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Paper No. 22
Entered: March 22, 2018

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AUTOLIV ASP, INC.; NIHON PLAST CO., LTD.;
NEATON AUTO PRODUCTS MANUFACTURING, INC.;
TAKATA CORPORATION; TK HOLDINGS INC.;
TOYODA GOSEI CO., LTD.; HYUNDAI MOBIS CO., LTD.;
MOBIS ALABAMA, LLC; and MOBIS PARTS AMERICA, LLC,
Petitioner,

v.

AMERICAN VEHICULAR SCIENCES, LLC,
Patent Owner.

Case IPR2016-01794
Patent 9,043,093 B2

Before TREVOR M. JEFFERSON, JENNIFER MEYER CHAGNON, and SCOTT C. MOORE, *Administrative Patent Judges*.

CHAGNON, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
Inter Partes Review
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

We have jurisdiction to hear this *inter partes* review under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed herein, we determine that Petitioner has shown, by a preponderance of the evidence, that claims 1–44 ("the challenged claims") of U.S. Patent No. 9,043,093 B2 (Ex. 1001, "the '093 patent") are unpatentable.

A. Procedural History

Toyoda Gosei Co., Ltd.; Autoliv ASP, Inc.; Nihon Plast Co., Ltd.; Neaton Auto Products Manufacturing, Inc.; Takata Corporation; TK Holdings Inc.; Hyundai Mobis Co., Ltd.; Mobis Alabama, LLC; and Mobis Parts America, LLC (collectively, "Petitioner")[1] filed a Petition for *inter partes* review of claims 1–44 ("the challenged claims") of U.S. Patent No. 9,043,093 B2 (Ex. 1001, "the '093 patent"). Paper 1 ("Pet."). Petitioner provided a Declaration of Stephen W. Rouhana, Ph.D. (Ex. 1003) in support of its positions. American Vehicular Sciences, LLC ("Patent Owner") filed a Preliminary Response to the Petition (Paper 6 ("Prelim. Resp.")), relying on a Declaration of Michael Nranian P.E. (Ex. 2008) in support of its positions.

[1] Petitioner identifies Toyoda Gosei North America Corp.; Autoliv, Inc.; and Mobis America, Inc. as additional real parties-in-interest. Pet. 1.

Pursuant to 35 U.S.C. § 314(a), on March 23, 2017, we instituted *inter partes* review on the following grounds:

> whether claims 1, 10, 17–20, 26, 27, and 36–40 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland[2] and Stütz[3];
>
> whether claims 2 and 3 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland, Stütz, and Faigle[4];
>
> whether claims 5 and 7 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland, Stütz, and Kaji[5];
>
> whether claim 9 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland, Stütz, and Steffens[6];
>
> whether claims 11, 28–32, and 41 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland, Stütz, and Davis[7];
>
> whether claim 16 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland, Stütz, and Swann[8];
>
> whether claims 22, 24, and 25 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland, Stütz, and Suzuki[9];

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[2] U.S. Patent No. 5,788,270, issued Aug. 4, 1998, filed Feb. 20, 1996 (Ex. 1008).
[3] U.S. Patent No. 5,957,487, issued Sept. 28, 1999, filed Mar. 19, 1997 (Ex. 1009).
[4] U.S. Patent No. 6,176,518, issued Jan. 23, 2001, filed July 26, 1999 (Ex. 1010).
[5] U.S. Patent No. 5,222,761, issued June 29, 1993 (Ex. 1012).
[6] U.S. Patent No. 5,524,924, issued June 11, 1996, filed Nov. 15, 1993 (Ex. 1013).
[7] U.S. Patent No. 5,269,561, issued Dec. 14, 1993 (Ex. 1014).
[8] U.S. Patent No. 5,507,890, issued Apr. 16, 1996, filed May 17, 1994 (Ex. 1016).

whether claim 23 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland, Stütz, Suzuki, and Marlow[10];

whether claim 21 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland, Stütz, and Enders[11];

whether claims 1, 4, 6, 8, 10, 17–20, 26, 27, and 36–40 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland and Daniel[12];

whether claims 1, 10, 12–15, 17–20, 26, 27, 33, and 36–40 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland and Tanase[13];

whether claims 34 and 35 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland, Tanase, and Kaji; and

whether claims 42–44 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland.

See Paper 7 ("Inst. Dec."). Subsequent to institution, Patent Owner filed a Patent Owner Response (Paper 10, "PO Resp."), along with a second declaration of Michael Nranian P.E. (Ex. 2018) to support its positions. Petitioner filed a Reply (Paper 13, "Reply") to the Patent Owner Response.

An oral hearing was held on December 6, 2017. A transcript of the hearing is included in the record. Paper 21 ("Tr.").

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[9] U.S. Patent No. 4,021,058, issued May 3, 1977 (Ex. 1017).
[10] U.S. Patent No. 3,966,225, issued June 29, 1976 (Ex. 1015).
[11] U.S. Patent No. 5,845,935, issued Dec. 8, 1998, filed Mar. 7, 1997 (Ex. 1019).
[12] U.S. Patent No. 5,540,459, issued July 30, 1996, filed Oct. 5, 1994 (Ex. 1011).
[13] U.S. Appl. Pub. 2002/0180192, published Dec. 5, 2002, filed May 23, 2002 (Ex. 1018).

B. Related Proceedings

The parties indicate that the ’093 patent is the subject of the following district court proceedings: *Am. Vehicular Scis. LLC v. Hyundai Motor Co.*, No. 5:16-cv-11529-JEL-APP (E.D. Mich.); *Am. Vehicular Scis. LLC v. Nissan Motor Co.*, No. 5:16-cv-11530-JEL-APP (E.D. Mich.); *Am. Vehicular Scis., LLC v. Toyota Motor Corp.*, No. 5:16-cv-11531-JEL-APP (E.D. Mich.); and *Am. Vehicular Scis., LLC v. Am. Honda Motor Co.*, No. 5:16-cv-11532-JEL-APP (E.D. Mich.). Paper 5, 2; Pet. 1–2.

Claims 1–44 of the ’093 patent also are subject to review in IPR2016-01790. *See Autoliv ASP, Inc. v. Am. Vehicular Scis.*, Case IPR2016-01790 (PTAB Mar. 28, 2017) (Paper 16). Claims 1, 8, 10, 12, 17–19, 26, 27, and 36 of the ’093 patent previously were determined to be unpatentable. *See Unified Patents Inc. v. Am. Vehicular Scis.*, Case IPR2016-00364 (PTAB May 19, 2017) (Paper 35) (appeal currently pending, Fed. Cir. Case No. 17-2307).

Patent Owner also identifies pending application No. 14/721,136, which claims priority to the ’093 patent (Paper 5, 2); according to USPTO records, this application has been abandoned.

C. The ’093 Patent

The ’093 patent is titled “Single Side Curtain Airbag for Vehicles,” and was filed as U.S. application No. 11/930,330 (“the ’330 application”) on October 31, 2007. Ex. 1001, at [21], [22], [54]. The ’093 patent claims priority, via a chain of continuation-in-part and divisional applications, to

U.S. application No. 08/571,247 ("the '247 application"), filed on December 12, 1995.[14] *Id.* at [60].

The '093 patent relates to an airbag system for a vehicle, in which "the airbag for the front and rear seats are combined, i.e., the airbag deploys along substantially the entire side of the vehicle alongside both the front seat and the rear seat." *Id.* at 65:29–32. According to the '093 patent, this arrangement "results in significantly greater protection in side impacts when the windows are broken." *Id.* at 65:32–34. Further, the airbag system of the '093 patent utilizes a single gas-providing system with only one inflator to inflate the airbag. *Id.* at 187:3–6. The airbag also includes a plurality of compartments in flow communication with each other. *See, e.g.*, *id.* at 169:27–33. As described in the '093 patent, the compartments allow the airbag to be formed of the desired shape, while minimizing stress concentrations, as well as the weight of the airbag. *Id.* at 81:14–19.

D. Illustrative Claim

Of the challenged claims, claims 1, 22, 26, 29, 36–39, and 41–43 are independent. Claims 2–21 and 33–35 depend, directly or indirectly, from claim 1; claims 23–25 depend from claim 22; claims 27 and 28 depend from claim 26; claims 30–32 depend from claim 29; claim 40 depends from claim 39; and claim 44 depends from claim 43. Claim 1 of the '093 patent, reproduced below, is illustrative of the challenged claims.

> 1. An airbag system of a vehicle, the airbag system comprising:
>
> a single airbag extending across at least two seating positions of a passenger compartment of a vehicle, the single

[14] As discussed in more detail *infra* (*see* Section II.D), the parties dispute the priority date to which the claims of the '093 patent are entitled.

> airbag arranged to deploy into the passenger compartment along a lateral side of the vehicle and adjacent each of the at least two seating positions;
>
> a cover interposed between the single airbag and the passenger compartment to cover the single airbag prior to deployment;
>
> a single gas-providing system that has only one inflator that provides gas to inflate the single airbag and which is arranged apart from the single airbag; and
>
> a conduit leading from the single gas-providing system to provide gas to inflate the single airbag, the conduit being arranged to deliver the gas from the single gas-providing system into the single airbag;
>
> the at least two seating positions comprising a first seating position in a first seat row of seats of the vehicle and a second seating position in a second seat row of seats of the vehicle longitudinally displaced from the first seat row of seats, along the lateral side of the vehicle;
>
> wherein the single airbag has a plurality of compartments for receiving the gas, and wherein the plurality of compartments are in flow communication with each other.

Ex. 1001, 186:61–187:18.

