine no further construction of this limitation is necessary.

2. “*mirror head comprises a bracket to which said exterior mirror reflective element is fixedly attached*”

Claim 3⁴ depends from claim 1 and further recites “said mirror head comprises a bracket to which said exterior mirror reflective element is fixedly attached.” Ex. 1001, 76:65–67. In the Petition, Petitioner did not propose a construction for the entire limitation but instead proposed “fixedly attached” means “securely fastened, either directly or indirectly, and not readily detachable.” Pet. 5–6 (citing Ex. 1002 ¶¶ 48–49). In our Decision on Institution, we did not reject Petitioner’s proposed construction of “fixedly attached,” however, we expressed doubt regarding Petitioner’s application of that construction to the additional limitation of claim 3. Dec. 21–23.

During trial, the issue as to this claim phrase largely remains the same. In its Response, Patent Owner contends “Petitioner’s construction is divorced from, and does not rely on, the intrinsic record.” PO Resp. 12. In particular, Patent Owner contends that Petitioner supports its construction by relying solely on “less reliable” extrinsic evidence. *Id.* (citing Pet. 5–6; *Phillips*, 415 F.3d at 1317–18). Patent Owner points to a number of court decisions it contends support the understanding that “a claimed *attachment* only covers direct attachment, not indirect.” *Id.* at 12–13. Patent Owner further contends these decisions support that terms like “fixedly attached” “cannot be construed without reference to the term’s use in the specific

⁴ As Patent Owner does, we focus our analysis for purposes of claim construction on the language of dependent claims 3 and 4. *See* PO Resp. 11–19. As Petitioner notes (Pet. Reply 7–8), a number of other challenged claims also recite a “bracket.” We address those claims further in the context of Petitioner’s unpatentability challenges below.

context of the specific claim” and that “generic reference to extrinsic sources may lead to an improper construction.” *Id.* at 13–14.

Patent Owner further argues that the intrinsic evidence supports its proposed construction (a bracket that is directly attached to said exterior mirror reflective element). *Id.* at 11, 14–19. According to Patent Owner, “the claim language itself does not allow for an *indirect* attachment of the mirror reflective element to the bracket.” *Id.* at 14. Based on the language of claim 3 and claim 1 from which claim 3 depends, Patent Owner contends “that the ‘bracket’ is a particular component of the ‘mirror head’ that attaches the ‘mirror reflective element’ to the ‘mirror head’”; thus, “the bracket cannot be merely some portion of the mirror head that does not serve to directly attach the mirror reflective element to the mirror head, such that the bracket is only indirectly attached to the mirror reflective element.” *Id.* Because the claims recite the bracket as “the precise component of the mirror head ‘to which said exterior mirror reflective element is fixedly attached,’ the claims exclude the possibility of indirect attachment of the mirror reflective element to the ‘bracket.’” *Id.* Patent Owner also points to claim 4 because “[a]n attachment between two components by ‘use of an adhesive’ can only mean a direct attachment of one to another.” *Id.* at 15.

Regarding Petitioner’s reliance on Figure 56, Patent Owner contends “the ‘attachment portion 614a’ [] serves as the bracket that most closely aligns with the ‘bracket’ as set forth in the claims.” *Id.* at 16 (citing Ex. 1001, Fig. 56, 58:58–67; Ex. 2001 ¶ 96). Patent Owner further contends that Petitioner’s asserted bracket (“mounting element 616”) does not correspond to the “bracket” recited in claim 3 because it “is attached at a first actuator 618” and the “mirror head housing 614,” not the mirror reflective element. *Id.* at 16 (citing Ex. 1001, Fig. 56, 59:7–9; Ex. 2001 ¶ 96); *see also id.* at 17–

18 (discussing how Figure 68 depicts the direct attachment between bracket 734 and mirror reflective element 742). Patent Owner further contends that “nowhere in the specification are mirror reflective elements described as attached to the bracket through any intermediate structure,” and that, in fact, “[w]hat makes a bracket a bracket is that it is intermediate between [two structures] and fixes [] one to the other.” *Id.* at 18. Referring back to claims 3 and 6, Patent Owner states “[t]he claims [] require that the bracket be *the* intermediary structure directly fixing the ‘mirror reflective element’ to one side, and the ‘support structure’ *directly* to the other side.” *Id.* at 19 (citing Ex. 2001 ¶ 95).

Patent Owner also contends that the Specification’s description of using an adhesive to attach the mirror reflective element to the mirror head supports its proposed construction requiring direct attachment. *Id.* at 17. Patent Owner contends the ’648 patent “uses the term ‘fixedly attached’ synonymously with the term ‘adhered.’” *Id.* (citing Ex. 1001, 29:66–30:1, 71:53–55, Fig. 26A).

In its Reply, Petitioner proposes a modified construction and contends “[f]or two elements to be fixedly attached, as that term is used in the ’648 patent, they must be not readily detachable, and they must move in tandem with one another.” Pet. Reply 4. Petitioner notes that the claims use the modifier “fixedly” instead of “directly,” and contends “[t]he word ‘fixedly’ means that two elements are ‘placed so as to be firm and not readily movable.’” *Id.* (citing Ex. 1002 ¶ 49 (citing Ex. 1013, 1; Ex. 1014, 1)). As an example, Petitioner points to Mr. McLellan’s testimony that a “wheel of a vehicle is fixedly attached to the axel by the wheel hub such that the axel and the wheel are not readily detachable and move together,” and that “[t]he

wheel is directly and fixedly attached to the wheel hub, which is directly and fixedly attached to the axel.” *Id.* at 4–5 (citing Ex. 1002 ¶ 49).

To support this construction, Petitioner points to Figure 56 of the challenged patent and contends that Patent Owner’s expert Mr. Nranian agrees that “bracket 616 is inserted into and fastened to the mirror head housing 614” and that reflective element 612 moves in tandem with the bracket 616 and the mirror head 614. *Id.* at 5–6 (citing Ex. 1020, 76:13–77:5). Thus, Petitioner contends Figure 56 depicts “(1) the reflective element fixedly attached to the mirror head, (2) the mirror head comprising a bracket, and (3) a bracket [i.e., bracket 616] that is fixedly attached to the reflective element.” *Id.* at 6.

Petitioner also points to Mr. Nranian’s deposition testimony regarding Figure 68 of the challenged patent to support the construction that “fixedly attached” encompasses indirect attachment. *Id.* at 6–8 (citing Ex. 1020, 36:21–25). In particular, Petitioner describes the configuration in Figure 68 as depicting the supporting arm structure 740 connected to the mirror reflective element 742 by the intermediary bracket 734. *Id.* at 6–7 (citing Ex. 1001, Fig. 68). Petitioner further relies on Figure 68 to show the bracket is not required to be directly attached to the mirror reflective element because Figure 68 does not depict the claimed mirror head. *Id.* at 7–8 (citing PO Resp. 17; Ex. 1020, 98:18–20).

Petitioner also contends that “Figure 68A [] does not support a ‘direct attachment’ of the bracket to the reflective element because Figure 68A does not use a bracket” or “show a mirror head.” *Id.* at 9 (citing Ex. 1001, 68:51–69:9; Ex. 1020, 98:20–21). Even if Figure 68A were modified to include those elements, as Mr. Nranian testifies would have been obvious, Petitioner contends it “would still not satisfy the claim requirements of the ‘mirror

casing attaches at said bracket,’ unless ‘attaches’ also includes indirect attachment.” *Id.* at 10.

In its Sur-reply, Patent Owner responds that Petitioner’s new proposed construction based upon extrinsic evidence “is not substantively different than Petitioner’s initial construction, and is just as untenable.” PO Sur-reply 6. Patent Owner argues that Petitioner’s proposed construction is based upon “extrinsic evidence ‘divorced from the intrinsic evidence’ [as] soundly rejected by *Phillips*.” *Id.* (citing *Phillips*, 415 F.3d at 1319–1324). Patent Owner first points to the claim language and contends the language “a bracket *to which* said exterior mirror reflective element is fixedly attached” “makes clear the direct nature of the attachment and [is] inconsistent with an indirect attachment.” *Id.*; *see also id.* at 6–7 (citing Dec. 22–23 (discussing the language of claim 4 reciting attachment “by use of an adhesive” as requiring a *direct* adhesive attachment)).

Patent Owner further contends the embodiments disclosed in the Specification support Patent Owner’s construction. *Id.* at 7–10. Addressing Petitioner’s reliance on element 616 in Figure 56 as a bracket, Patent Owner notes that element 620 is also referred to as a bracket. *Id.* at 7 (citing Ex. 1001, 59:12–18). Patent Owner contends that “Figure 56 plainly includes structure that serves as a bracket attaching the reflective element 612 to the mirror head 614, and that structure is element 614a, which attaches the two to each other.” *Id.* at 8. Further addressing element 616, Patent Owner contends (1) “element 616 is not part of the mirror head, as the claim requires,” but is instead a separate piece; and (2) “element 616 does not connect the reflective element 612 to the mirror head housing 614.” *Id.* at 8–9 (citing Ex. 1001, 76:65–68).

Patent Owner contends that “Petitioner also incorrectly discounts Figure 68” because Petitioner’s argument “wrongly assumes that every figure must disclose every feature of a claim to be relevant to claim construction.” *Id.* at 9. Patent Owner relies on Mr. Nranian’s testimony that Figure 68 is a schematic “included to illustrate the relationship between various internal elements, including how the bracket is attached to the reflective element.” *Id.* (citing Ex. 1001, 68:51–64; Ex. 1020, 98:7–9). Thus, “[o]ne of skill in the art would understand that the embodiment of Figure 68 is not meant to be the finished, final product, but rather an illustration of certain components ultimately included in such a product.” *Id.* at 10 (citing Ex. 1020, 98:7–9).

Lastly, Patent Owner contends that the extrinsic evidence cited by Petitioner “undermines Petitioner’s attempt to construe the claims to cover ‘indirect’ attachment.” *Id.* at 11–12 (citing Ex. 1011). Patent Owner contends “Exhibit 1011 describes a ‘bracket’ as an ‘intermediate component for fixing one part to another,’ [such that] ‘[w]hat makes a bracket a bracket is that it is intermediate between the two and fixes the one to the other.’” *Id.* at 11 (quoting Ex. 1011, 1).

After reviewing the claim language, the arguments, and the evidence, we determine that “mirror head comprises a bracket to which said exterior mirror reflective element is fixedly attached” is not so broad that it encompasses any structures indirectly attached to the mirror reflective element and that move in tandem therewith as Petitioner contends. Thus, we reject Petitioner’s proposed construction (Pet. Reply 4).

Regarding the claim language of claim 3, we agree with Patent Owner that the claimed bracket is part of the recited mirror head and is attached to the mirror reflective element. PO Resp. 14–19. Claim 3 depends directly

from independent claim 1 and further recites that the “mirror head comprises a bracket to which said exterior mirror reflective element is fixedly attached,” and claim 4 also depends from claim 1 and further recites that the “mirror head comprises a bracket to which said exterior mirror reflective element is fixedly attached by use of an adhesive.” Ex. 1001, 76:65–77:4. In independent claim 1, the language clearly recites that the “exterior mirror reflective element [is] fixedly attached at [the] mirror head.” *Id.* at 76:42–43. When these claims are viewed together, they demonstrate that a person of ordinary skill in the art would have understood that the recited “bracket” acts to attach the mirror reflective element to the mirror head. This understanding is underscored by the language of claim 4, which requires using an adhesive to fixedly attach the mirror reflective element to the bracket. *Id.* at 77:1–4.

Regarding the Specification, we are not persuaded by Petitioner’s arguments that Figures 68 and 68A do not depict a mirror head, and thus cannot inform the construction of the recited “bracket.” *See* Pet. Reply 6–10. Figures 68 and 68A are described as schematic views of an exterior rearview mirror system of the present invention. Ex. 1001, 5:25–63, 68:51–69:9. Figure 68 depicts “the attachment element or bracket 736 is disposed at the outer or distal end of the support arm or structure 740, and a mirror reflective element 742 . . . may be attached to the attachment element or bracket 736.” *Id.* at 68:51–56. While not depicted, the Specification states “[o]ptionally, and desirably, a mirror casing or shell 744 (FIG. 68A) may be readily attached at the mirror attachment element or bracket or to the mirror reflective element itself.” *Id.* at 68:62–64. Thus, although Petitioner contends “because [Figure] 68 doesn’t depict the mirror head, that [attachment plate or bracket] 734 in [Figure] 68 can’t be the bracket” (Tr.

15:16–21), the Specification instead supports an understanding that the embodiment of Figure 68 can include a mirror casing “attached at the mirror attachment element or bracket or to the mirror reflective element itself.” In other words, Petitioner’s arguments that Figure 68A fails to support direct attachment because it “does not use a bracket” (Pet. Reply 9–10) is not persuasive because the Specification describes that Figure 68A is an optional and desirable configuration of the embodiment in Figure 68, which also describes a mirror casing being attached to an attachment bracket and a mirror reflective element (Ex. 1001, 5:60–63, 68:25–63).

Petitioner’s reliance on Figure 56 is also misplaced. Pet. Reply 5–6. Although bracket 616 “is inserted into and fastened to the mirror head housing 614,” which has a rear attaching portion 614a that is attached to the mirror reflective element 612, we determine that bracket 616 is not the recited “bracket” of the mirror head attached to the mirror reflective element. Instead, we agree with Patent Owner that “Figure 56 plainly includes structure that serves as a bracket attaching the reflective element 612 to the mirror head 614, and that structure is element 614a, which attaches the two to each other.” PO Sur-reply 8.

Further, the Specification supports that attachment plate 244 is attached or adhered to a reflective element 214 via adhesive 242. Ex. 1001, 29:66–30:1, Fig. 26A. In this configuration, attachment plate 244, rather than bracket 616, corresponds to the recited “bracket” based on the Specification’s description of attachment plate or bracket 734 attached to mirror reflective element 742; bracket 616 is a mounting element that attaches mirror head 614 and actuator 618. *Id.* at Fig. 56, 59:7–12.

Thus, based on the complete trial record, we find the intrinsic evidence supports our preliminary determination in the Decision on

Institution that Petitioner’s proposed construction that “any bracket attached to the mirror housing, and connecting the mirror housing to some other component, would result in the bracket being indirectly fixedly attached to the reflective element via the mirror housing” is “a bridge too far.” Dec. 22. We determine that the intrinsic evidence supports the bracket connecting the mirror head to the mirror reflective element. We have considered the extrinsic evidence including Mr. McLellan’s testimony, as well as the dictionary definitions on which Petitioner relies (*see* Pet. Reply 4–5 (citing Ex. 1002 ¶ 49; Ex. 1012; Ex. 1013)), but we give that evidence little weight based on the clarity of the intrinsic evidence discussed above.

3. *“wherein the outermost front perimeter edge of said exterior mirror reflective element is rounded”*

Claim 2⁵ depends from claim 1 and further recites “wherein said mirror head comprises a mirror casing and wherein the outermost front perimeter edge of said exterior mirror reflective element is rounded.” Ex. 1001, 76:61–64. Patent Owner contends “wherein the outermost front perimeter edge of said exterior mirror reflective element is rounded” means “wherein the outermost front perimeter edge of said exterior mirror reflective element is exposed and has at least a 2.5 mm minimum radius of curvature.” PO Resp. 19. Patent Owner’s proposed construction is premised on the perimeter edge being exposed. *See id.* at 20–21 (citing Ex. 1001, 28:51–60, 33:51–64; Ex. 2001 ¶¶ 97–108, 204–216; Ex. 2010 ¶¶ 16–23). As discussed above, we determine that claim 1 does not require attachment of the mirror reflective element to a peripheral exterior surface portion of the mirror head. As further discussed in detail below, we also

⁵ Our analysis here applies equally to dependent claims 16 and 33, which also recite “rounded.” *See* PO Resp. 19–20.

determine that the “rounded” limitation of claim 2 does not require that the rounded edge of the mirror reflective element be exposed. Thus, we determine we need not explicitly construe this limitation to require a specific radius of curvature, but instead determine the term “rounded” has its plain and ordinary meaning.

In support of its proposed construction, Patent Owner points to the Specification’s disclosure of rounding “in order to obviate/avoid a sharp edge at the front or outermost perimeter surface of the mirror reflective element and mirror assembly that could potentially hurt/injure an occupant of a vehicle equipped with the interior rearview mirror assembly during an accident” and contends the Specification denotes an edge as rounded by disclosing “the perimeter edge portion can have a full 2.8 mm radius of curvature to meet the requirements of *at least a 2.5 mm minimum radius of curvature.*” *Id.* at 21 (citing Ex. 1001, 9:38–42, 28:25–46; Ex. 2001 ¶¶ 98–101). Thus, Patent Owner contends that one of ordinary skill in the art would understand that for an exposed edge to be rounded enough to meet minimum safety requirements, as discussed in several pieces of extrinsic evidence, a radius of at least 2.5 mm is required. *Id.* at 21–23 (citing Ex. 1004, 46:23–33; Ex. 2001 ¶¶ 99–107, 211; Ex. 2003, 12, 23; Ex. 2004, 9–10; Ex. 2010 ¶¶ 19–23; Ex. 2011, 8–9; Ex. 2015, 1). Patent Owner further argues that the term “rounded” is a term of degree and to differentiate between a sufficiently rounded edge and “one that is otherwise straight or sharp, [it] is necessary to give effect to the plain meaning of the term and to differentiate the outer boundary of the claim.” *Id.* (citing *Halliburton Energy Servs., Inc. v. M-I LLC*, 514 F.3d 1244, 1254 (Fed. Cir. 2008)).

In its Reply, Petitioner notes that a “‘2.5 mm minimum radius of curvature’ appears nowhere in the claims, and only once in the ’648 patent

overall, where it is used to describe the interior rearview mirrors of Figures 4B and 5.” Pet. Reply 11 (citing Ex. 1001, 9:38–47). Notably, Petitioner contends that the rounded description is used in connection with the exterior rearview mirrors only in reference to Figures 56–56B. *Id.* at 11–12 (citing Ex. 1001, 58:67–59:6). Petitioner concludes: “while the front perimeter edge *could* be rounded to 2.5 mm, nothing in the ’648 patent *requires* the additional limitation of the outermost front perimeter edge having ‘at least a 2.5 mm minimum radius of curvature.’” *Id.* at 12. As an alternative, Petitioner contends because the disclosure of the front perimeter edge could be “*curved, or rounded, or beveled . . . a specific radius of curvature is either unnecessary or unimportant.*” *Id.*

In its Sur-reply, Patent Owner contends “rounded” “conveys that the ‘edge’ of the mirror reflective element has a minimum radius of curvature of 2.5 mm because in the ’648 patent the edge is exposed and that degree of curvature is a necessary minimum safety threshold.” PO Sur-reply 14 (citing Ex. 2001 ¶ 98). Specifically, Patent Owner contends the Specification relates the rounded edge of interior mirrors to that of exterior mirrors, because “one of skill in the art knows that the minimum radius of curvature threshold would necessarily apply to any exposed glass edge, interior or exterior.” *Id.* (citing Ex. 1001, 58:49–52; Ex. 2001 ¶¶ 98–108).

We do not agree with Patent Owner’s proposed construction. We agree with Petitioner that a “‘2.5 mm minimum radius of curvature’ appears nowhere in the claims.” Pet. Reply 11. Similarly, neither claim 2 nor claim 1 from which claim 2 depends recites an “exposed” outermost front perimeter edges of the mirror reflective element. *See generally* Ex. 1001, 76:38–82:16.

Regarding the Specification, we agree with Patent Owner that the Specification supports rounding, beveling, or slanting a front perimeter edge of the mirror reflective element that may be exposed to, and contactable by, persons “in order to obviate/avoid a sharp edge . . . that could potentially hurt/injure” someone. Ex. 1001, 28:25–46. The majority of the Specification’s disclosures describe rounding the edge in the context of an interior rearview mirror assembly because such assembly “could potentially hurt/injure *an occupant of a vehicle* . . . during an accident.” *Id.* at 28:41–46 (emphasis added); PO Resp. 23 (citing Ex. 2010 ¶ 23); Tr. 23:20–24:5. We acknowledge the Specification’s disclosure that “[o]ptionally, aspects of the mirror assemblies discussed [in regard to interior rearview mirror assemblies] may be incorporated in or associated with an exterior rearview mirror assembly that is configured for mounting at a side region of a vehicle.” Ex. 1001, 59:49–52. The Specification describes such curved or rounded edges on an exterior mirror reflective assembly “to provide a smooth or continuous transition between the generally planar front surface of the reflective element and the side walls or surfaces of the mirror housing.” *Id.* at 59:1–4. Such arrangement between the rounded mirror reflective element and a finished mirror casing may also be used to enhance the aesthetic appearance “immediately adjacent and to the rear of the curved transition surface of the reflective element.” *Id.* at 28:47–29:9; *see also id.* at 34:53–36:22 (discussing various bezel and/or reflective element configurations that provide a curved or beveled periphery at the reflective element and/or bezel of the mirror assemblies). We do not view these disclosures, however, as limiting claim 2 to require a specific minimum radius of curvature.

We similarly find the Specification does not support Patent Owner's requirement that "the outermost front perimeter edge of [the] exterior mirror reflective element [be] exposed." PO Resp. 19. As discussed above, the Specification describes the rounded edge of the mirror reflective element for safety purposes when the front perimeter surfaces are exposed, and thus contactable. *See* Ex. 1001, 28:25–46. However, the Specification additionally describes a rounded edge of an exterior reflective element "to provide a smooth or continuous transition between the generally planar front surface of the reflective element and the side walls or surfaces of the mirror housing," which may be used to enhance the aesthetic appearance "immediately adjacent and to the rear of the curved transition surface of the reflective element." *Id.* at 28:47–29:9, 58:49–52, 58:65–59:6. One exemplary configuration of "the mirror assembly may include a plastic molding that comprises a portion that (a) abuts a circumferential edge of the [mirror reflective element] and (b) has an outer curved surface that extends from generally adjacent to a first surface of the [mirror reflective element] and that may lack a sharp edge." *Id.* at 33:34–44. Such a configuration is similar to the configurations of the mirror assembly comprising a bezel, as depicted in Figures 32–34, 37–40, that may cover, or be flush and coplanar with, a front perimeter surface of the mirror reflective element. *Id.* at 33:64–67, 34:57–66, 36:20–22. Accordingly, we determine the Specification does not support *requiring* the front perimeter edge of the mirror reflective element to be exposed when that edge is "rounded."

We also determine that the Specification's discussion of a 2.5 mm minimum radius of curvature and various safety requirements are in the context of the front perimeter edge of the mirror reflective element being exposed. *See id.* at 9:38–43, 17:44–54; *see also* Ex. 2003, 12 (discussing

Federal Motor Vehicle Safety Standard (FMVSS) mounting adequacy tests for outside mirror to “[d]etermine that all outside mirrors are free of sharp points or edges that could contribute to pedestrian injury.”); Ex. 2004, 9–10, 38–41 (discussing Economic Commission for Europe (ECE) 324, Regulation 46 as requiring a 2.5 mm minimum radius of curvature for “reflecting surfaces [that] project[] beyond the protective housing.”). Because we determine that claim 2 does not *require* an exposed front perimeter edge of the mirror reflective element, we find that this evidence does not compel requiring the specific radius of curvature for which Patent Owner argues.

For the foregoing reasons, we do not adopt Patent Owner’s proposed further limitation to require that the outermost front perimeter edge of the mirror reflective element is exposed and has at least a 2.5 mm minimum radius of curvature.

4. “yaw” and “roll”

Claims 9, 25, 31, and 36 of the ’648 patent recite the terms “yaw” and “roll.” In the Petition, Petitioner proposed that “‘roll’ should be defined as ‘a rotation about a main axis,’ and ‘yaw’ should be defined as ‘a rotation about a vertical axis perpendicular to the main axis.’” Pet. 6 (citing Ex. 1002 ¶¶ 50–51). Prior to institution, Patent Owner argued that we should construe “roll” to mean “a rotation about a vehicle’s longitudinal axis (in the direction from the front of the vehicle to the back of the vehicle)” and “yaw” to mean “a rotation about a vehicle’s vertical axis (in the direction from the bottom of the car to the top of the car) perpendicular to a longitudinal axis.” Prelim. Resp. 27 (citing Ex. 2001 ¶¶ 117–127). At institution, we did not adopt either parties’ proposed construction. Dec. 14–15. Instead, we noted that the “[t]he claims which use these terms [] recite a

frame of reference for the yaw and roll adjustment: ‘yaw and roll adjustment of said exterior mirror reflective element relative to the exterior portion of the equipped vehicle at which said exterior rearview mirror assembly is attached.’” *Id.* (citing Ex. 1001, 77:29–33 (claim 9)). We invited the parties to address during trial whether “yaw” and “roll” with respect to the vehicle as a whole is the same as “yaw” and “roll” with respect to “the exterior portion of the equipped vehicle at which said exterior rearview mirror assembly is attached,” as recited in the applicable claims. *Id.* at 15.⁶

During trial, the parties agreed that “roll” is about a longitudinal axis and “yaw” is a rotation about an axis vertical to the longitudinal axis. Pet. Reply 16; PO Resp. 29. According to Petitioner, the “disputed issue is whether the longitudinal axis of the claim is the main axis of the vehicle or the main axis of the mirror.” Pet. Reply 16. According to Petitioner, “[b]ecause the claims are directed to an exterior rearview *mirror assembly*, the roll axis is the longitudinal axis of mirror assembly, not the vehicle.” *Id.*

Patent Owner continues to argue a person of ordinary skill in the art “would understand the pitch, yaw, and roll axes as a standard coordinate system with a pre-established orientation relative to the vehicle.” PO Resp. 33. Patent Owner argues that the frame of reference in the claims at issue (i.e., “relative to the exterior portion of the equipped vehicle at which said exterior rearview mirror assembly is attached”) “suggests a *shift* of the coordinate system from the center of the vehicle to the side of the vehicle.” *Id.* at 34 (citing Ex. 2010 ¶ 9).