II. ANALYSIS

A. Principles of Law

To prevail in its challenges to the patentability of the claims, Petitioner must demonstrate by a preponderance of the evidence that the challenged claims are unpatentable. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). "In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable." *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review

petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")). This burden of persuasion never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378–79 (Fed. Cir. 2015) (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–27 (Fed. Cir. 2008)) (discussing the burdens of persuasion and production in *inter partes* review).

A claim is unpatentable for obviousness if, to one of ordinary skill in the pertinent art, "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (quoting 35 U.S.C. § 103(a)). 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) objective evidence of nonobviousness.[15] *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

A patent claim "is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." *KSR*, 550 U.S. at 418. An obviousness determination requires finding "both 'that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.'" *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367–68 (Fed. Cir. 2016) (citation omitted); *see KSR*, 550 U.S. at 418 (for an

[15] Neither party directs our attention to specific objective evidence of nonobviousness.

obviousness analysis, "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does"). A motivation to combine the teachings of two references can be "found explicitly or implicitly in market forces; design incentives; the 'interrelated teachings of multiple patents'; 'any need or problem known in the field of endeavor at the time of invention and addressed by the patent'; and the background knowledge, creativity, and common sense of the person of ordinary skill." *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1354 (Fed. Cir. 2013) (citation omitted).

In an *inter partes* review, Petitioner cannot satisfy its burden of proving obviousness by employing "mere conclusory statements," but "must instead articulate specific reasoning, based on evidence of record" to support an obviousness determination. *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1380–81 (Fed. Cir. 2016). The "factual inquiry" into the reasons for "combin[ing] references must be thorough and searching, and the need for specificity pervades." *In re NuVasive, Inc.*, 842 F.3d 1376, 1381–82 (Fed. Cir. 2016) (internal quotations and citations omitted). A determination of obviousness cannot be reached where the record lacks "explanation as to how or why the references would be combined to produce the claimed invention." *TriVascular, Inc. v. Samuels*, 812 F.3d 1056, 1066 (Fed. Cir. 2016); *see NuVasive*, 842 F.3d at 1382–85; *Magnum Oil*, 829 F.3d at 1380–81. Thus, to prevail Petitioner must explain how the prior art would have rendered the challenged claim unpatentable.

At this final stage, we determine whether a preponderance of the evidence of the record shows that the challenged claims would have been

obvious in view of the asserted prior art. We analyze the asserted grounds of unpatentability in accordance with those principles.

B. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art "would have a degree in a related field of science including physics, mechanical or electrical engineering, or equivalent coursework, and at least two years of experience in the area of automotive safety systems with the equivalent of a post-graduate education, such as a master's degree or equivalent knowledge obtained through work experience, and several years of experience in the design of vehicle occupant protection systems." Pet. 21 (citing Ex. 1003 ¶ 37). Patent Owner does not address the level of ordinary skill in its Patent Owner Response, but Mr. Nranian testifies that such a person "would have at least a Bachelor's degree in electrical, electronic, mechanical, or automotive engineering, and at least three years of experience in the integration of airbag, safety, and vehicle occupant protection devices in automotive vehicles, or equivalent knowledge obtained through work experience in the relevant field." Ex. 2018 ¶ 36. We do not discern a difference between these formulations as applied to the issues in dispute in this proceeding, and the parties do not identify any issue in dispute that allegedly turns on such a difference.

For purposes of this Final Written Decision, and based on the parties' proposed definitions and the complete record now before us, we maintain our previously adopted definition of one of ordinary skill in the art: a person having at least a Bachelor's degree in physics, or electrical, electronic, mechanical, or automotive engineering, or equivalent coursework, and having several years of experience in the design of vehicle occupant

protection systems in automotive vehicles, or equivalent knowledge obtained through work experience in the relevant field. *See* Inst. Dec. 15–16. The level of ordinary skill in the art in this case further is reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995); *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978).

C. Claim Construction

The '093 patent has expired. *See* PO Resp. 16; Ex. 1001, at [60]; 35 U.S.C. § 154(a)(2). When interpreting claims of an expired patent, our analysis is similar to that of a district court. *In re Rambus, Inc.*, 694 F.3d 42, 46 (Fed. Cir. 2012); *see also Black & Decker, Inc. v. Positec USA, Inc., RW*, 646 Fed. App. 1019, 1024 (Fed. Cir. 2016) (holding that in an *inter partes* review, "[c]laims of an expired patent are given their ordinary and customary meaning in accordance with our opinion in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc)").[16] Specifically, claim terms are given their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art at the time of the invention, in light of the language of the claims, the specification, and the prosecution history of record. *Phillips*, 415 F.3d at 1313–17. However, there is no presumption of validity, and we do not apply a rule of construction with an aim to preserve the validity of claims.

Petitioner asserts that "all claim terms should be given their plain and ordinary meaning in light of the specification." Pet. 22. Patent Owner proposes constructions for three claim terms: (1) "single airbag";

[16] The parties agree that the *Phillips* standard of claim construction should be applied to the claims in this proceeding. Pet. 11; PO Resp. 16.

(2) "a single airbag extending across at least two seating positions of a passenger compartment of a vehicle . . . the at least two seating positions comprising a first seating position in a first seat row of seats of the vehicle and a second seating position in a second seat row of seats of the vehicle longitudinally displaced from the first seat row of seats"; and (3) "a plurality of compartments." PO Resp. 16–20.

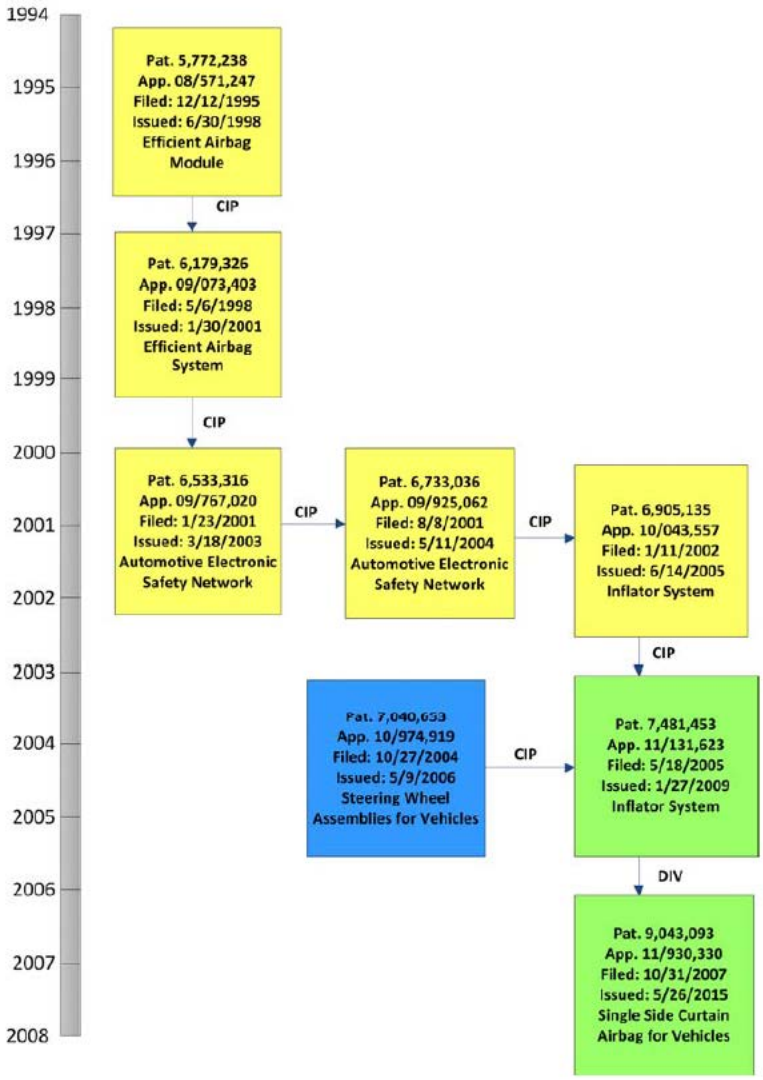
The parties' dispute does not require express construction of any claim term. *See, e.g.*, *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) ("[W]e need only construe terms 'that are in controversy, and only to the extent necessary to resolve the controversy.'") (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

D. Effective Filing Date of the '093 Patent Claims; Status of Asserted References as Prior Art

Patent Owner argues that the asserted references HÅland, Stütz, Faigle, Tanase, and Enders are not available as prior art to the claims of the '093 patent. PO Resp. 20–28. This argument is premised on Patent Owner's contention that the claims of the '093 patent are entitled to the earliest filing date to which the '093 patent claims priority—namely, the December 12, 1995 filing date of the '247 application. *See id.*; *see also id.* at 28–66 (Patent Owner arguing the claims of the '093 patent are entitled to a priority date of December 12, 1995). Petitioner, on the other hand, asserts that the claims of the '093 patent are entitled to a priority date no earlier than October 27, 2004, the filing date of U.S. application No. 10/974,919 ("the '919 application"). Pet. 10–21. If the claims of the '093 patent are not entitled to the December 12, 1995 filing date of the '247 application, then

HÅland, Stütz, and Enders are available as prior art thereto, because they were each filed prior to the filing date of the next application in the priority chain (i.e., May 6, 1998). *See* Ex. 1001, at [60]; Ex. 1008, at [22]; Ex. 1009, at [22]; Ex. 1019, at [22]. Further, if the claims of the '093 patent are entitled only to the October 27, 2004 filing date of the '919 application, as asserted by Petitioner, then Faigle and Tanase also are available as prior art thereto, because they were filed and published prior to October 27, 2004. *See* Ex. 1010, at [22], [45]; Ex. 1018, at [22], [43]. Accordingly, we address the parties' arguments regarding the priority date of the challenged claims, before addressing Petitioner's substantive challenges to the claims.