⁶ Our analysis here applies equally to claims 9, 25, 31, and 36 which all similarly recite “yaw” and “roll” adjustment.

We have no quarrel with Patent Owner’s argument that pitch, roll, and yaw have a well-established meaning with respect to a vehicle itself; Patent Owner supports that argument with persuasive evidence. *See* PO Resp. 29–33; PO Sur-reply 16–17. But here we are not tasked with interpreting “yaw” and “roll” in isolation, or in the context of a vehicle as a whole. Instead we must interpret the phrase “yaw and roll adjustment of said exterior mirror reflective element relative to the exterior portion of the equipped vehicle at which said exterior rearview mirror assembly is attached” as claimed. In the context of that claim phrase, we determine Patent Owner’s proposed construction effectively reads out “relative to the exterior portion of the equipped vehicle at which said exterior rearview mirror assembly is attached.” In other words, under Patent Owner’s proposed construction, the claim phrase would have the same meaning if rewritten as “yaw and roll adjustment of said exterior mirror reflective element.” *See* Pet. Reply 14 (citing *Merck & Co., Inc. v. Teva Pharm. USA, Inc.*, 395 F.3d 1364, 1372 (Fed. Cir. 2005)). Characterizing the “relative to” clause as a shift from the center to the side of the vehicle merely moves the coordinate plane to the side of the vehicle with no practical effect. *See id.* at 13–14 (citing Ex. 1020, 58:5–10); Tr. 60:27–61:22. Here, the claim drafter chose to specify a particular frame of reference, and we agree with Petitioner that in doing so the claim drafter reoriented the coordinate plane for yaw and roll adjustment of the mirror itself relative to the exterior portion of the vehicle, and thus the coordinate planes of the vehicle itself do not apply. Such a construction gives effect to the recited adjustment “relative to the exterior portion of the equipped vehicle at which said exterior rearview mirror assembly is attached” as something more than merely shifting the coordinate system from the center of the car to the side of the car. *Merck & Co.*, 395 F.3d at

1372 (“A claim construction that gives meaning to all the terms of the claim is preferred over one that does not do so.”); *Power Mosfet Techs., L.L.C. v. Siemens AG*, 378 F.3d 1396, 1410 (Fed. Cir. 2004) (“[I]nterpretations that render some portion of the claim language superfluous are disfavored.”).

If anything, the Specification supports this view. For example, Petitioner points us to the Specification’s description of Figure 68, which notes “the arm may be pivoted up/down and forward/rearward . . . and the arm may be rotated about its longitudinal axis to further adjust . . . the reflective element relative to the side of the vehicle (thus providing independent and/or cooperative pitch, yaw, and roll adjustment of the reflective element relative to the side of the vehicle).” Ex. 1001, 68:43–50. Although not determinative, we agree that this listing of the directions and ranges of movement immediately followed by a listing of the axes of rotation appears to be consistent with our understanding discussed above (i.e., matching an up/down pivoting of the mirror to pitch, a rearward/forward pivoting (i.e., folding in) of the mirror to yaw, and a rotational adjustment to roll). See Tr. 28:5–24, 31:2–10.

We determine that to give effect to the entire phrase including rotation *with respect to* the side of the vehicle at which the mirror assembly is attached, the roll adjustment corresponds to a rotational movement about the longitudinal axis of the mirror assembly and yaw corresponds to a rotational movement about an axis vertical to the longitudinal axis of the mirror assembly.

D. Asserted Obviousness over Lupo

1. Overview of Lupo (Ex. 1003)

Lupo describes “a lateral rear-view mirror for a vehicle, and particularly to a mirror having mechanisms for adjusting its orientation

which can be operated by electric motors.” Ex. 1003, 1:3–6. Figure 1 of Lupo is reproduced below.

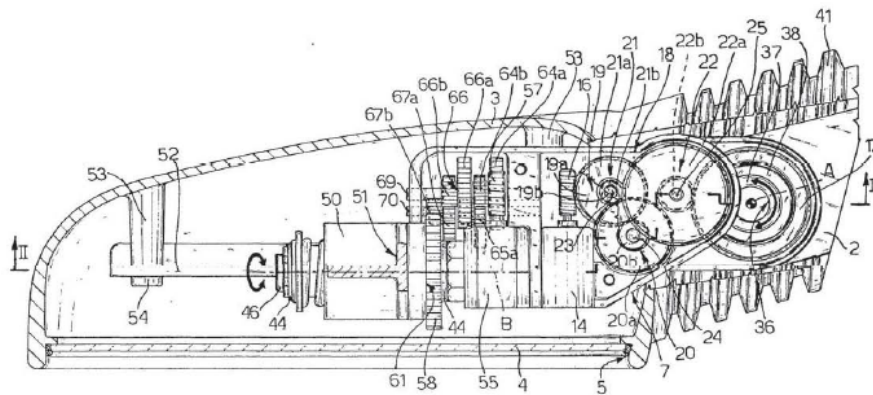


Fig.1

Figure 1 is a partially-sectioned plan view, from above, of Lupo’s rear-view mirror. Ex. 1003, 3:16–18. The bottom of Figure 1 shows “a reflective plate 4 fixed to the [rear-view mirror’s] body 3 in a frontal aperture 5.” *Id.* at 4:6–9. Further, as shown on the right-hand portion of Figure 1, Lupo’s rear-view mirror includes support 2 which “is adapted to be fixed to a side portion of the motor-vehicle bodywork.” *Id.* at 4:4–6.

In Lupo, body 3 of the rear-view mirror “houses a drive assembly 6 . . . which can adjust the orientation of the body 3 . . . relative to the support bracket 2.” *Id.* at 4:11–12. In particular, drive assembly 6 adjusts orientation of mirror body 3 by “relative rotations about a first, substantially-vertical axis A,” shown on the right-hand side of Figure 1 with a double-ended, semi-circular arrow, “and a second substantially-horizontal axis B parallel to the plane of the plate 4,” shown in the center of Figure 1, with a double-ended, circular arrow. *Id.* at 4:11–16.

Adjusting the orientation of mirror body 3 via drive assembly 6 also adjusts the orientation of reflective plate 4. *Id.* at 4:11–13. A portion of drive assembly 6 connects to appendages 52; appendages 52 are connected

to projections 53 within mirror body 3; and mirror body 3 is fixed to reflective plate 4. *Id.* at 7:16–23; *see id.* at Fig. 2. As such, adjusting the orientation of mirror body 3 by drive assembly 6 also adjusts the orientation of reflective plate 4.

2. *Analysis*

Petitioner contends claims 1, 3, 5–13, and 15 are unpatentable as obvious over Lupo. Pet. 11–33. We have reviewed the evidence and arguments provided by the parties and are persuaded that Petitioner has shown by a preponderance of the evidence that claims 1, 5, 8–11, and 15 are unpatentable as obvious over Lupo, but Petitioner has not shown by a preponderance of the evidence that claims 3, 6, 7, 12, and 13 are unpatentable as obvious over Lupo.

a) *Claim 1*

Claim 1 recites, in the preamble, “an exterior rearview mirror assembly configured for mounting at an exterior portion of a vehicle.” Ex. 1001, 76:38–40. Petitioner contends the preamble is non-limiting and, in any case, Lupo teaches this limitation by disclosing “an *external rear-view mirror* for a motor vehicle” that includes support bracket 2 adapted to be fixed to a side portion of the vehicle bodywork. Pet. 11–12 (citing Ex. 1003, code (57), Fig. 1; Ex. 1002 ¶¶ 72–73). We agree with Petitioner that Lupo teaches this limitation (Ex. 1003, code (57)), and Patent Owner does not argue otherwise (*see generally* PO Resp.; PO Sur-reply).

Claim 1 further recites “a mirror head.” Ex. 1001, 76:41. Petitioner contends Lupo’s hollow outer body 3 and projections 53 teach this limitation. Pet. 12–13 (citing Ex. 1003, 4:4–9, 7:17–24, Fig. 1; Ex. 1002 ¶¶ 74–75). We agree with Petitioner that Lupo teaches this limitation

(Ex. 1003, 4:4–9, 7:17–24, Fig. 1), and Patent Owner does not argue otherwise (*see generally* PO Resp.; PO Sur-reply).

Claim 1 recites “an exterior mirror reflective element fixedly attached at said mirror head.” Ex. 1001, 76:42–43. Petitioner contends Lupo’s reflective plate 4 teaches this limitation. Pet. 13 (citing Ex. 1003, 4:4–9, Fig. 1; Ex. 1002 ¶¶ 76–77).

Patent Owner contends Lupo’s reflective plate 4 does not teach this limitation because it “is not ‘attached at’ the mirror head, but rather is ‘disposed in’ or ‘housed in’ the hollow body or mirror casing or mirror head.” PO Resp. 38. Patent Owner’s argument in this regard is based on its proposed construction of this limitation, which as discussed above, we do not adopt.

As shown in Figure 1 of Lupo, reflective plate 4 (exterior mirror reflective element) is fixedly attached to hollow outer body 3 (mirror head). Ex. 1003, Fig. 1, 4:4–9; Ex. 1002 ¶¶ 76–77. We determine Petitioner has shown Lupo teaches this limitation of claim 1.

Claim 1 also recites “an attachment portion configured for attachment at an exterior portion of a vehicle equipped with said exterior rearview mirror assembly.” Ex. 1001, 76:44–46. Petitioner contends Lupo’s support bracket 2 teaches this limitation. Pet. 14 (citing Ex. 1003, 4:4–9, Fig. 1; Ex. 1002 ¶¶ 78–79). We agree with Petitioner that Lupo teaches this limitation (Ex. 1003, 4:4–9, Fig. 1), and Patent Owner does not argue otherwise (*see generally* PO Resp.; PO Sur-reply).

Claim 1 further recites “a multi-axis adjustment mechanism comprising at least one electrically-operable actuator.” Ex. 1001, 76:47–48. Petitioner contends Lupo teaches “a multi-axis adjustment mechanism (drive assembly 6) comprising at least one electrically-operable actuator (motors

14, 55).” Pet. 15–16 (citing Ex. 1003, 4:11–16, 4:19–22, 4:25–5:2, 7:25–29, Figs. 1–3; Ex. 1002 ¶¶ 80–83). We agree with Petitioner that Lupo teaches this limitation (Ex. 1003, 4:11–16, 4:19–22, 4:25–5:2, 7:25–29, Figs. 1–3), and Patent Owner does not argue otherwise (*see generally* PO Resp.; PO Sur-reply).

Claim 1 also recites “wherein said multi-axis adjustment mechanism is operable to move said mirror head, with said exterior mirror reflective element fixedly attached thereto, about multiple axes relative to said attachment portion.” Ex. 1001, 76:49–52. Petitioner contends Lupo teaches this limitation. Pet. 17 (citing Ex. 1003, 4:11–16; Ex. 1002 ¶¶ 84–85). Specifically, Petitioner contends “Lupo teaches that a multi-axis adjustment mechanism (drive assembly 6) is operable to move said mirror head (body 3, projections 53) with a mirror reflective element (reflective plate 4) fixedly attached thereto, about multiple axes (axis A and axis B) relative to said attachment portion (bracket 2).” *Id.* We agree with Petitioner that Lupo teaches this limitation (Ex. 1003, 4:11–16), and Patent Owner does not argue otherwise (*see generally* PO Resp.; PO Sur-reply).

Claim 1 also recites

wherein said exterior mirror reflective element moves in tandem with movement of said mirror head relative to the exterior portion of the body of the equipped vehicle at which said exterior rearview mirror assembly is attached to adjust the rearward field of view of a driver of the equipped vehicle who views said exterior mirror reflective element when operating the equipped vehicle.

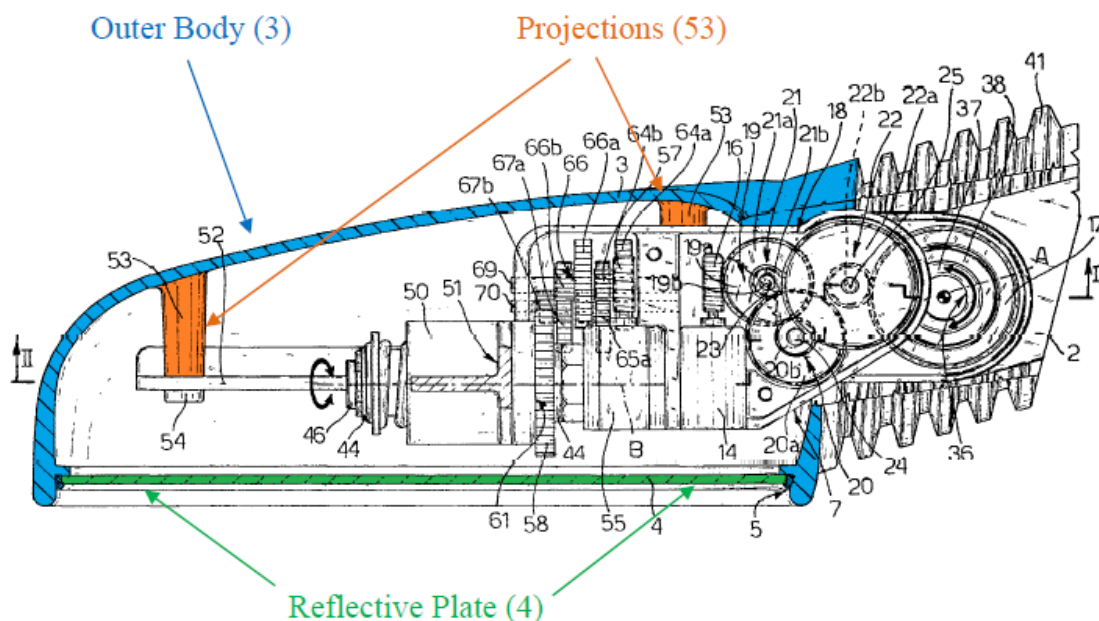
Ex. 1001, 76:53–60. Petitioner contends that because Lupo’s reflective plate 4 is fixedly attached to body 3 by frontal aperture 5, reflective plate 4 moves in tandem with body 3. Pet. 17–19 (citing Ex. 1003, 4:4–9). Petitioner further contends it would have been obvious to a person of ordinary skill in

the art that “operating the mirror assembly disclosed in Lupo as described therein would result in adjusting the rearward field of view of the driver.” *Id.* at 18–19 (citing Ex. 1001, 9:19–21; Ex. 1002 ¶¶ 86–92, 69–71, 40). We agree with Petitioner that Lupo teaches this limitation (Ex. 1003, 4:4–9), and Patent Owner does not argue otherwise (*see generally* PO Resp.; PO Sur-reply).

For the reasons discussed above, we determine Petitioner has shown by a preponderance of the evidence that claim 1 is obvious over Lupo.

b) *Claim 3*

Claim 3 depends from claim 1 and recites “said mirror head comprises a bracket to which said exterior mirror reflective element is fixedly attached.” Ex. 1001, 76:65–67. Petitioner contends Lupo teaches this limitation. Pet. 19–20. Figure 1 of Lupo, as annotated by Petitioner, is reproduced below.



Pet. Reply 19 (reproducing Ex. 1003, Fig. 1 with annotations and coloring); Pet. 20. Petitioner argues “Lupo teaches wherein said mirror head (outer

body 3, projections 53) comprises a bracket (projections 53) to which said exterior mirror reflective element (reflective plate 4) is fixedly attached.”

Pet. Reply 19. Petitioner explains that “reflective element 4 is indirectly, but fixedly, attached to the projections 53.” *Id.*

Patent Owner contends that the “attachment” between the claimed “mirror reflective element” and “bracket” must be direct, but Lupo’s “projections 53 are not directly attached to the reflective plate 4,” as required by the claims. PO Resp. 39. Instead, PO explains that “projections 53 are intermediate to, and attached to, structure 51 and body 3.” *Id.*

We determine Petitioner has not shown Lupo teaches this limitation of claim 3. As discussed above, we determine that the “bracket” recited in claim 3 connects the mirror head to the mirror reflective element. Petitioner maps Lupo’s projections 53 as the recited “bracket.” Pet. Reply 19. Lupo’s Figure 1, reproduced above, shows that Lupo’s projections 53 are not fixedly attached to reflective plate 4 (exterior mirror reflective element). Instead, those projections fixedly attach Lupo’s outer body 3 to other components of Lupo’s mirror assembly.

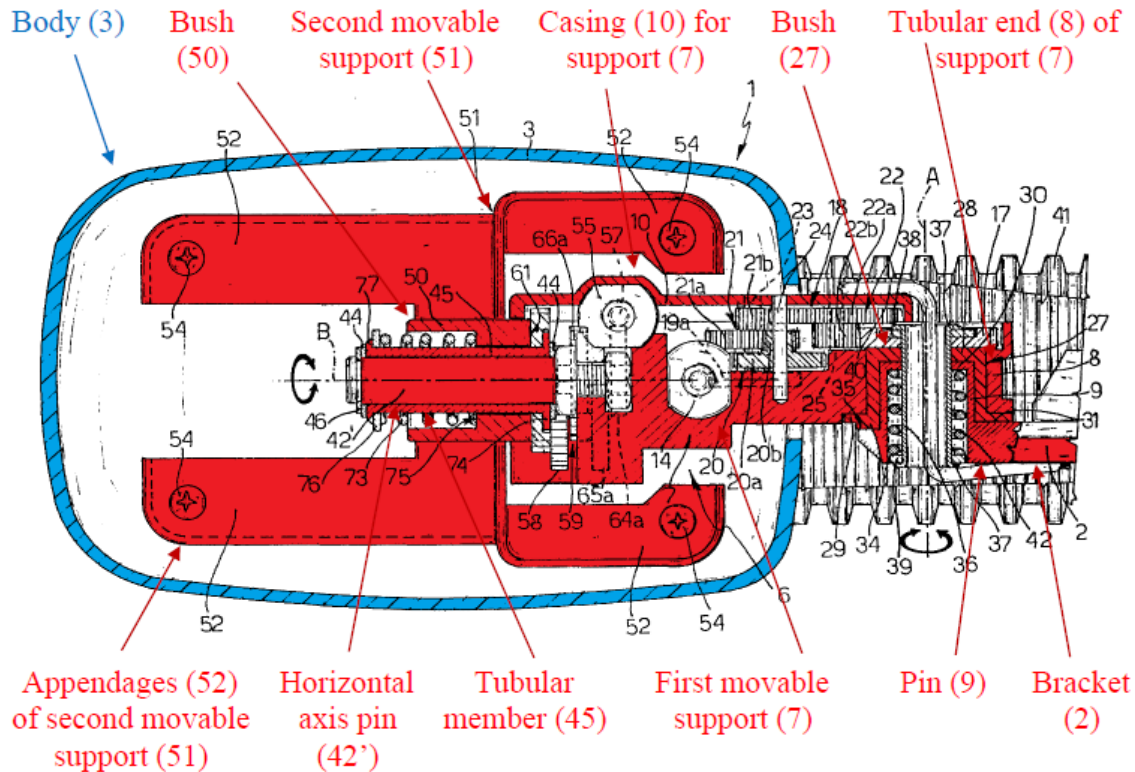
For the reasons discussed above, we determine Petitioner has not shown by a preponderance of the evidence that claim 3 is obvious over Lupo.

c) Claim 5

Claim 5 depends from claim 1 and recites, in part, “wherein said mirror head is disposed at one end of said support structure and wherein said attachment portion is at a distal other end of said support structure.”

Ex. 1001, 77:11–13. Petitioner contends Lupo teaches this limitation.

Pet. 20–25. Figure 2 of Lupo, as annotated by Petitioner, is reproduced below.



Pet. 24 (reproducing Ex. 1003, Fig. 2 with annotations and coloring);
 Pet. Reply 20. Petitioner argues Lupo teaches its “mirror head (body 3, projections 53) is disposed at one end of said support structure (second movable support 51) and wherein said attachment portion (bracket 2) is at a distal other end of said support structure (disposed at the distal other end of second movable support 51 through the first movable support 7, bush 27 and pin 9).” Pet. 24–25 (citing Ex. 1002 ¶¶ 96–101).

We determine Petitioner has shown Lupo teaches this limitation of claim 5. Pet. 24 (reproducing Ex. 1003, Fig. 2 with annotations and coloring); Pet. Reply 20. Although Patent Owner argued prior to institution that Lupo does not teach the additional limitation of claim 5 (Prelim. Resp. 34–37), Patent Owner did not make those same arguments during the trial (*see generally* PO Resp.; PO Sur-reply). Accordingly, Patent Owner waived those arguments. Paper 8, 8 (“Patent Owner is cautioned that any arguments

not raised in the response may be deemed waived.”); *see, e.g., In re NuVasive, Inc.*, 842 F.3d 1376, 1380–81 (Fed. Cir. 2016); Consolidated Trial Practice Guide 52 (Nov. 2019).

For the reasons discussed above, we determine Petitioner has shown by a preponderance of the evidence that claim 5 is obvious over Lupo.

d) Claims 6 and 7

Claim 6 further depends from claim 5 and recites “wherein said mirror head comprises a bracket to which said exterior mirror reflective element is fixedly attached, and wherein said one end of said support structure attaches at said bracket.” Ex. 1001, 77:15–19. Claim 7 further depends from claim 6. *Id.* at 77:20–24. For the additional limitations of claim 6, Petitioner relies on its contentions for claim 3. Pet. 25. As discussed above, we do not find Petitioner’s contentions persuasive.

Accordingly, we determine Petitioner has not shown by a preponderance of the evidence that claims 6 and 7 are obvious over Lupo.

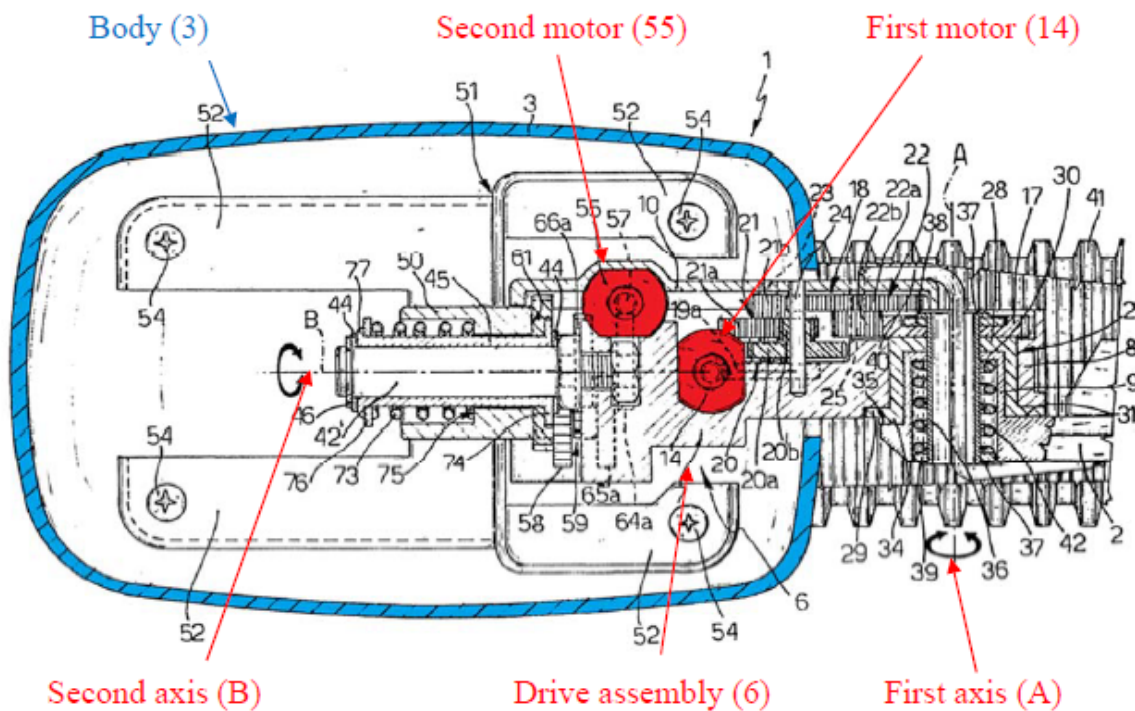
e) Claim 8

Claim 8 further depends from claim 5 and additionally recites “wherein said multi-axis adjustment mechanism comprises at least one pivot element.” Ex. 1001, 77:25–27. Petitioner contends that Lupo’s drive assembly 6 includes first bush 27 and second bush 50 which allow for Lupo’s mirror assembly to pivot along the first axis A and second axis B respectively. Pet. 26 (citing Ex. 1003, 5:26–29; 7:16–24, Fig. 2; Ex. 1002 ¶¶ 110–112). We agree with Petitioner that Lupo teaches this limitation (Ex. 1003, 5:26–29; 7:16–24, Fig. 2), and Patent Owner does not argue otherwise (*see generally* PO Resp.; PO Sur-reply).

For the reasons discussed above, we determine Petitioner has shown by a preponderance of the evidence that claim 8 is obvious over Lupo.

f) Claim 9

Claim 9 depends from claim 1 and recites “wherein said multi-axis adjustment mechanism is operable for yaw and roll adjustment of said exterior mirror reflective element relative to the exterior portion of the equipped vehicle at which said exterior rearview mirror assembly is attached.” Ex. 1001, 77:28–33. Petitioner contends Lupo teaches this limitation. Pet. 26–27. Figure 2 of Lupo, as annotated by Petitioner, is reproduced below.