On its face, the '093 patent claims priority, via a chain of continuation-in-part and divisional applications, back to December 12, 1995. Ex. 1001, at [60]. A graphical representation of the priority chain of the '093 patent, prepared by Petitioner (Pet. 10), is reproduced below for convenience.



The above chart provides a graphical representation of the priority chain of the ’093 patent.

For a claim to be entitled to the priority date of an earlier application under 35 U.S.C. § 120, each application in the chain leading back to the earliest application must provide adequate written description support for that claim, as required by 35 U.S.C. § 112. *Zenon Envt’l, Inc. v. U.S. Filter Corp.*, 506 F.3d 1370, 1378 (Fed. Cir. 2007); *see also In re Hogan*, 559 F.2d 595, 609 (CCPA 1977) (“[T]here has to be a continuous chain of copending applications each of which satisfies the requirements of § 112 with respect to

the subject matter presently claimed."). In order to satisfy the written description requirement, the disclosure of the earlier filed application must describe the later claimed invention "in sufficient detail that one skilled in the art can clearly conclude that the inventor invented the claimed invention as of the filing date sought." *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997); *see also Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc) (based on "an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art . . . , the specification must describe an invention understandable to that skilled artisan and show that the inventor actually invented the invention claimed."). "In other words, the test for sufficiency is whether the disclosure of the [earlier] application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter" as of the earlier filing date. *Ariad*, 598 F.3d at 1351; *see also Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1331–32 (Fed. Cir. 2008) ("While the earlier application need not describe the claimed subject matter in precisely the same terms as found in the claims at issue, the prior application must 'convey with reasonable clarity to those skilled in the art that, as of the filing date sought, [the inventor] was in possession of the invention.'" (internal citations omitted, emphasis removed)).

However, "[e]ntitlement to a filing date does not extend to subject matter which is not disclosed, but would be obvious over what is expressly disclosed." *In re Huston*, 308 F.3d 1267, 1277 (Fed. Cir. 2002) (quoting *Lockwood*, 107 F.3d at 1571–72). "[I]t is the specification itself that must demonstrate possession. And while the description requirement does not

demand any particular form of disclosure, . . . or that the specification recite the claimed invention *in haec verba*, a description that merely renders the invention obvious does not satisfy the requirement." *Ariad*, 598 F.3d at 1352 (citing *Carnegie Mellon Univ. v. Hoffmann–La Roche Inc.*, 541 F.3d 1115, 1122 (Fed. Cir. 2008); *Lockwood*, 107 F.3d at 1571–72); *see also Tronzo v. Biomet, Inc.*, 156 F.3d 1154, 1158 (Fed. Cir. 1998) ("For a claim in a later-filed application to be entitled to the filing date of an earlier application under 35 U.S.C. § 120 (1994), the earlier application must comply with the written description requirement of 35 U.S.C. § 112, ¶ 1 (1994). . . . A disclosure in a parent application that merely renders the later-claimed invention obvious is not sufficient to meet the written description requirement; the disclosure must describe the claimed invention with all its limitations." (internal citations omitted)).

According to Petitioner, the earliest disclosure of certain limitations of the claims of the '093 patent is in the '919 application, which was filed on October 27, 2004. Pet. 12–15, 18–21. In particular, Petitioner contends that the earlier applications (i.e., those highlighted in yellow in Petitioner's graphical representation of the priority chain, reproduced above) do not contain written description support for the following limitations:

> (a) either "a single airbag extending across at least two seating positions of a passenger compartment of a vehicle" or "arranging the single airbag to extend across at least two seating positions of a passenger compartment of the vehicle," (b) "wherein the single airbag has a plurality of compartments for receiving the gas," and (c) "wherein the plurality of compartments are in flow communication with each other."

Id. at 12.

Patent Owner argues that each of these features is, in fact, supported in the '247 application and the other applications in the priority chain. *See* PO Resp. 28–66. For the reasons discussed below, we determine that the '247 application does not provide sufficient written description support for at least the limitation "wherein the plurality of compartments are in flow communication with each other" ("the flow communication limitation").[17]

Regarding the flow communication limitation, Patent Owner asserts, relying on testimony from Mr. Nranian, that "there are numerous other embodiments that are described in the '238 patent [corresponding to the '247 application] . . . that do disclose compartments that receive (or are receiving gas) indirectly from an inflator, via other compartments." *Id.* at 41–42 (quoting Ex. 2018 ¶ 93) (alterations by Patent Owner). In support of this, Patent Owner notes that "the '247 application (as well as the other applications in the priority chain) explicitly defines the term 'airbag' to encompass an airbag having a plurality of compartments: '[t]he term "airbag" as used herein means either the case where the airbag module 100 contains a single airbag, as in most conventional designs, or where the airbag module 100 contains a ***single airbag having a plurality of compartments***

[17] In view of this determination, we need not address whether the '247 application includes written description support for the other limitations identified by Petitioner—namely, "a single airbag extending across at least two seating positions of a passenger compartment of a vehicle"/"arranging the single airbag to extend across at least two seating positions of a passenger compartment of the vehicle" and "wherein the single airbag has a plurality of compartments for receiving the gas."

which deploy in concert to protect an occupant.'" *Id.* at 40 (quoting Ex. 2020[18], 131 (lines 4–7)[19]) (emphasis Patent Owner's).

According to Patent Owner, because the '247 application "explicitly define[s] the term 'airbag' to include 'a single airbag having a plurality of compartments which deploy in concert to protect an occupant'" (*id.* at 42 (citing Ex. 2020, 131:4–7)), and because "none of [the original] claims [of the '247 application] requires each of the compartments in the airbag to be directly filled by the inflator" (*id.* (citing Ex. 2020, 51–56)), these claims, therefore, "describe an airbag having a plurality of compartments in which some of the compartments are necessarily filled with gas from being in flow communication with neighboring compartments" (*id.* at 42–43). We disagree. Although Patent Owner is correct that "none of [the original] claims [of the '247 application] requires each of the compartments in the airbag to be directly filled by the inflator" (*id.* at 42), Patent Owner's conclusion (i.e., that the claims "describe an airbag having a plurality of compartments in which some of the compartments are necessarily filled with gas from being in flow communication with neighboring compartments" (*id.* at 42–43)) does not necessarily follow. Instead, the claims are silent as to

[18] Citations to Exhibit 2020, which is the file history of the '247 application, are to the page numbers added by Patent Owner in the bottom right-hand corner of the page.

[19] Patent Owner provides citations to the '247 application, as well as parallel citations to corresponding portions of the intervening applications. For efficiency, we include only the citations to the '247 application. We note that Patent Owner's citations to the Specification of the '247 application are to a substitute specification, which was filed to provide sufficient top margins (*see* Ex. 2020, 101 (Office Action, requiring substitute specification), 176–77 (indicating the substitute specification contains no new matter)).

specifically *how* the claimed airbag (with or without compartments) is inflated. The generic description in the Specification that the term "airbag" includes, among other distinct possibilities, "a single airbag having a plurality of compartments which deploy in concert to protect an occupant," coupled with silence in the claims as to the specifics of how the claimed airbags are inflated is insufficient to support a conclusion that the original claims of the '247 application actually disclose the claimed flow communication limitation. *See Huston*, 308 F.3d at 1277 ("Entitlement to a filing date does not extend to subject matter which is not disclosed, but would be obvious over what is expressly disclosed."); *see also* Ex. 1027, 31:5–11 (Mr. Nranian admitting during cross-examination that an airbag with a plurality of compartments, "could have plurality of compartments in flow communication with each other *or could have a plurality of compartments that are not in flow communication with each other*." (emphasis added)); Reply 8.

Patent Owner's argument during oral hearing that the recitation in original dependent claim 3 of the '247 application, that the "inflator means . . . [has] a length which is more than half the length of said airbag" (Ex. 2020, 51), indicates that the "inflator means" of claim 1 may have a length of only half the length of the airbag, and thus other compartments of the airbag must necessarily be in flow communication in order to be inflated (*see* Tr. 21:24–24:6) is similarly unpersuasive.[20] First, this argument presupposes multiple compartments in the airbag of claim 1, but as Patent

[20] Because Patent Owner's argument is not persuasive, we do not address Petitioner's contention that this argument was made only at the oral hearing, and was not included in the Patent Owner Response. *See* Tr. 29:7–11.

Owner admits, "airbag" also includes a single, non-compartmented airbag, which would not require any flow communication between compartments in order to be inflated, even if the inflator means is only half the length of the airbag. *See, e.g.*, PO Resp. 40. Second, Patent Owner does not direct us to any description of an "inflator means" in the Specification of the '247 application having a length of half or less than half the length of the airbag, and we do not discern any. Instead, in discussing the preferred embodiments, the '238 patent discloses that nozzle 115 delivering gas from tube 121 to airbag 110 is defined by "elongate U-shaped nozzle walls 160," which as seen in Figure 2F *extend along, at least a significant portion of, the length of airbag 110*. *See* Ex. 2020, 133 (line 7)–134 (line 14), Fig. 2F; *see also id.* at 138 (lines 15–17) ("Referring now to FIG. 2F, it can be seen that the nozzle walls 160 are solid and extend in the longitudinal direction of the tube 121. Similarly, spring shields 155 are connected to the walls 160 over substantially the entire length of the walls 160."); *see also Ariad*, 598 F.3d at 1352 ("while the description requirement does not demand any particular form of disclosure, . . . a description that merely renders the invention obvious does not satisfy the requirement.").

Patent Owner also points to Figure 4 of the '247 application (PO Resp. 44; Ex. 2020, 88), reproduced below:

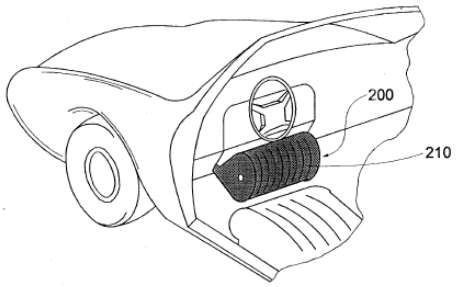


FIG. 4

Figure 4 is a "perspective view of a preferred embodiment of the airbag module . . . used for knee protection shown in the deployed condition." Ex. 2020, 129 (lines 13–14). According to Patent Owner, a person of ordinary skill in the art "would have understood [from reviewing Figure 4] the[] compartments [indicated by the lines on the airbag of Figure 4] are in flow communication with each other to make the airbag stronger, more rigid, and to also allow gas flow between compartments to mitigate occupant contact surface point impact loading through gas flow between compartments of the airbag and out the vent hole shown in side panel." PO Resp. 47–48 (quoting Ex. 2018 ¶ 99). The '247 application, however, nowhere describes this airbag as including multiple compartments, let alone such compartments being in flow communication. *See* Ex. 2020, 43–44; Reply 10–11. Petitioner, relying on testimony from Dr. Rouhana, asserts that "the lines on the knee airbag could depict numerous features unrelated to compartments or flow communication," such as "contour lines commonly used in drawings to represent curved surfaces, sew lines, pleats, or friction members to keep the knees from sliding off the airbag." Reply 12 (citing Ex. 1003 ¶ 60). Petitioner further argues that, "even assuming the lines on the knee airbag of

Figure 4 represent multiple compartments, there would be multiple ways for the system to absorb and distribute occupant energy and forces without flow communication between the compartments," such as "each 'compartment' in the knee airbag of Figure 4 could have its own vent that is out of view, behind or underneath the airbag." *Id.* at 13 (citing Ex. 1003 ¶ 63). We find Dr. Rouhana's testimony more consistent with the disclosure of the '247 application, and are not persuaded that Figure 4 and the related discussion in the '247 application provide sufficient written description support for the flow communication limitation of the challenged claims.

Patent Owner points to three additional U.S. patents, incorporated by reference into the '247 application[21]—U.S. Patent No. 5,004,586 to Hayashi ("the '586 patent") (Ex. 2026), U.S. Patent No. 3,158,314 to Young ("the '314 patent") (Ex. 2027), and U.S. Patent No. 3,370,794 to Day ("the '794 patent") (Ex. 2028)—which allegedly also provide written description support for the flow communication limitation. *See* PO Resp. 49–60. Patent Owner argues, relying on testimony from Mr. Nranian, that "a dinghy like the one mentioned in the '314 patent has a plurality of compartments in flow communication" (*id.* at 51 (citing Ex. 2018 ¶ 112)) and that a person of ordinary skill in the art "would have understood that the air raft (air mattress) mentioned in the '784 patent has a plurality of compartments in flow communication" (*id.* at 55–56 (citing Ex. 2018 ¶ 115)). However, Patent Owner does not point to any material in these patents themselves that actually discloses the flow communication

[21] Petitioner contends that these references are not, in fact, incorporated by reference into the '247 application. Reply 15 n.6. We need not decide this question, however, for purposes of this Final Written Decision.

limitation. In fact, as noted by Petitioner in its Reply (*see* Reply 16), these patents are related to inflation devices and aspirators. *See* Ex. 2020, 114 (line 14)–119 (line 17) (the '247 application discussing these and other patents in the context of prior patents directed to "airbag systems using aspirated inflators"). Instead, Patent Owner discusses an exemplary inflatable boat and air mattress as evidence that "the principle of flow communication between compartments is well known and explicitly cited by, for example, a conventional inflatable dinghy, raft (air mattress), and/or an inflatable boat." PO Resp. 51 (quoting Ex. 2018 ¶ 105). Patent Owner's reliance on "a conventional inflatable dinghy, raft (air mattress), and/or an inflatable boat" is, at best, evidence that such flow communication would have been obvious to a person of ordinary skill in the art. *See Ariad*, 598 F.3d at 1352 ("while the description requirement does not demand any particular form of disclosure, . . . a description that merely renders the invention obvious does not satisfy the requirement."). In any event, Patent Owner has not presented any evidence that the exemplary inflatable boat and air mattress were known or available in December 1995. *See* Reply 16 n.7, n.8.

Finally, Patent Owner points to the prosecution history of the '093 patent, where the Examiner stated that "official notice is taken of the fact that it is common knowledge for gas to pass through compartments of an airbag." *See* PO Resp. 60 (citing Ex. 2019 (the '093 patent file history, Final Office Action, mailed Oct. 10, 2010, at pp. 7–8)); *see also id.* at 61 (citing Exhibit 2019 (the '093 patent file history, Decision on Appeal, at pp. 8–10)). Patent Owner also argues that "a very large number of patents published before the filing date of the '247 application in December of 1995 disclose

airbags having multiple compartments in flow communication with each other." *Id.* at 62 (citing Ex. 2018 ¶¶ 122–133). As discussed above, however, "it is the *specification itself* that must demonstrate possession. . . . [A] description that merely renders the invention obvious does not satisfy the requirement." *Ariad*, 598 F.3d at 1352 (emphasis added).

For the reasons discussed above, we are not persuaded that the '247 application provides written description support for the flow communication limitation of the challenged claims. Thus, we find that the challenged claims are not entitled to the December 12, 1995 filing date of the '247 application. Regarding the intervening applications, Patent Owner merely provides parallel citations to those applications, and does not present any additional discussion or argument regarding written description support for the challenged claims.[22] Thus, for the same reasons, we find that the challenged claims are not entitled to filing date of any of the intervening applications.

Therefore, we also find that HÅland, Stütz, Faigle, Tanase, and Enders are each available as prior art to the claims of the '093 patent.[23]

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[22] Patent Owner does not address any alleged support in the '919 application, which is not in the direct priority line between the '247 application and the '330 application, from which the '093 patent matured.

[23] Patent Owner notes that Petitioner did not allege that Daniel, Steffens, and Swann were prior art under 35 U.S.C. § 102(e), but instead alleges only that these references are prior art under 35 U.S.C. § 102(b). PO Resp. 27 (citing Pet. 5–6). Patent Owner recognizes, however, that we determined in the Institution Decision that, even if the claims of the '093 patent are entitled to the December 12, 1995 filing date of the '247 application, Daniel, Steffens, and Swann are available as prior art under 35 U.S.C. § 102(e), because they were each filed prior to December 12, 1995. *See* Inst. Dec. 6 (citing Ex. 1011, at [22]; Ex. 1013, at [22]; Ex. 1016, at [22]); PO Resp. 27. Patent Owner does not challenge this determination.

E. Asserted Obviousness in View of HÅland and Stütz

Petitioner asserts that claims 1, 10, 17–20, 26, 27, and 36–40 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of HÅland and Stütz. Pet. 32–52. Petitioner further asserts that claims 2 and 3 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of HÅland, Stütz, and Faigle; that claims 5 and 7 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of HÅland, Stütz, and Kaji; that claim 9 is unpatentable under 35 U.S.C. § 103(a) as obvious in view of HÅland, Stütz, and Steffens; that claims 11, 28–32, and 41 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of HÅland, Stütz, and Davis; that claim 16 is unpatentable under 35 U.S.C. § 103(a) as obvious in view of HÅland, Stütz, and Swann; that claims 22, 24, and 25 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of HÅland, Stütz, and Suzuki; that claim 23 is unpatentable under 35 U.S.C. § 103(a) as obvious in view of HÅland, Stütz, Suzuki, and Marlow; and that claim 21 is unpatentable under 35 U.S.C. § 103(a) as obvious in view of HÅland, Stütz, and Enders. *Id.* at 52–54, 59–72, 81–82.

Aside from its argument that certain references are not available as prior art, which we have addressed above, Patent Owner does not address Petitioner's asserted grounds substantively. We note that our Scheduling Order cautioned Patent Owner "that any arguments for patentability not raised in the [Patent Owner's Response] will be deemed waived." *See* Paper 8, 5–6; *see also NuVasive, Inc.*, 842 F.3d at 1380–81 (determining Patent Owner waived arguments made only in its Preliminary Response but not raised in the Patent Owner Response after institution).

For the reasons explained below, we determine that Petitioner has demonstrated, by a preponderance of the evidence, that claims 1–3, 5, 7, 9–11, 16–32, and 36–41 would have been obvious.