Id. at 27 (reproducing Ex. 1003, Fig. 2 with annotations and coloring).

Petitioner contends:

Lupo teaches wherein said multi-axis adjustment mechanism (drive assembly 6) is operable for yaw (about axis A) and roll (about axis B) adjustment of said exterior mirror reflective element relative (reflective plate 4) to the exterior portion of the equipped vehicle at which said exterior rearview mirror assembly is attached (attached by bracket 2).

Id. (citing Ex. 1002 ¶¶ 113–118).

Patent Owner argues “Lupo only discloses two adjustment mechanisms arranged for movement about pivot axes that are 90 degrees apart,” specifically “adjustment about the ‘pitch’ axis and about the ‘yaw’ axis,” but not “roll adjustment.” PO Resp. 42. Patent Owner asserts that “axis B in Lupo is really the ‘pitch’ axis, running perpendicular to the direction of travel to the vehicle, and perpendicular to the ‘exterior portion’ of the side of the vehicle to which the mirror is attached.” *Id.* at 43. Patent Owner’s arguments are based on a construction of “yaw,” which as discussed in detail above, we do not adopt.

We determine Petitioner has shown Lupo teaches the limitations recited in claim 9 (Ex. 1003, Fig. 2; Pet. 26–27; Ex. 1002 ¶¶ 113–118). For the reasons discussed above, we determine Petitioner has shown by a preponderance of the evidence that claim 9 is unpatentable as obvious over Lupo.

g) Claim 10

Claim 10 depends from claim 1 and further recites “wherein said multi-axis adjustment mechanism is operable to adjust said exterior mirror reflective element about a first pivot axis and a second pivot axis, and wherein said first and second pivot axes are angled non-orthogonally relative to one another.” Ex. 1001, 77:34–39. Petitioner contends that Lupo teaches its pivot axis is “substantially vertical” and its second pivot axis is “substantially horizontal.” Pet. 27 (citing Ex. 1003, 2:25–3:8). Because “substantially” indicates a reasonable deviation, Petitioner contends Lupo teaches these axes can be angled non-orthogonally relative to one another (i.e., at an angle other than 90 degrees). *Id.* at 27–28 (citing Ex. 1002 ¶¶ 119–124).

We determine Petitioner has shown Lupo teaches the additional limitation of claim 10. Ex. 1003, 2:25–3:8. Although Patent Owner argued prior to institution that Lupo does not teach its pivot axes are non-orthogonal (Prelim. Resp. 43–45), Patent Owner did not make those same arguments during the trial (*see generally* PO Resp.; PO Sur-reply). Accordingly, Patent Owner waived those arguments. Paper 8, 8 (“Patent Owner is cautioned that any arguments not raised in the response may be deemed waived.”); *see, e.g., In re NuVasive*, 842 F.3d at 1380–81; Consolidated Trial Practice Guide 52 (Nov. 2019).

For the reasons discussed above, we determine Petitioner has shown by a preponderance of the evidence that claim 10 is unpatentable as obvious over Lupo.

h) Claim 11

Claim 11 further depends from claim 10 and recites “wherein said first and second pivot axes are angled relative to one another at an angle that is greater than 15 degrees and is less than 90 degrees.” Ex. 1001, 77:40–43. Petitioner relies on the same disclosures in Lupo as it did for claim 10. Pet. 28. We determine Petitioner has shown Lupo at least suggests the additional limitation of claim 11 because a person of ordinary skill in the art would understand “substantially horizontal” and “substantially vertical” includes a relative angle of less than 90 degrees. Ex. 1003, 2:25–3:8; Ex. 1002 ¶ 126. Patent Owner does not argue otherwise (*see generally* PO Resp.; PO Sur-reply).

For the reasons discussed above, we determine Petitioner has shown by a preponderance of the evidence that claim 11 is unpatentable as obvious over Lupo.

i) *Claim 12*

Claim 12 depends from claim 1 and recites “wherein said first and second electrically-operable actuators are cooperatively operable to adjust said mirror head.” Ex. 1001, 77:47–49. Petitioner contends Lupo teaches this limitation. Pet. 28–31. Specifically, Petitioner argues Lupo teaches “a first electrically-operable actuator (motor 14) and a second electrically-operable actuator (motor 15) and wherein said first and second electrically-operable actuators are cooperatively operable (motor 14 adjusting the first axis, motor 51 adjusting the second axis) to adjust said mirror head (body 3, projections 53).” *Id.* at 30 (citing Ex. 1002 ¶¶ 128–132). Petitioner states that a “user could operate push button 81 which tells the control unit 80 to supply voltage to the first motor 14, which subsequently rotates the reflective element 4 about the axis A,” and “a user could operate push button 82 which tells the control unit 80 to supply voltage to the second motor 55, which subsequently rotates the reflective element 4 about the axis B.” *Id.* at 29–30 (citing Ex. 1003, 9:24–10:14, 11:5–12). At Institution, we agreed with Patent Owner that “the ’648 specification suggests cooperative operation includes operating at the same time,” and we stated that, at that stage of the proceeding, we did not “view Lupo’s disclosure of separate buttons as meaning its motors do not operate at the same (e.g., when an operator pushes both buttons).” Dec. 25.

During trial, as to this limitation, the parties focused on whether Lupo teaches its motors operate at the same time or whether such operation would have been obvious.

Patent Owner contends that buttons 81 and 82 do not “work at the same time” such that “the actuation and operation of motors 14 and 15 [operate] cooperatively—that is, at the same time to achieve a specific

adjustment.” PO Resp. 45–46. Patent Owner additionally asserts that “Petitioner’s original ground asserted that Lupo expressly discloses this feature” but, in its Reply, “contends that such a feature would have been obvious.” PO Sur-reply 21–22. Patent Owner further argues that “Petitioner’s argument is unsupported.” *Id.* at 23. We agree with Patent Owner.

In its Reply, Petitioner contends a person of ordinary skill in the art “would understand that a user can press both buttons and operate both motors simultaneously. Even if Lupo does not explicitly describe the motors [as] simultaneously operable, this would be a simple, straightforward application that would have been obvious and easy for a [person of ordinary skill in the art] to implement.” Pet. Reply 22–23 (citing Ex. 1002 ¶¶ 128–132). Although Petitioner cites Mr. McLellan’s testimony, we agree with Patent Owner (PO Sur-reply 23) that the cited testimony does not address simultaneous operation of the two motors in Lupo. *See* Ex. 1002 ¶¶ 128–132. Instead these contentions in Petitioner’s Reply are unsupported attorney argument, which we afford little to no weight. *Icon Health & Fitness, Inc. v. Strava, Inc.*, 849 F.3d 1034, 1043 (Fed. Cir. 2017). The evidence of record supports that Lupo teaches two motors which can be operated with two different buttons, but does not establish that a person of ordinary skill in the art would have understood or found obvious that those motors could be operated simultaneously by pushing both buttons.

We note that neither party asked in its briefing that we expressly construe “cooperatively operable.” At the oral hearing, however, Petitioner argued that the “cooperatively operable” includes separate, independent operation, such that Lupo’s express disclosure of its two motors operating when two separate buttons are pushed would satisfy this limitation. *See* Tr.

32:26–36:7. In particular, at the oral hearing, Petitioner pointed to column 59, lines 57 to 62 of the '648 patent which states: “[T]he first and second actuators may be operated together or cooperatively operated to laterally adjust the rearward field of view while maintaining a generally constant tip angle (and without also vertically adjusting the rearward field of view of the reflective element).” Tr. 33:1–3. According to Petitioner, “it seems clear that operated together means operating at the same time, and therefore, cooperatively operable would mean something different since it’s offered as an alternative.” *Id.* at 33:8–11. Even if we consider Petitioner’s belated claim construction argument, however, Petitioner doesn’t address other parts of the Specification that suggest “cooperatively operable” does not include separate operation. For example, the Specification in another passage states that “the first and second actuators may be operated separately or together or cooperatively operated” (Ex. 1001, 66:64–67), which applying Petitioner’s same logic suggests that cooperatively operable is something different than either operable separately or operable together.

Petitioner has the burden to show by the preponderance of the evidence that claim 12 is unpatentable as obvious over Lupo. We determine that the '648 patent Specification suggests independent operation is not encompassed by the additional limitation of claim 12 (Ex. 1001, 66:64–67), and thus Petitioner’s reliance on Lupo’s disclosure of its two motors operating separately with two buttons is insufficient. In addition, we determine that if “cooperatively operable” encompasses simultaneous operation of the two motors, Petitioner has not adequately shown that Lupo teaches or renders obvious such simultaneous operation as discussed above. Petitioner has not provided other evidence regarding Lupo’s operation, and thus we do not need to further construe “cooperatively operable” to resolve

the controversy before us. *See Nidec Motor Corp.*, 868 F.3d at 1017 (“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc.*, 200 F.3d at 803)).

For the reasons discussed above, we determine Petitioner has not shown by a preponderance of the evidence that claim 12 is obvious over Lupo.

j) Claim 13

Claim 13 depends from claim 12 and recites “wherein said first electrically-operable actuator is operable at a speed different than a speed of operation of said second electrically-operable actuator.” Ex. 1001, 77:55–58. Because we determine Petitioner has not adequately shown claim 12 (from which claim 13 depends) is unpatentable, we also determine Petitioner has not shown by a preponderance of the evidence that claim 13 is unpatentable as obvious over Lupo.

k) Claim 15

Independent claim 15 recites similar limitations to claims 1 and 8. Ex. 1001, 78:37–67. Petitioner relies on its contentions addressing how Lupo teaches the similar limitations of independent claim 1 and dependent claim 8. Pet. 32–33 (citing Ex. 1002 ¶¶ 137–141). Patent Owner does not present arguments specific to claim 15, instead, arguing limitations of claims 1 and 15 together. *See* PO Resp. 37–38. For the same reasons discussed above, we determine Petitioner has shown Lupo teaches the limitations recited in claim 15. As such, we determine Petitioner has shown by a preponderance of the evidence that claim 15 is unpatentable as obvious over Lupo.

l) Conclusion

For the reasons discussed above, we determine Petitioner has shown by a preponderance of the evidence that claims 1, 5, 8–11, and 15 are unpatentable as obvious over Lupo, but Petitioner has not shown by a preponderance of the evidence that claims 3, 6, 7, 12, and 13 are unpatentable as obvious over Lupo.

E. Asserted Obviousness over Lupo and McCabe

1. Overview of McCabe (Ex. 1004)

McCabe describes “automotive rearview mirror assemblies.” Ex. 1004, 3:41–43, code (57). McCabe’s “reflective element assemblies include a front substrate and a rear substrate,” with rear substrate having “a reflective coating on its front surface (toward the front substrate when the substrates are sandwiched together[]).” *Id.* at 3:56–67. McCabe also describes that its “front substrate (either before or after the mating with the rear substrate) may have its perimeter edges seamed or finished (such as pencil seamed or rounded) so that there is a radius and not a sharp edge at the outer perimeter of the reflective element assembly.” *Id.* at 46:29–33.

2. Analysis

Petitioner contends claims 2, 16, 17, and 19–36 are unpatentable as obvious over Lupo and McCabe. Pet. 33–45. We have reviewed the evidence and arguments provided by the parties and are persuaded that Petitioner has demonstrated by a preponderance of the evidence that claims 2, 16, 26, and 34–36 are unpatentable as obvious over Lupo and McCabe, but Petitioner has not demonstrated by a preponderance of the evidence that claims 17, 19–25, and 27–33 are unpatentable as obvious over Lupo and McCabe.

a) *Claim 2*

Claim 2 depends from claim 1 and recites “wherein said mirror head comprises a mirror casing and wherein the outermost front perimeter edge of said exterior mirror reflective element is rounded.” Ex. 1001, 76:61–64. Petitioner argues Lupo teaches a mirror casing (its hollow outer body 3) and the combination of Lupo and McCabe teaches the recited rounded edge.⁷ Pet. 33–35. Specifically, Petitioner points to the statement in McCabe that “the front substrate (either before or after the mating with the rear substrate) may have its perimeter edges seamed or finished (such as pencil seamed or *rounded*) so that there is a radius and not a sharp edge at the outer perimeter of the reflective element assembly.” *Id.* at 34 (quoting Ex. 1004, 46:29–33 (emphasis added)). Petitioner contends it would have been obvious to combine McCabe’s rounded edge with Lupo to have fewer sharp edges. *Id.* at 34–35 (citing Ex. 1002 ¶¶ 143–148). Petitioner’s declarant testifies, “a finished rounded outer perimeter edge would reduce the number of sharp edges around the perimeter of the outermost surface, decreasing the risk of injury to vehicle users and people who walk past the vehicle of cutting themselves on the reflective element.” Ex. 1002 ¶ 145.

Patent Owner argues that “Lupo’s reflective element does not have an exposed outermost front perimeter edge” and “McCabe does not disclose a mirror reflective element having an exposed outermost front perimeter edge

⁷ Petitioner alternatively contends that if this limitation “means that the reflective element has rounded corners (i.e., viewing the perimeter edge from the front), Lupo teaches this limitation.” Pet. 33–34. Patent Owner contends this misreads the limitation which requires a certain rounded edge, not merely rounded corners. PO Resp. 48. We agree with Patent Owner, and thus, we address in detail Petitioner’s contention that the combination of Lupo and McCabe teaches this limitation.

or any rounded edge with at least a minimum 2.5 mm radius of curvature.”

PO Resp. 47. Patent Owner argues that McCabe’s “seaming merely dresses a cut edge to remove loosened glass particles and does not remove or materially round the sharp cut edge, much less round to a minimum 2.5 mm radius of curvature.” *Id.* These arguments are based on Patent Owner’s proposed construction of the additional limitation of claim 2, which as discussed in detail above, we do not adopt.

We determine Petitioner has shown that the combination of Lupo and McCabe teaches the rounded edge recited in claim 2. Specifically, McCabe states: “Optionally, the front substrate (either before or after the mating with the rear substrate) may have its perimeter edges seamed or finished (such as pencil seamed or *rounded*) so that there is a radius and not a sharp edge at the outer perimeter of the reflective element assembly.” Ex. 1004, 46:29–33 (emphasis added).⁸

Patent Owner further argues “there is no motivation to combine McCabe with Lupo” for two reasons. PO Resp. 52–54. “First, a POSA would avoid modifying Lupo as Petitioner suggests because rounding the outermost front perimeter glass edge as in ’648 would require an additional costly manufacturing process.” *Id.* (citing Ex. 2001 ¶ 215). And, “[s]econd, a POSA would consider rounding edges in the way claimed by ’648 only if those edges were going to be exposed, and the rounding is used for safety purposes.” *Id.* (citing Ex. 2001 ¶¶ 214–215).

⁸ We further note that if Patent Owner is correct that “rounded” in the context of the ’648 patent requires a 2.5 mm minimum radius of curvature, then a person of ordinary skill in the art would have understood McCabe’s disclosure of a rounded edge to have that same radius of curvature.

We determine Petitioner has articulated sufficiently persuasive reasoning with rational underpinning for combining the relied upon teachings of Lupo and McCabe. In particular, we determine that a person of ordinary skill in the art would have easily envisioned why avoiding sharp edges would be beneficial, even when those edges are not exposed in the finished assembly. *See* Pet. 34–35 (citing Ex. 1002 ¶¶ 143–148). We do not agree that any disadvantages (e.g., cost) associated with making the modification undercut Petitioner’s obviousness rationale. *See Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006).

For the reasons discussed above, we determine Petitioner has shown by a preponderance of the evidence that claim 2 is unpatentable as obvious over the combination of Lupo and McCabe.

b) Claims 16, 17, 19–36

Petitioner also provides further analysis detailing where it contends each additional limitation of dependent claims 16, 17, 19–25, and 27–36 is taught by the combination of Lupo and McCabe. Pet. 35–45. Aside from similar limitations previously argued, as discussed above, Patent Owner does not address Petitioner’s obviousness challenge to these claims. *See generally* PO Resp.; PO Sur-reply.

Claim 16 depends from claim 15 and additionally recites wherein said exterior mirror reflective element comprises an electro-optic exterior mirror reflective element, and wherein said electro-optic exterior mirror reflective element comprises a front glass substrate and a rear substrate sandwiching an electro-optic medium capable of electrically-variable light transmission, and wherein said front glass substrate has an outer first side separated from an inner second side by the plate thickness of said front glass substrate, and wherein the perimeter circumferential edge of said outer first side of said front glass substrate is rounded.

Ex. 1001, 79:1–11. Petitioner contends McCabe teaches the additional limitation of claim 16. Pet. 35–38. Specifically, Petitioner points out that “McCabe explains that electro-optic and electrochromic cells have been widely used in interior and exterior rearview mirrors for vehicles” and further details such glass substrates. *Id.* at 35–36 (citing Ex. 1004, 1:40–52, 1:56–59, 39:59–40:12, 41:49–56, 46:29–33, Fig. 37). We agree that McCabe teaches this limitation. Ex. 1004, 1:40–52, 1:56–59, 39:59–40:12, 41:49–56, 46:29–33.

Claim 17 depends from claim 16 and additionally recites “wherein said electro-optic exterior mirror reflective element is fixedly attached to a bracket by at least one of (i) mechanical attachment and (ii) adhesive attachment using an adhesive.” Ex. 1001, 79:12–16. Petitioner contends Lupo teaches the additional limitation of claim 17. Pet. 38. Referencing its analysis of claim 3, Petitioner points out that “Lupo teaches that the reflective plate 4 is attached to the projections 53 by the outer body 3, which is a mechanical attachment.” *Id.* (citing *id.* at 19–20). Petitioner relies only on Lupo to teach the recited “bracket.” *Id.* For the same reasons discussed above in regards to claim 3, Petitioner has not shown Lupo teaches “electro-optic exterior mirror reflective element is fixedly attached to a bracket.” As such, Petitioner has not shown Lupo teaches all the limitations recited in claim 17.

Claims 19–23 depend, directly or indirectly, from claim 17. Ex. 1001, 79:21–44. Because Petitioner has not shown Lupo teaches all the limitations recited in claim 17, from which claims 19–23 depend, Petitioner has not shown Lupo teaches all the limitations recited in claims 19–23.

For claim 24, Petitioner relies primarily on its contentions as to how Lupo teaches similar limitations of dependent claim 12. Pet. 39. For the

reasons discussed above regarding claim 12, we determine Petitioner has not shown that Lupo teaches the additional limitation of claim 24. Petitioner does not rely on McCabe as teaching the additional limitation of claim 24. *See id.* Claim 25 depends from claim 24. Ex. 1001, 79:45–55. Because Petitioner has not shown Lupo teaches the additional limitation recited in claim 24, from which claim 25 depends, and Petitioner’s contentions as to claim 25 do not address this deficiency (Pet. 39), Petitioner has not shown the combination of Lupo and McCabe teaches all the limitations recited in claim 25.

Claim 26 is independent and recites similar limitations to claim 1, claim 5, claim 8, and claim 16. Ex. 1001, 79:62–80:38; Pet. 39–41. Petitioner relies primarily on its contentions as to how Lupo teaches similar limitations of those claims. Pet. 11–19, 20–26, 39–41. For the reasons discussed above regarding claims 1, 5, 8, and 16, we determine Petitioner has shown the combination of Lupo and McCabe teaches the limitations recited in claim 26.

Claim 27 recites, in relevant part, a similar limitation to claim 12. Ex. 1001, 80:39–50. For the limitation of claim 27, Petitioner relies primarily only on its contentions as to how Lupo teaches the similar limitation of claim 12. Pet. 41. For the reasons discussed above regarding claims 12, we do not find those contentions persuasive. Petitioner does not rely on McCabe as teaching this portion of claim 27. We determine Petitioner has not shown the combination of Lupo and McCabe teaches all of the limitations of claim 27. Claim 28 depends from claim 27. Ex. 1001, 80:51–54. Because Petitioner has not shown Lupo teaches the additional limitation recited in claim 27, from which claim 28 depends, and Petitioner’s contentions as to claim 28 do not address this deficiency (Pet. 41), Petitioner

has not shown the combination of Lupo and McCabe teaches all the limitations recited in claim 28.

Claim 29 depends from claim 26 and additionally recites, in part, “wherein said mirror head comprises a bracket to which said electrochromic exterior mirror reflective element is fixedly attached, and wherein said one end of said support structure attaches at said bracket.” Ex. 1001, 80:55–59. Petitioner relies primarily on its contentions as to how the combination of Lupo and McCabe teaches similar limitations of dependent claims 6 and 16. Pet. 42. For the same reasons discussed above in regards to claim 6, Petitioner has not shown Lupo teaches the recited “bracket,” and Petitioner does not contend McCabe remedies this deficiency (*see id.*). As such, Petitioner has not shown the combination of Lupo and McCabe teaches all the limitations recited in claim 29.

Claims 30 and 31 depend, directly or indirectly, from claim 29. Ex. 1001, 80:60–81:3. Because Petitioner has not shown the combination of Lupo and McCabe teaches all the limitations recited in claim 29, from which claims 30 and 31 depend, and Petitioner’s contentions as to claims 30 and 31 do not address this deficiency (Pet. 42), Petitioner has not shown the combination of Lupo and McCabe teaches all the limitations recited in claims 30 and 31.

Claim 32 depends from claim 26 and additionally recites, in part, “wherein said mirror head comprises a bracket at which said electrochromic exterior mirror reflective element is fixedly attached.” Ex. 1001, 81:11–13. Petitioner relies on its contentions as to how the combination of Lupo and McCabe teaches similar limitations of dependent 16. Pet. 43. Similar to other claims (e.g., claim 3) discussed above, Petitioner relies only on projections 53 of Lupo to teach the recited bracket. *Id.* at 44. For the same

reasons discussed above in regards to claim 3, Petitioner has not shown Lupo teaches the recited “bracket.” As such, Petitioner has not shown the combination of Lupo and McCabe teaches all the limitations recited in claim 32.

Claims 33 depends from claim 32. Ex. 1001, 81:16–18. Because Petitioner has not shown the combination of Lupo and McCabe teaches all the limitations recited in claim 32, Petitioner has not shown the combination of Lupo and McCabe teaches all the limitations recited in claim 33.

Claim 34 depends from claim 26 and recites an additional limitation similar to claim 10. Ex. 1001, 82:1–6. For its assertions as to claim 34, Petitioner relies primarily on its contentions as to how Lupo teaches similar limitations of dependent claim 10. Pet. 44. For the reasons discussed above regarding claim 10, we find those contentions persuasive. We determine Petitioner has shown the combination of Lupo and McCabe teaches the limitations recited in claim 34.

Claim 35 depends from claim 34 and recites an additional limitation similar to claim 11. Ex. 1001, 82:7–10. For its assertions as to claim 35, Petitioner relies primarily on its contentions as to how Lupo teaches similar limitations of dependent claim 11. Pet. 45. For the reasons discussed above regarding claim 11, we find those contentions persuasive. We determine Petitioner has shown the combination of Lupo and McCabe teaches the limitations recited in claim 35.

Claim 36 depends from claim 34 and recites an additional limitation similar to claim 9. Ex. 1001, 82:11–16. For its assertions as to claim 36, Petitioner relies primarily on its contentions as to how Lupo teaches the similar limitations of claim 9. Pet. 45. For the reasons discussed above regarding claim 9, we find those contentions persuasive. We determine

Petitioner has shown the combination of Lupo and McCabe teaches the limitations recited in claim 36.

As discussed above, we find Petitioner has shown the combination of Lupo and McCabe teaches the additional limitations of claims 16, 26, and 34–36. Petitioner contends it would have been obvious to combine Lupo’s teachings with the electro-optic or electrochromic mirror element of McCabe as a simple substitution that would have “yield[ed] the beneficial, predictable results of providing an exterior, rearview mirror assembly with an electro-optic mirror element that can adjust its opacity or be darkened.” Pet. 36–37 (citing Ex. 1004, 3:4–15; Ex. 1002 ¶ 152). Petitioner applies this rationale to claims 16, 26, and 34–36. *Id.* at 36–39, 44–45.

Prior to institution, Patent Owner disputed that a person of ordinary skill in the art would have modified Lupo with McCabe’s electrochromic reflective element. Prelim. Resp. 51–52. Patent Owner, however, did not make those same arguments during the trial (*see generally* PO Resp.; PO Sur-reply). Accordingly, Patent Owner waived those arguments. Paper 8, 8 (“Patent Owner is cautioned that any arguments not raised in the response may be deemed waived.”); *see, e.g., In re NuVasive*, 842 F.3d at 1380–81; Consolidated Trial Practice Guide 52 (Nov. 2019).

We find Petitioner’s reasoning for combining Lupo’s teachings with the electro-optic or electrochromic mirror element of McCabe to be persuasive and supported by rational underpinnings. Pet. 36–37 (citing Ex. 1004, 3:4–15; Ex. 1002 ¶ 152).

c) Conclusion

For the reasons discussed above, we determine Petitioner has shown by a preponderance of the evidence that claims 2, 16, 17, and 19–36 are unpatentable as obvious over Lupo and McCabe, but Petitioner has not

shown by a preponderance of the evidence that claims 17, 19–25, and 27–33 are unpatentable as obvious over Lupo and McCabe.

F. Asserted Obviousness over Lupo and Tsuyama

Petitioner contends claim 4 is unpatentable as obvious over Lupo and Tsuyama. Pet. 45–48. Claim 4 depends from claim 1 and further recites, in part, “wherein said mirror head comprises a bracket to which said exterior mirror reflective element is fixedly attached by use of an adhesive.”