1. Summary of HÅland

HÅland relates to a "side impact and roll over inflatable head protector," or in other words a side curtain airbag for a vehicle. Ex. 1008, at [54]; Ex. 1003 ¶ 83. Figure 6, which illustrates one embodiment of HÅland, is reproduced below:

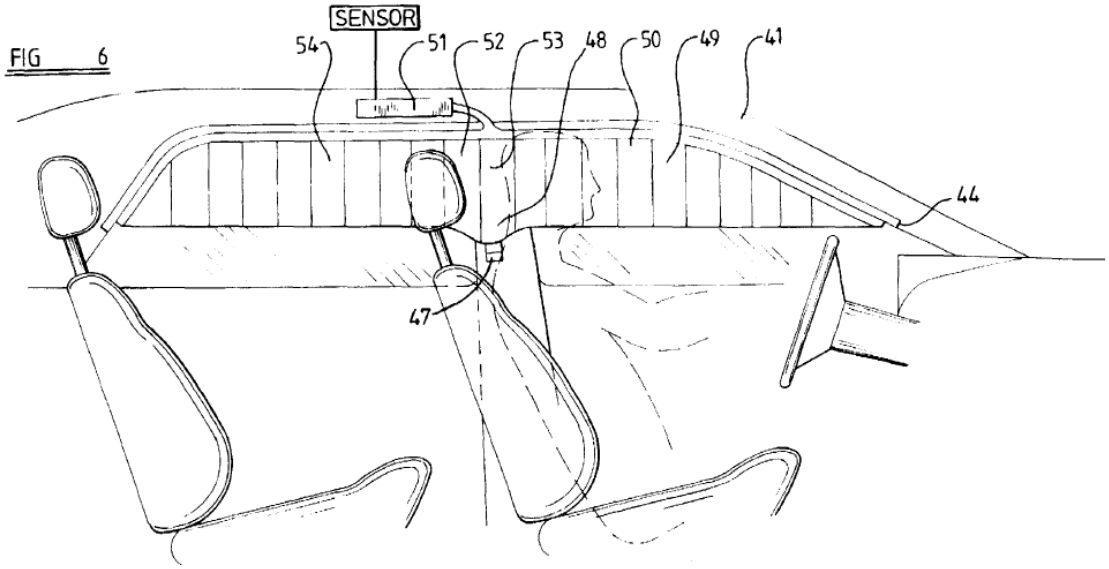


Figure 6 shows a side view of the interior of a motor vehicle, including a safety device (i.e., an airbag) in accordance with the invention of HÅland, when the safety device is in the operative state (i.e., when the airbag is inflated). Ex. 1008, 2:55–60. As seen in Figure 6, the inflatable element "provide[s] protection not only for a person in the front seat of a motor vehicle . . . , but also for a person in the rear seat of the vehicle." *Id.* at 5:47–50.

Gas generator 51 is connected to inflatable element 49 via a conduit. *Id.* at 6:8–9; *see id.* at 3:25–26, 4:52–53; Ex. 1003 ¶ 84. Inflatable element

49 is formed of "a plurality of parallel cells, which when inflated are substantially cylindrical." Ex. 1008, 6:4–7. As described in HÅland, "gas is initially supplied to the cells 52, 53," then "[t]he rest of the cells 54 of the inflatable element are . . . inflated." *Id.* at 6:13–14, 6:21–22. Once inflated, "the inflatable element then extends fully across the upper parts of the windows in the doors 42, 43 of the motor vehicle." *Id.* at 6:22–24.

As can further be seen in Figure 6, inflatable element 49 is secured to part of door frame 41 at its top edge 50. *Id.* at 5:63–66. The inflatable element of HÅland includes venting between adjacent cells thereof "to avoid any severe rebound" of a vehicle occupant's head. *See id.* at 4:16–21. In this way, the inflatable element of HÅland allows for a "'soft' impact" if a vehicle occupant's head impacts the inflated element. *Id.* at 4:21–27.

Further according to the disclosure of HÅland, the "weight of the fabric [forming the inflatable element] should be kept to be as low as possible, so that if the inflatable element should impact with the head of the person in the vehicle as the inflatable element is inflated no harm will be done." *Id.* at 4:28–31.

2. Summary of Stütz

Stütz relates to a "lateral impact protective device for a front and a rear vehicle occupant," or in other words a side airbag for a vehicle. Ex. 1009, at [57]; Ex. 1003 ¶ 86. Figure 1, which illustrates an embodiment of Stütz, is reproduced below:

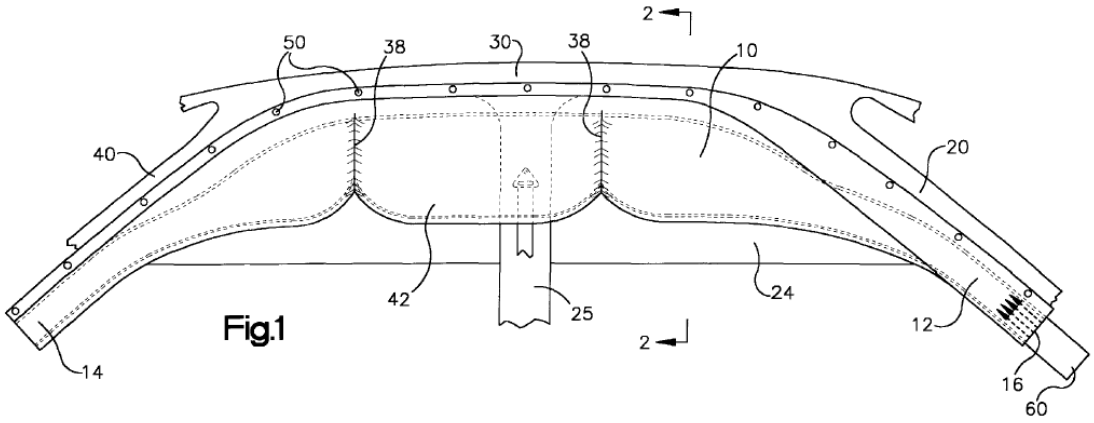


Figure 1 shows a side elevation view of an embodiment of the protective device of Stütz, in an inflated state. Ex. 1009, 2:38–40. As seen in Figure 1, head gas bag 10 is "designed to offer lateral impact protection both for a front occupant and also for a rear occupant." *Id.* at 2:52–55; *see id.* at 1:25–35. At least one end 12, 14 of head gas bag 10 includes gas inlet opening 16, for connection to gas generator 60, with a single gas generator shown in the embodiment of Figure 1. *Id.* at 3:15–19.

As described in Stütz, head gas bag 10 is arranged in fitting sheath 22, as shown in Figure 2 (*id.* at 2:58–60), reproduced below:

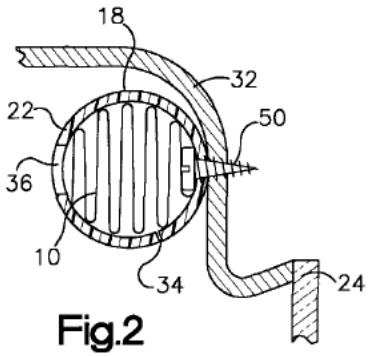


Figure 2 shows a cross-section through a roof frame of a vehicle having an installed, folded up head gas bag 10. *Id.* at 2:41–42. Fitting sheath 22 may

be arranged behind cladding 32 (not shown), or attached to the external side of cladding 32 by screws 50 (as shown in Figure 2). *Id.* at 2:60–66.

When there is a lateral impact to the vehicle, gas flows into the interior of gas bag 10 from gas generator 60, as indicated by the arrows in Figure 1. *Id.* at 3:20–24. Upon inflation of head gas bag 10, the bag emerges from fitting sheath 22, and "spreads out toward the side window 24 in a crash and moves into a position between the occupant's head and the vehicle." *Id.* at 3:7–9, 3:23–24. If gas bag 10 is arranged under cladding 32, cladding 32 will be ripped open. *Id.* at 3:23–25.

3. Claims 1, 10, 17–20, 26, 27, and 36–40: Obviousness in view of HÅland and Stütz

Independent claim 1 recites an "airbag system of a vehicle." As discussed above, HÅland and Stütz each disclose such an airbag system. *See* Pet. 22–24.

Claim 1 further recites that the airbag system includes "a single airbag extending across at least two seating positions of a passenger compartment of a vehicle, the single airbag arranged to deploy into the passenger compartment along a lateral side of the vehicle and adjacent each of the at least two seating positions." Further, the claimed "at least two seating positions" include "a first seating position in a first seat row of seats of the vehicle and a second seating position in a second seat row of seats of the vehicle longitudinally displaced from the first seat row of seats, along the lateral side of the vehicle." In other words, "the airbag for the front and rear seats are combined, i.e., the airbag deploys along substantially the entire side of the vehicle alongside both the front seat and the rear seat." Ex. 1001,

65:29–32. Collectively, we refer to these features as "the single airbag extending across front and back seats limitation".

According to Petitioner, both HÅland and Stütz teach the single airbag extending across front and back seats limitation. *See* Pet. 32–34, 38; Ex. 1003 ¶¶ 103–104. Petitioner asserts that "HÅland teaches a single airbag extending across two seating positions that are longitudinally displaced along a lateral side of the vehicle." Pet. 32 (citing Ex. 1008, 5:47–51, Figs. 5, 6). Petitioner further asserts that "Stütz . . . also discloses the claimed single airbag extending across two seating positions that are longitudinally displaced along a lateral side of the vehicle." *Id.* at 33–34 (citing Ex. 1009, 1:25–32, 1:50–55, 2:52–55, Figs. 1, 3). We agree with Petitioner, and find that HÅland and Stütz each teaches or suggests the single airbag extending across front and back seats limitation.

The airbag system of claim 1 further includes "a cover interposed between the single airbag and the passenger compartment to cover the single airbag prior to deployment." Petitioner asserts that, while "HÅland does not explicitly teach a cover, . . . this feature is shown repeatedly in other prior art, including Stütz." *Id.* at 34; Ex. 1003 ¶ 105. Petitioner points to fitting sheath 22, shown in Figure 2 of Stütz, as teaching a cover, as claimed. Pet. 34–35 (citing Ex. 1009, 1:67–2:9, 2:58–60, 2:62–3:14, Fig. 2); Ex. 1003 ¶ 106. Petitioner asserts that "[c]overs were well known features of airbag systems," and "[t]he advantages of having an airbag cover were well known and include protecting the airbag and providing a deployment path." Pet. 51 (citing Ex. 1003 ¶ 147). Thus, according to Petitioner, a person of ordinary skill in the art would have been motivated to add Stütz's cover to the airbag system of HÅland. *See id.* at 52; Ex. 1003 ¶ 147. We agree with Petitioner,

and find that Stütz teaches or suggests a cover, as claimed, and that a person of ordinary skill in the art would have added Stütz's cover to the airbag system of HÅland, in view of the well-known advantages of a cover, including protecting the airbag and providing a deployment path.