Ex. 1001, 77:1–4. Petitioner relies only on Lupo’s projections 53 to teach the recited “bracket.” Pet. 47. As discussed above in regards to claim 3, Petitioner has not shown Lupo teaches “wherein said mirror head comprises a bracket to which said exterior mirror reflective element is fixedly attached.” As such, Petitioner has not shown the combination of Lupo and Tsuyama teaches all the limitations recited in claim 4.

For the reasons discussed above, we determine Petitioner has not shown by a preponderance of the evidence that claim 4 is unpatentable as obvious over the combination of Lupo and Tsuyama.

G. Asserted Obviousness Lupo, McCabe, and Tsuyama

Petitioner contends claim 18 is unpatentable as obvious over Lupo, McCabe, and Tsuyama. Pet. 48. Claim 18 depends from claim 17. As discussed above, Petitioner has not shown the combination of Lupo and McCabe teaches all the limitations recited in claim 17. Petitioner does not rely on Tsuyama to remedy this deficiency. As such, Petitioner has not shown the combination of Lupo, McCabe, and Tsuyama teaches all the limitations recited in claim 18.

For the reasons discussed above, we determine Petitioner has not shown by a preponderance of the evidence that claim 18 is obvious over the combination of Lupo, McCabe, and Tsuyama.

H. Asserted Obviousness over Tsuyama

1. Overview of Tsuyama (Ex. 1005)

Tsuyama describes “a remote-controlled mirror apparatus for vehicles” in which the angle of a mirror body, i.e., a reflective surface, can be adjusted to “secur[e] a wide field of view.” Ex. 1005, 2:54–60, code (57); *see id.* at 5:44.

Figures 2–4 of Tsuyama are reproduced below.

FIG.2 PRIOR ART

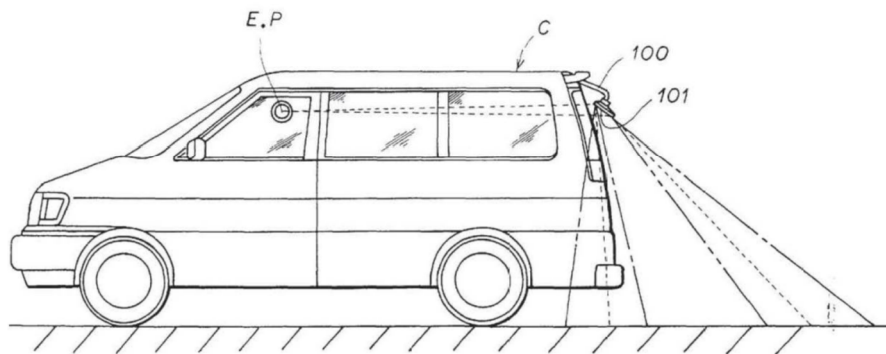


FIG.3 PRIOR ART

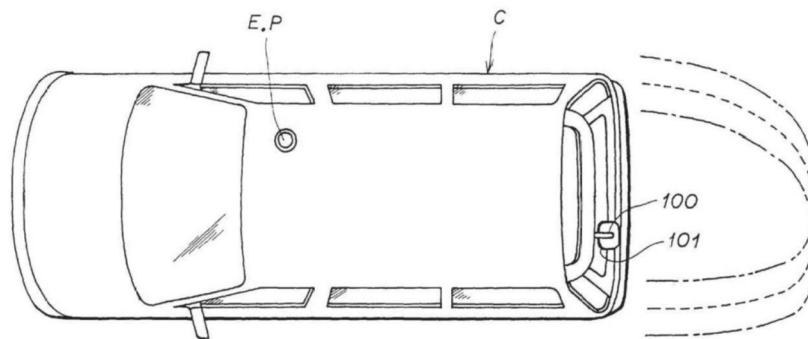
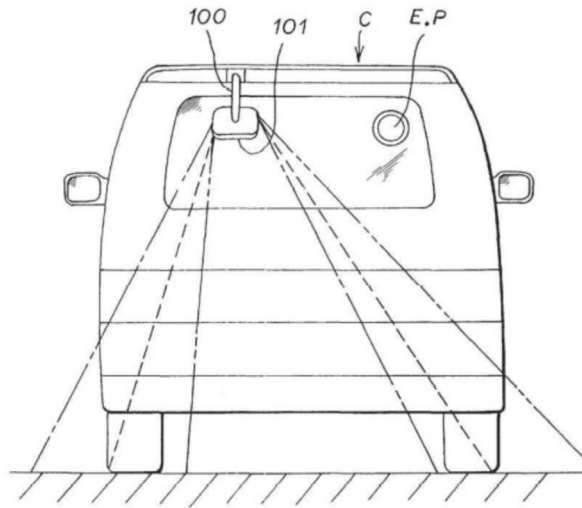


FIG.4 PRIOR ART



Figures 2–4 of Tsuyama show different views of using a remote controlled mirror apparatus. Ex. 1005, 3:25–31. Stay 100 is attached at the top of the rear of the vehicle body. *Id.* at 1:48–53.

Figure 5 of Tsuyama is reproduced below.

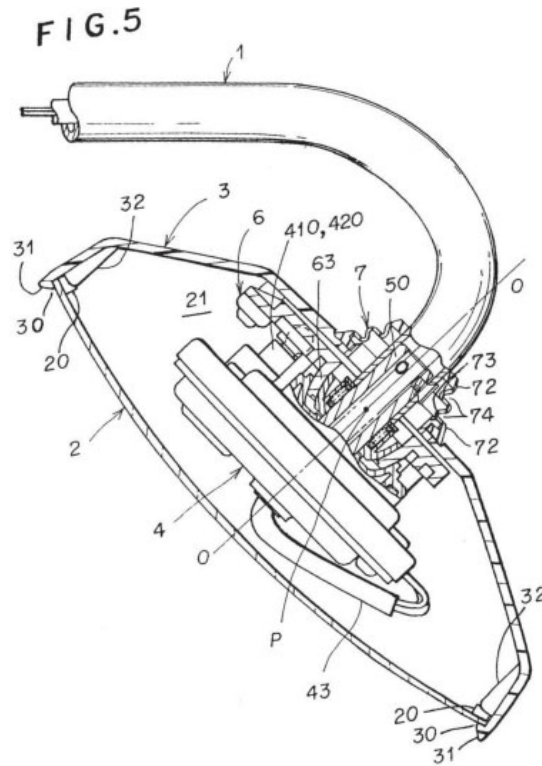


Figure 5 shows a partially cutaway view of Tsuyama's mirror apparatus. Ex. 1005, 3:32–34. At the top of Figure 5, “[o]ne end of stay 1 is attached to a vehicle body.” *Id.* at 4:37–39. And, “[m]ounted on the other end of the stay 1 is a mirror body 2 via a mirror holder 3 and power unit 4,” where the power unit “serve[s] as an angle adjusting mechanism, mounted to be capable of adjusting the angle.” *Id.* at 4:39–43. Further, “mirror body 2 is held by mirror holder 3 of the housing configuration.” *Id.* at 4:54–56. In particular, mirror body 2 is “[f]astened by bonding (and/or other fastening means)” between hooks 31 and ribs 32 in front opening 30 of mirror holder 3. *Id.* at 4:50–56.

As noted above, the angle, i.e., positioning, of the mirror body 2 can be adjusted so that “the field in which objects can be viewed and perceived can be changed, making it possible to view over a wider range.” *Id.* at 7:12–18, 11:32–36. Mirror body 2 is adjusted, i.e., repositioned, through power

unit 4. Specifically, mirror holder 3 that holds mirror body 2 is attached to power unit 4; power unit 4 rotates about center axis O–O (as shown in Figure 5); accordingly, the rotation of power unit 4 adjusts the position of mirror holder 3, correspondingly adjusting the position of mirror body 2. *Id.* at 7:5–12, 8:5–8. In particular, the movement of power unit 4 causes “the angle of the mirror body 2 [to be] adjusted” so that the “viewing direction can be changed to be left and right or back and forth.” *Id.* at 11:33–34.

Further, power unit 4 is rotated via first motor 41 and second motor 42. *Id.* at 11:14, 11:23. Figure 15 is reproduced below.

FIG. 15

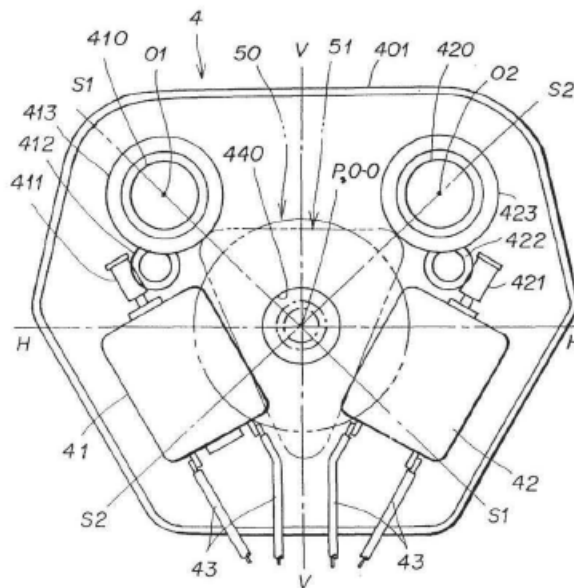


Figure 15 “is a schematic front view showing the layout of motors” (and other associated components) of power unit 4. *Id.* at 3:58–60. Power unit 4 is configured such that actuation of first motor 41 repositions mirror holder 3, and thereby “tilts [mirror body 2] about the first oblique axis S1–S1.” *Id.* at 11:18–22. Additionally, actuation of the second motor 42 can also

reposition mirror holder 3, and thereby “tilts [mirror body 2] about the second oblique axis S2–S2.” *Id.* at 11:27–31.

2. *Analysis*

Petitioner contends claims 1, 5, 8–9, 12, and 15 are unpatentable as obvious over Tsuyama. Pet. 49–66.

We have reviewed the evidence and arguments provided by the parties and are not persuaded that Petitioner has demonstrated by a preponderance of the evidence that claims 1, 5, 8–9, 12, and 15 are unpatentable as obvious over Tsuyama.

a) *Claim 1*

Claim 1 recites, in relevant part:

wherein said exterior mirror reflective element moves in tandem with movement of said mirror head relative to the exterior portion of the body or the equipped vehicle at which said exterior rearview mirror assembly is attached to adjust the rearward field of view of a driver of the equipped vehicle who views said exterior mirror reflective element when operating the equipped vehicle.

Ex. 1001, 76:53–60. Petitioner contends Tsuyama suggests this limitation. Pet. 56–58 (citing Ex. 1005, 1:30–34, 1:54–60, 3:4–19, 4:47–56, 11:58–61, Figs. 5–6; Ex. 1002 ¶¶ 88, 239–241). As to adjusting the rearward field of view of a driver, Petitioner states “the mirror assembly could be used as ‘side mirrors . . . attached to the vehicle body via a cylindrical support arm instead of the stay 100.’” *Id.* at 57 (quoting Ex. 1005, 1:30–34). According to Petitioner, “[i]f the mirror assembly 100 were attached on the side of the vehicle body as Tsuyama describes, then the field of view lines would extend from the eye point to the side-view mirror and then be generally directed towards the rear of the vehicle.” *Id.* at 57–58 (citing Ex. 1002 ¶¶ 239–240). Petitioner further argues that “Tsuyama also explicitly states

that” its mirror assembly “can be applied to vehicles other than one-box car and recreational vehicle, *and to mirror apparatuses other than the rear under mirror.*” Pet. Reply 29–30 (citing Ex. 1005, 12:4–10).

Patent Owner contends that Tsuyama describes a “rear under mirror” that “is incapable of serving as a ‘rearview mirror’ providing a driver with a ‘rearward field of view.’” PO Resp. 56. Patent Owner further contends that it would not have been obvious “to move the mirror assembly of Tsuyama to the side of the vehicle and use it as an exterior rearview mirror.” *Id.* Patent Owner supports that contention with three arguments. First, aside from “a passage from the background of the invention,” “[n]owhere else in the patent does Tsuyama state or imply that its ‘rear under’ mirror could be used as a rearview mirror at the side of the vehicle.” *Id.* at 57. Second, “Tsuyama discloses a specific type of mirror for a particular purpose” and that mirror is “not designed for and would be incapable of serving as a rearview mirror, much less an exterior rearview mirror.” *Id.* And, third, a person of ordinary skill in the art would have “avoid[ed]” modifying Tsuyama “to move the mirror assembly . . . to the side of the vehicle to serve as an exterior rearview mirror assembly.” *Id.* at 58.

We determine Petitioner has not shown Tsuyama teaches or suggests this limitation of claim 1. At institution, we preliminarily adopted Patent Owner’s proposed construction of “rearward field of view” as a “view of rearwardly approaching or following vehicles.” Dec. 15. During trial, Petitioner does not dispute this construction (Pet. Reply 3), and we continue to apply it here.