Claim 1 further recites "a single gas-providing system that has only one inflator that provides gas to inflate the single airbag and which is arranged apart from the single airbag." Petitioner points to gas generator 51 of HÅland as teaching this claim feature. Pet. 35–36 (citing Ex. 1008, 4:42–53, 6:8–19, Figs. 2, 6); Ex. 1003 ¶ 107. Petitioner also points to gas generator 60 of Stütz as expressly teaching the use of directed gas from a *single* inflator. *See* Pet. 36–37 (citing Ex. 1009, 3:15–19, 3:44–48, Fig. 1); Ex. 1003 ¶ 108; *see also* Pet. 51–52 (citing Ex. 1003 ¶¶ 148–149 (noting the advantages of directed gas from a single inflator were well known)). We agree with Petitioner, and find that HÅland and Stütz each teaches or suggests using a single inflator, as claimed.

Regarding the claimed "conduit leading from the single gas-providing system to provide gas to inflate the single airbag, the conduit being arranged to deliver the gas from the single gas-providing system into the single airbag," Petitioner points to the unlabeled conduit between gas generator 51 and inflatable element 49, shown in Figure 6 of HÅland, as disclosing this claim feature. Pet. 37–38 (citing Ex. 1008, Figs. 1, 2, 6); Ex. 1003 ¶ 109. We agree with Petitioner, and find that HÅland teaches a conduit, as claimed.

Finally, claim 1 recites that "the single airbag has a plurality of compartments for receiving the gas, and wherein the plurality of compartments are in flow communication with each other." Petitioner

points to cells 52–54 of HÅland, as teaching the claimed plurality of compartments. Pet. 38–39 (citing Ex. 1008, 4:16–22, 6:2–7, Fig. 6); Ex. 1003 ¶ 111. Petitioner further points to HÅland's disclosure that "there is venting between at least selected adjacent cells," as teaching the cells are in flow communication, as claimed. Pet. 39–40 (citing Ex. 1008, 4:16–22, 6:2–7); Ex. 1003 ¶ 111. Petitioner also notes that Stütz teaches a plurality of compartments that are in flow communication with each other. *See* Pet. 39–40 (citing Ex. 1009, 3:20–23, 3:28–43, Fig. 1; Ex. 1003 ¶ 112). We agree with Petitioner, and find that HÅland and Stütz each teaches or suggests compartments in flow communication, as claimed.

Regarding independent claims 26 and 36–39, Petitioner refers back to the arguments and evidence presented with respect to claim 1. *See* Pet. 42–51. Claim 26 recites method steps that generally correspond to the elements of claim 1, but does not include the claimed cover. *See id.* at 42–43; Ex. 1003 ¶¶ 124–127. As discussed in detail with respect to claim 1, we find that the combination of HÅland and Stütz teaches or suggests all the limitations of claim 26.

Claim 36 further recites that the airbag is "arranged to deploy downward into the passenger compartment and the conduit is arranged at or adjacent to a top edge of the single airbag." Claim 37 recites a similar additional feature. Petitioner points to Figure 6 of HÅland, which shows the airbag (inflatable element 49) arranged to deploy downward, as claimed, and the conduit also arranged adjacent to a top edge of the airbag. *See* Pet. 45 (citing Ex. 1008, 5:63–6:19). Petitioner's annotated version of Figure 6 is reproduced below:

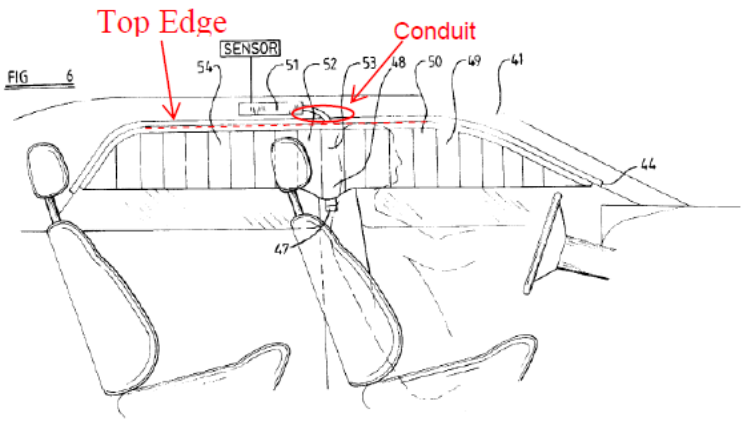


Figure 6 of HÅland, above, illustrates a side view of the interior of a motor vehicle, including an airbag, and is annotated to highlight the top edge of the airbag and the conduit. *Id.*; *see* Ex. 1003 ¶¶ 130–134. We agree with Petitioner, and find that HÅland teaches or suggests an airbag arranged to deploy downward and the conduit arranged adjacent to a top edge of the airbag, as claimed. As discussed in detail with respect to claim 1, we find that the combination of HÅland and Stütz teaches or suggests all the remaining limitations of claims 36 and 37.

Claim 38 further recites that "the gas from the single gas-providing system passes through one of the plurality of compartments to another one of the plurality of compartments for inflating the single airbag." Petitioner points to HÅland's disclosure that "gas is initially supplied to the cells 52, 53" and "[t]he rest of the cells 54 of the inflatable element are then inflated" as teaching this claim feature. Pet. 48 (citing Ex. 1008, 6:12–23, Fig. 6); *see* Ex. 1003 ¶¶ 135–138. We agree with Petitioner, and find that HÅland teaches or suggests the gas passing through one compartment to another, as claimed. As discussed in detail with respect to claim 1, we find that the combination of HÅland and Stütz teaches or suggests all the remaining limitations of claim 38.

Claim 39 further recites that "the single airbag has a single inflating portion and no other inflating portion, wherein the single inflating portion consists of the plurality of compartments." Petitioner provides an annotated version of Figure 6 of HÅland (Pet. 50), reproduced below.

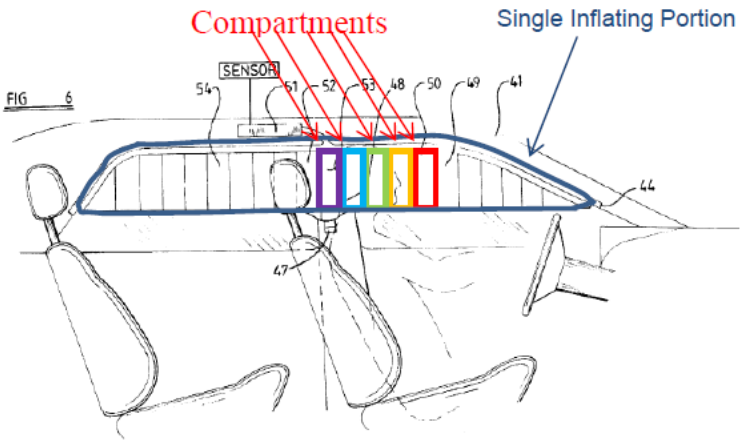


Figure 6 of HÅland, above, illustrates a side view of the interior of a motor vehicle, including an airbag, and is annotated to highlight the "single inflating portion" and the plurality of compartments. *See id.* (citing Ex. 1008, 4:16–22, 6:2–7, Fig. 6); Ex. 1003 ¶¶ 139–144. We agree with Petitioner, and find that HÅland teaches or suggests the single inflating portion, as claimed. As discussed in detail with respect to claim 1, we find that the combination of HÅland and Stütz teaches or suggests all the remaining limitations of claim 39.

Further, regarding dependent claims 10, 17–20, 27, and 40, Petitioner provides arguments and evidence as to how each claim limitation is taught or suggested by the cited combination of HÅland and Stütz, and relies upon Dr. Rouhana's testimony. *See* Pet. 40–42, 44, 51 (citing Ex. 1008, 4:16–22, 6:2–7, Figs. 1, 2, 6; Ex. 1003 ¶¶ 117, 119, 123); Ex. 1003 ¶¶ 114–123, 128–129, 145–146. We agree with Petitioner and find that the combination of

HÅland and Stütz teaches or suggests all the limitations of dependent claims 10, 17–20, 27, and 40.

Patent Owner does not address this asserted ground substantively. We are persuaded that Petitioner has shown that the combination of HÅland and Stütz teaches or suggests all of the limitations of claims 1, 10, 17–20, 26, 27, and 36–40, and has articulated sufficient reasoning why it would have been obvious to combine these references in the proposed manner. Thus, we are persuaded that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of HÅland and Stütz renders obvious claims 1, 10, 17–20, 26, 27, and 36–40.

4. Claims 2 and 3: Obviousness in view of HÅland, Stütz, and Faigle

Claim 2 depends from claim 1, and further recites a "nozzle or flow restrictor" that "affect[s] the flow rate of the gas into the single airbag as a function of temperature." Claim 3 depends from claim 2, and further recites that "nozzle or the flow restrictor has an opening that changes in size as a function of temperature." Petitioner relies on Faigle as disclosing these additional claim limitations. Pet. 52–54.

In relevant part, Faigle teaches a "valve . . . located outside the container [(i.e., the source of inflation fluid)] in an inflation fluid flow path extending from the container to the protection device" (i.e., the airbag). Ex. 1010, 1:45–51. Petitioner provides an annotated version of Figure 3 of Faigle (Pet. 53), reproduced below.