Based on that construction, the issue is whether Tsuyama teaches or at least suggests that an “exterior rearview mirror assembly is attached to adjust the rearward field of view of a driver of the equipped vehicle who

views said exterior mirror reflective element when operating the equipped vehicle.” In the Petition, Petitioner relied on Tsuyama’s mirror assembly with the field of view shown in Figures 2–4 of Tsuyama. Pet. 57. That mirror, however, does not adjust a view of rearwardly approaching or following vehicles. *See* Ex. 1005, Fig. 2, 1:54–60, 4:26–29. Indeed, Tsuyama refers to a preferred embodiment as detailed in Figures 5, 11, and 15 (for which Petitioner relies on most of the limitations of claim 1 (*see* Pet. 50–58)) as a “rear under mirror assembly.” Ex. 1005, 4:23–30. Thus, we disagree with Petitioner’s contention that Tsuyama’s adjustment of the field of view shown as dashed lines in Figure 2 teaches adjustment of a rearward field of view. *See* Pet. 57–58 (citing Ex. 1002 ¶¶ 239–240).

Petitioner further contends “Tsuyama also states that the mirror assembly could be used as “side mirrors . . . attached to the vehicle body via a cylindrical support arm instead of the stay 100.” *Id.* at 58 (citing Ex. 1005, 1:30–34). At institution, we found that the cited statement in Tsuyama

describes an example of a remote-controlled mirror apparatus in another publication being used as side mirrors. *See* Ex. 1005, 1:28–34 (‘An example of the remote-controlled mirror apparatus for vehicles described above is disclosed in Japanese Patent Application Laid-open No. H8-26031. The remote-controlled mirror apparatus for vehicles disclosed in this publication is used as side mirrors for heavy duty vehicles such as truck and bus, and is attached to the vehicle body via a cylindrical support arm instead of the stay 100.’).

Dec. 41. Thus, we preliminarily found that by not addressing the context of this statement in Tsuyama, Petitioner had not adequately explained “why a person of ordinary skill would have had reason to move Tsuyama’s mirror assembly depicted in Figures 2–4 to the side of the vehicle to allow adjustment of a rearward field of view.” *Id.*

In its Petition, Petitioner also contends a person of ordinary skill in the art “would understand that the primary (if not sole) purpose for a vehicle’s exterior rearview mirror (e.g., as described in Tsuyama) is to adjust the driver’s rearward field of view ‘who views said exterior mirror reflective element when operating the equipped vehicle.’” Pet. 58 (citing Ex. 1002 ¶ 88). As we noted in our Decision on Institution (Dec. 41), the cited paragraph of Petitioner’s declarant’s testimony discusses obviousness in the context of Lupo’s teachings (not Tsuyama), which is unhelpful because Lupo clearly teaches an external rearview mirror. *See* Ex. 1002 ¶ 88; Ex. 1003, 2:12–15. Petitioner also contends: “To the extent another reference is needed, Schnell can be combined with Tsuyama to teach this limitation, as described in Ground 1(a).” Pet. 58 (citing Ex. 1002 ¶¶ 239–241). We also do not find this contention persuasive because Petitioner’s passing mention of the Schnell reference relies only on Petitioner’s analysis in the obviousness ground over Lupo, which does not mention moving the location of the mirror assembly. *Id.* at 18–19. The cited portion of Petitioner’s declarant’s testimony is unsupported and also does not discuss moving the location of Tsuyama’s rear under mirror. *See* Ex. 1002 ¶¶ 239–241 (“As stated above with respect to Ground 1(a), the very purpose of exterior rearview mirrors on vehicles is to adjust the rearward field of view of the driver for safer operation of the vehicle. This would be apparent to a person of ordinary skill in the art. Further evidence to support this can be found in Schnell.”).

Considering the complete trial record, we find the preponderance of the evidence does not support that a person of ordinary skill in the art would have had a sufficient reason to move Tsuyama’s rear under mirror (as depicted, for example, in Figure 5) to the side of the vehicle. In its Reply,

Petitioner contends the example discussed in the Tsuyama's background at least suggests that the prior art embodiment depicted in Figures 2–4 can be used as a side mirror. Pet. Reply 27–28 (citing Ex. 1005, 1:28–34).

Petitioner then argues that Tsuyama's Figure 5 uses the same general structure as the prior art, with the "primary difference" being that in Figure 5, the reflective element is attached to the mirror housing so they move in tandem. *Id.* at 28–29. According to Petitioner, "[b]ecause a [person of ordinary skill in the art] would understand that Figure 1 could be used as a side mirror, a [person of ordinary skill in the art] would also understand that the similarly structured mirror in Figure 5 could also be used as a side mirror." *Id.* at 29. As support for that contention, Petitioner points only to Tsuyama's disclosure that "[w]hile the embodiment described above is a rear under mirror for automobile used in the vehicle C Such [*sic*] as one-box car or recreational vehicle, the remote-controlled mirror apparatus for vehicles of the present invention can be applied to vehicles other than one-box car and recreational vehicle, and to mirror apparatuses other than the rear under mirror." *Id.* at 29–30 (citing Ex. 1005, 12:4–10).

Petitioner also points to Mr. McLellan's testimony as explaining that a person of ordinary skill in the art "would understand this disclosure of Tsuyama to mean that the 'mirror assembly could be used as a side mirror that is attachable by a cylindrical support arm instead of the stay.'" *Id.* at 30 (citing Ex. 1002 ¶ 223). Petitioner also points generally to safety requirements for selling cars in the United States. *Id.* (citing Ex. 2001 ¶ 13). Thus, Petitioner contends "it would have been obvious for a [person of ordinary skill in the art] to move the remote-controlled mirror of Tsuyama to the side of the vehicle. Doing so would 'adjust the rearward field of view of the driver for safer operation of the vehicle.'" *Id.* (citing Ex. 1002 ¶ 239).

We are not persuaded by Petitioner's argument and evidence. At most, this evidence shows that a person would have had a reason to have side view mirrors generally on a vehicle and would have understood that the prior art disclosure in Tsuyama (i.e., Figures 2–4) could have been used as side view mirrors. Petitioner, however, does not persuasively address why a person of ordinary skill in the art would have found it obvious to move the mirror of Tsuyama's Figure 5 to the side of the vehicle. Petitioner identifies similarities between the major components in Figure 1 and Figure 5 (i.e., a stay, a mirror housing or holder, and a mirror body). Pet. Reply 28–29 (citing Ex. 1005, Figs. 1, 5). But Petitioner's contentions as to Tsuyama do not concern only these major components. Specifically, in its obviousness challenge to claim 1 over Tsuyama, Petitioner relies on Figures 11 and 15 of Tsuyama for a number of internal components of Tsuyama's mirror assembly. *See* Pet. 53–55 (providing annotated Figures 11 and 15 identifying Tsuyama's first advance-retract rod, second advance-retract rod, first motor, second motor, and power unit housing). Petitioner and its declarant are silent as to whether it would have been obvious to move a rear under mirror with these specific components to the side of the vehicle. *See* Pet. Reply 28–30; Ex. 1002 ¶ 239 (stating only that “the very purpose of exterior rearview mirrors on vehicles is to adjust the rearward field of view of the driver for safer operation of the vehicle” and not addressing any reason to move Tsuyama's Figure 5 mirror assembly). We also find the generic statement in Tsuyama that its mirror assembly could be used for “mirror apparatuses other than the rear under mirror” (Ex. 1005, 12:4–10) insufficient to support the specific modification on which Petitioner relies.

Thus, we determine Petitioner has not shown Tsuyama teaches:

wherein said exterior mirror reflective element moves in tandem with movement of said mirror head relative to the exterior portion of the body or the equipped vehicle at which said exterior rearview mirror assembly is attached to adjust the rearward field of view of a driver of the equipped vehicle who views said exterior mirror reflective element when operating the equipped vehicle,

as recited in claim 1, and Petitioner has not provided sufficient reasoning why it would have been obvious to modify Tsuyama to move its rear under mirror to the side of the vehicle.

For the reasons discussed above, we determine Petitioner has not shown by a preponderance of the evidence that claim 1 is unpatentable as obvious over Tsuyama.

b) Claim 5, 8, 9, and 12

Claims 5, 8, 9, and 12 depend directly or indirectly from claim 1. Petitioner's contentions as to these dependent claims do not cure the deficiency discussed above for claim 1. *See* Pet. 58–65. Because we determine Petitioner has not shown by a preponderance of the evidence that claim 1 is unpatentable as obvious over Tsuyama, we also determine that Petitioner has not shown by a preponderance of the evidence that claims 5, 8, 9 and 12 are unpatentable as obvious over Tsuyama.

c) Claim 15

Independent claim 15 recites a similar limitation to the limitation of claim 1 discussed in detail above, and Petitioner relies on its contentions as to claim 1 for that limitation of claim 15. Pet. 66. Our analysis as to claim 1 applies equally to this limitation of claim 15. Accordingly, we determine Petitioner has not shown by a preponderance of the evidence that claim 15 is unpatentable as obvious over Tsuyama.

d) Conclusion

For the reasons discussed above, we determine Petitioner has not shown by a preponderance of the evidence that claims 1, 5, 8, 9, 12, and 15 are unpatentable as obvious over Tsuyama.

I. Asserted Obviousness over Tsuyama and McCabe

Petitioner also contends claims 2, 16, 19, 20, 24–27, 31, 33, and 36 are unpatentable as obvious over Tsuyama and McCabe. Pet. 66–73. Claim 2 depends from claim 1, and claims 16, 19, 20, 24, and 25 depend directly or indirectly from claim 15. Petitioner’s contentions, including Petitioner’s reliance on McCabe, as to these dependent claims do not cure the deficiency discussed above for claims 1 and 15. *See id.* at 66–71. Because we determine Petitioner has not shown by a preponderance of the evidence that claims 1 and 15 are unpatentable as obvious over Tsuyama, we also determine that Petitioner has not shown by a preponderance of the evidence that claims 2, 16, 19, 20, 24, and 25 are unpatentable as obvious over Tsuyama and McCabe.

Independent claim 26 recites a similar limitation to the limitation of claim 1 discussed in detail above, and Petitioner relies only on its contentions as to claim 1 for that limitation of claim 26. *Id.* at 72–73. Our analysis as to claim 1 applies equally to this limitation of claim 26. Accordingly, we determine Petitioner has not shown by a preponderance of the evidence that claim 26 is unpatentable as obvious over Tsuyama and McCabe.

Claims 27, 31, 33, and 36 depend directly or indirectly from claim 26. Petitioner’s contentions, including Petitioner’s reliance on McCabe, as to these dependent claims do not cure the deficiency discussed above for claim 26. *See id.* at 73. Because we determine Petitioner has not shown by a

preponderance of the evidence that claim 26 is unpatentable as obvious over Tsuyama and McCabe, we also determine that Petitioner has not shown by a preponderance of the evidence that claims 27, 31, 33, and 36 are unpatentable as obvious over Tsuyama and McCabe.

IV. CONCLUSION⁹

For the foregoing reasons, we determine that Petitioner has shown by a preponderance of the evidence that claims 1, 2, 5, 8–11, 15, 16, 26, and 34–36 of the '648 patent are unpatentable, but has not shown by a preponderance of the evidence that claims 3, 4, 6, 7, 12, 13, 17–25, and 27–33 of the '648 patent are unpatentable, as summarized in the following table:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1, 3, 5– 13, 15	103	Lupo	1, 5, 8–11, 15	3, 6, 7, 12, 13
2, 16, 17, 19–36	103	Lupo, McCabe	2, 16, 26, 34– 36	17, 19–25, 27–33
4	103	Lupo, Tsuyama		4
18	103	Lupo, McCabe, Tsuyama		18
1, 5, 8, 9, 12, 15	103	Tsuyama		1, 5, 8, 9, 12, 15
2, 16,	103	Tsuyama, McCabe		2, 16, 19–20,

⁹ 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).

19–20, 24–27, 31, 33, 36				24–27, 31, 33, 36
Overall Outcome			1, 2, 5, 8–11, 15, 16, 26, 34–36	3, 4, 6, 7, 12, 13, 17–25, 27–33

V. ORDER

Accordingly, it is:

ORDERED that claims 1, 2, 5, 8–11, 15, 16, 26, and 34–36 of the '648 patent are held to be unpatentable;

ORDERED that claims 3, 4, 6, 7, 12, 13, 17–25, and 27–33 of the '648 patent have not been shown to be unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, 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.

IPR2020-00777
Patent 10,261,648 B2

FOR PETITIONER:

Kenneth Luchesi
Joseph Sauer
David Cochran
Robert Breetz
JONES DAY
kluchesi@jonesday.com
jmsauer@jonesday.com
dcochran@jonesday.com
rbreetz@jonesday.com

FOR PATENT OWNER:

Dennis Abdelnour
Timothy Flory
David Thomas
HONIGMAN LLP
dabdelnour@honigman.com
tflory@honigman.com
dthomas@honigman.com