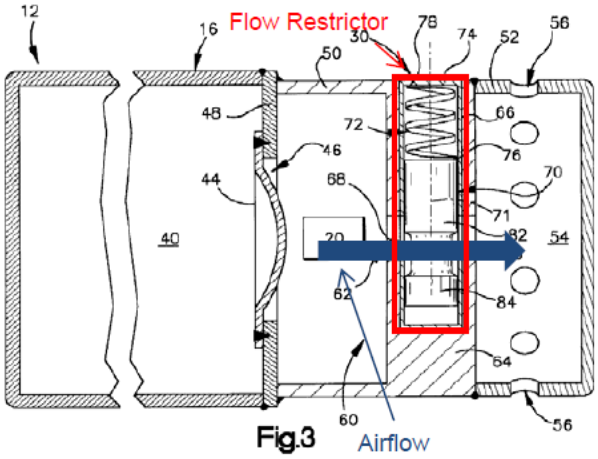


Fig.3

Figure 3 shows a side view of a portion of the vehicle occupant protection apparatus of Faigle, including valve 30 between inflation fluid container 16 and airbag 14 (*see* Fig. 1). Ex. 1010, 2:21–22, 3:45–48. Openings 56 direct inflation fluid from inflator 12 toward airbag 14. *Id.* at 3:48–52. As described in Faigle:

> When the thermostatic metal element 72 contracts in response to a decrease in the ambient temperature, it moves the spool 70 axially upward, as viewed in FIG. 3. This increases the extent to which the groove 80 is in alignment with the passage 68, and simultaneously decreases the extent to which the land 82 constricts the passage 68. The outlet flow area is increased accordingly. When the thermostatic metal element 72 expands in response to an increase in the ambient temperature, it moves the spool 70 axially downward to decrease the extent to which the groove 80 is aligned with the passage 68. Simultaneously, the extent to which the land 82 constricts the passage 68 increases. The outlet flow area is decreased accordingly.

Id. at 4:28–40; *see id.* at 3:53–4:52. Thus, according to Petitioner, Faigle teaches a flow restrictor affecting the flow rate of the gas as a function of temperature, by way of an opening that changes sizes as a function of temperature. Pet. 53–54 (citing Ex. 1003 ¶¶ 152–153).

Further, according to Petitioner, advantages of different types of flow restrictors were "very well known," and include "the ability to control the inflation rate of the airbag to reduce potential injury to vehicle occupants." *Id.* at 54 (citing Ex. 1003 ¶ 157). Petitioner asserts that a person of ordinary skill in the art would have been motivated to "consider additional solutions" for controlling the inflation rate of the airbag, and, thus, would have used the flow restrictor of Faigle in the airbag system of HÅland and Stütz, in order to provide additional safety to vehicle occupants. *Id.* (citing Ex. 1003 ¶¶ 157–158).

Patent Owner does not address this asserted ground substantively. We agree with Petitioner, and find that Faigle teaches or suggests nozzle or flow restrictor, as recited in claims 2 and 3, and that a person of ordinary skill in the art would have used the flow restrictor of Faigle in the airbag system of HÅland and Stütz, in order to provide additional safety to vehicle occupants. Thus, we are persuaded that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of HÅland, Stütz, and Faigle renders obvious claims 2 and 3.

5. Claims 5 and 7: Obviousness in view of HÅland, Stütz, and Kaji

Claims 5 and 7 depend from claim 1, and further recite "wherein the single airbag comprises at least two material layers with an outermost one of said at least two layers being made from film" and "wherein the single airbag comprises at least one layer of film," respectively. Petitioner relies on Kaji as disclosing these additional claim limitations. Pet. 59–60.

Kaji discloses, in relevant part, forming an airbag of a "cloth laminated by a plastic film." Ex. 1012, 2:47–53. According to Petitioner, while HÅland and Stütz do not explicitly describe manufacturing an airbag

with a film layer, HÅland notes that airbag weight should be kept as low as possible. *See* Pet. 60 (citing Ex. 1008, 4:16–34). Petitioner, relying on testimony from Dr. Rouhana, asserts that a person of ordinary skill in the art "would have understood that a thin cloth laminated by a plastic film [as in Kaji] would achieve a lightweight airbag." *Id.* (citing Ex. 1003 ¶ 176). Thus, according to Petitioner, using a cloth laminated by a plastic film, as disclosed in Kaji, in the airbag system of HÅland and Stütz is merely a "combination . . . of familiar elements according to known methods to yield predictable results." *Id.*; Ex. 1003 ¶ 176.

Patent Owner does not address this asserted ground substantively. We agree with Petitioner, and find that Kaji teaches or suggests an airbag with a film layer, as recited in claims 5 and 7, and that a person of ordinary skill in the art would have used the airbag material of Kaji in the airbag system of HÅland and Stütz, in order to provide a lightweight airbag, which HÅland expressly indicates is desirable. Thus, we are persuaded that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of HÅland, Stütz, and Kaji renders obvious claims 5 and 7.

6. Claim 9: Obviousness in view of HÅland, Stütz, and Steffens

Claim 9 depends from claim 1, and further recites that "the single gas-providing system is a hybrid gas inflation system." Petitioner relies on Steffens as disclosing this additional claim limitation. Pet. 60.

Steffens discloses, in relevant part, an inflator used in an airbag system. Ex. 1013, 4:16–17. The inflator "contains a source of inflation fluid, preferably inert gas, such as a pyrotechnic gas generating material or a quantity of stored gas or a combination of stored gas and gas generating material." *Id.* at 4:24–27. According to Petitioner, while HÅland and Stütz

do not explicitly disclose a hybrid gas inflation system, "the hybrid gas inflator described in Steffens was one of the three common types of inflators." Pet. 60 (citing Ex. 1003 ¶ 180). Petitioner, relying on testimony from Dr. Rouhana, asserts that it would have been a "simple substitution of one known element for another" to use the hybrid gas inflator described in Steffens in the airbag system of HÅland and Stütz. *Id.*; Ex. 1003 ¶ 180.

Patent Owner does not address this asserted ground substantively. We agree with Petitioner, and find that Steffens teaches a hybrid gas inflation system, as recited in claim 9, and that person of ordinary skill in the art would have used the hybrid gas inflator of Steffens in the airbag system of HÅland and Stütz, because it would have been a simple substitution of one known element for another (i.e., to use one of the three common types of inflators). Thus, we are persuaded that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of HÅland, Stütz, and Steffens renders obvious claim 9.

7. Claims 11, 28–32, and 41: Obviousness in view of HÅland, Stütz, and Davis

Claim 11 depends from claim 1, and further recites that "the conduit is configured to vary as a function of pressure for providing variable amounts of gas to the single airbag as a function of pressure, wherein a first amount of gas is provided to the single airbag at a first pressure and a second amount of gas is provided to the single airbag at a second pressure different than the first pressure." Claim 28 depends from claim 26 and recites a similar feature.

Independent claim 41 recites features similar to claim 1, and further recites that "the conduit is configured to vary as a function of temperature

for providing variable amounts of gas to the single airbag as a function of temperature, wherein a first amount of gas is provided to the single airbag at a first temperature and a second amount of gas is provided to the single airbag at a second temperature different than the first temperature." Independent claim 29 is a method claim, similar to claim 26, and recites a similar additional limitation as claim 41.

Petitioner refers back to its discussion regarding claim 1 for the corresponding limitations of independent claims 29 and 41, and further relies on Davis as teaching the additional limitations of these claims and of claims 11 and 28, as noted above. Pet. 61–66. Davis teaches, in relevant part, an airbag inflator including several sets of orifices, of varying sizes, through which an airbag inflating gas is directed to an airbag. Ex. 1014, 6:20–48. Prior to activation of the inflator, all of the orifices are blocked by a layer of rupturable foil. *Id.* at 6:48–53. Once the inflator is activated, a first set of orifices is unblocked/opened. *Id.* at 6:53–60. When the temperature and pressure increase to certain levels, a second set of orifices is opened, and when the temperature and pressure increase further, a third set of orifices is opened. *Id.* at 6:60–7:1.

According to Petitioner, Davis, thus, teaches varying the conduit of an airbag inflator to provide variable amounts of gas as a function of pressure and temperature. *See* Pet. 61, 63; Ex. 1003 ¶¶ 184, 189. Petitioner notes that the '093 patent recognizes that "it is a known property or characteristic of propellants . . . that their burn rate is dependent on the surrounding pressure." Pet. 65 (quoting Ex. 1001, 59:36–39). Dr. Rouhana testifies that burn rate affects inflation rate. Ex. 1003 ¶ 201; *see* Pet. 65. According to Petitioner, one of ordinary skill in the art would have been motivated to use

the teachings of Davis (i.e., varying the conduit of an airbag inflator to provide variable amounts of gas as a function of pressure and temperature) in the airbag system of HÅland and Stütz to control the inflation rate thereof in order "to reduce the risk of injuries to the vehicle occupants when the airbag inflates and [to] comply with mandated safety testing." Pet. 66 (citing Ex. 1003 ¶ 201).

Further, regarding claims 30–32, which depend from claim 29, Petitioner provides arguments and evidence as to how each claim limitation is taught or suggested by the cited combination of HÅland, Stütz, and Davis, and relies upon Dr. Rouhana's testimony. *See id.* at 63–64 (citing Ex. 1014, 6:51–7:5); Ex. 1003 ¶¶ 190–198.

Patent Owner does not address this asserted ground substantively. We agree with Petitioner, and find that Davis teaches or suggests providing variable amounts of gas as a function of pressure and as a function of temperature, as recited in claims 11, 28, 29, and 41, and that a person of ordinary skill in the art would have used this teaching of Davis in the airbag system of HÅland and Stütz, in order to control the inflation rate to reduce the risk of injuries and to comply with mandated safety testing. As discussed in detail with respect to claim 1, we find that the combination of HÅland and Stütz teaches or suggests all the remaining limitations of claims 29 and 41. We also agree with Petitioner and find that the combination of HÅland, Stütz, and Davis teaches or suggests all the limitations of dependent claims 30–32. Thus, we are persuaded that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of HÅland, Stütz, and Davis renders obvious claims 11, 28–32, and 41.

8. Claim 16: Obviousness in view of HÅland, Stütz, and Swann

Claim 16 depends from claim 1, and further recites that "the one inflator is configured to provide a first propellant formulation and a second propellant formulation, wherein the first propellant formulation is a faster burning propellant than the second propellant formulation." Petitioner relies on Swann as disclosing this additional claim limitation. Pet. 66 (citing Ex. 1016, at [57], 1:47–2:2, 2:18–29).

Swann discloses, in relevant part, an ignitable material for generating gas for inflating an airbag. Ex. 1016, at [57]. The ignitable material described in Swann includes "at least two layers of ignitable gas generating material which are pressed together." *Id.* at 1:49–50. "One of the layers comprises a nitrogen generating composition which is easily ignited and burns rapidly. The other of the layers comprises a nitrogen generating composition which is less easily ignited and burns less rapidly than the one layer." *Id.* at 1:50–54.

Petitioner, relying on testimony from Dr. Rouhana, asserts that "[s]uch dual propellant inflators were well known in the art" and are a known way "to control airbag inflation rate, which is desirable to reduce the risk of injuries to vehicle occupants." Pet. 66 (citing Ex. 1003 ¶ 205). Petitioner further asserts that using the dual propellant inflator described in Swann in the airbag system of HÅland and Stütz "would do no more than yield predictable results." *Id.* (citing Ex. 1003 ¶ 205).

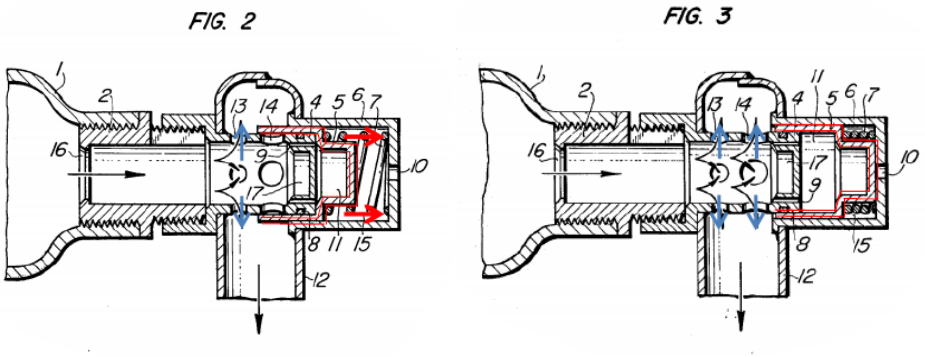
Patent Owner does not address this asserted ground substantively. We agree with Petitioner, and find that Swann teaches or suggests the respective propellant formulations, as recited in claim 16, and that a person of ordinary skill in the art would have used this dual propellant inflator of Swann in the

airbag system of HÅland and Stütz, in order to control inflation rate and reduce risk of injury. Thus, we are persuaded that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of HÅland, Stütz, and Swann renders obvious claim 16.

9. Claims 22, 24, and 25: Obviousness in view of HÅland, Stütz, and Suzuki

Independent claim 22 recites features similar to claim 1, and further recites "a nozzle or flow restrictor between the single gas-providing system and an interior of the single airbag, said nozzle or flow restrictor affecting the flow rate of the gas into the single airbag as a function of pressure." Petitioner refers back to its discussion regarding claim 1 for the corresponding limitations of independent claim 22, and further relies on Suzuki as teaching the additional claim limitation noted above. Pet. 67–70.

Suzuki teaches, in relevant part, a nozzle for use in an airbag system. Ex. 1017, at [57]. High-pressure gas is discharged from a container into an inflatable safety bag through a nozzle and conduit. *Id.* at 2:41–44. As the gas flows through the nozzle, the pressure of the gas forces the nozzle to open further. *See id.* at 3:34–61. Petitioner's annotated versions of Figures 2 and 3 of Suzuki (Pet. 69) are reproduced below.



Figures 2 and 3 are partial cross-sectional views of a nozzle portion of the airbag system of Suzuki, as annotated by Petitioner. Ex. 1017, at [57], 2:15–19. As highlighted by Petitioner's annotations, increased pressure from the high pressure gas (indicated by a black arrow in the figures) forces spool 5 to retract (shown in red), thereby opening nozzle holes 14 and increasing gas flow through nozzle 4 (shown by blue arrows in the figures). *See id.* at 3:34–61. Thus, according to Petitioner, Suzuki's flow restrictor limits the inflation rate of the airbag as a function of pressure.[24] Pet. 70–71 (citing Ex. 1003 ¶ 216).

Petitioner asserts that one of skill in the art "would have wanted to control the inflation rate of the airbag to protect the vehicle occupants." *Id.*; Ex. 1003 ¶ 216. Thus, according to Petitioner, a person of ordinary skill in the art "would have been motivated to combine . . . Suzuki's flow restrictor with the side curtain airbag of HÅland and Stütz to protect the vehicle's occupants." Pet. 71 (citing Ex. 1003 ¶ 216).

Further, regarding claims 24 and 25, which depend from claim 22, Petitioner provides arguments and evidence as to how each claim limitation is taught or suggested by the cited combination of HÅland, Stütz, and Suzuki, and relies upon Dr. Rouhana's testimony. *See id.* at 70 (citing Ex. 1017, 3:47–51); Ex. 1003 ¶¶ 210–215.

Patent Owner does not address this asserted ground substantively. We agree with Petitioner, and find that Suzuki teaches or suggests a flow

[24] Petitioner references "temperature" rather than "pressure" in its discussion of Suzuki when discussing "motivation to combine." *See* Pet. 70. However, based on the language of the claim, Suzuki's disclosure, and Dr. Rouhana's testimony (Ex. 1003 ¶ 216), we understand this to be a clerical error, and treat it as such.

restrictor, as recited in claim 22, and that a person of ordinary skill in the art would have used the flow restrictor of Suzuki in the airbag system of HÅland and Stütz, in order to control the inflation rate to reduce the risk of injuries. As discussed in detail with respect to claim 1, we find that the combination of HÅland and Stütz teaches or suggests all the remaining limitations of claim 22. We also agree with Petitioner and find that the combination of HÅland, Stütz, and Suzuki teaches or suggests all the limitations of dependent claims 24 and 25. Thus, we are persuaded that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of HÅland, Stütz, and Suzuki renders obvious claims 22, 24, and 25.

10. Claim 23: Obviousness in view of HÅland, Stütz, Suzuki, and Marlow

Claim 23 depends from claim 22, and further recites that "the single airbag is configured to be inflated by the single gas-providing system and air from a cabin of the vehicle." Petitioner relies on Marlow as disclosing this additional claim limitation. Pet. 71–72.

Marlow teaches, in relevant, part, that "[t]he hot gas from the propellant charge can be the sole source of inflating the confinement, *can be used with ambient air*, or, in accordance with the preferred embodiment, used to augment a stored fluid." Ex. 1015, 1:33–37 (emphasis added). Petitioner, relying on testimony from Dr. Rouhana, asserts that "Marlow's inflator . . . could easily be adapted for use within the vehicle compartment to use cabin air." Pet. 71 (citing Ex. 1003 ¶¶ 219–220). Petitioner further asserts that one of skill in the art would have combined the teachings of HÅland, Stütz, Suzuki, and Marlow, and the combination would be one "of

familiar elements according to known methods that does no more than yield predictable results." *Id.* at 71–72 (citing Ex. 1003 ¶ 220).

Patent Owner does not address this asserted ground substantively. We agree with Petitioner, and find that Marlow teaches or suggests an inflator that uses ambient air (i.e., air from a cabin of the vehicle), as recited in claim 23, and that a person of ordinary skill in the art would have used the inflator of Marlow with the airbag system of HÅland, Stütz, and Suzuki, because it would have involved merely the use of familiar elements according to known methods. *See KSR*, 550 U.S. at 416 ("The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results."). Thus, we are persuaded that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of HÅland, Stütz, Suzuki, and Marlow renders obvious claim 23.

11. Claim 21: Obviousness in view of HÅland, Stütz, and Enders

Claim 21 depends from claim 1, and further recites that "the single airbag is deployed from a B-Pillar of the vehicle." Petitioner relies on Enders as disclosing this additional claim limitation. Pet. 81–82.

Enders discloses, in relevant part, a "side airbag module suitable for protecting both front and rear seat occupants of a vehicle with a single airbag," where the airbag is mounted within the B-pillar. *See* Ex. 1019, 1:7–9, 4:46–54, 4:63–65, Fig. 3; Pet. 81. Petitioner, relying on testimony from Dr. Rouhana, asserts that "[b]y deploying from the B-pillar, Enders provides additional protection for the chest and abdomen of the vehicle occupant when compared to a downward deployment from the roof rail without the need for an extremely large airbag." Pet. 81–82 (citing Ex. 1003 ¶ 252); *see*

also Ex. 1019, 1:24–31 (discussing advantages of mounting the airbag within the B-pillar). Thus, according to Petitioner, a person of ordinary skill in the art would have mounted the side airbag of HÅland within the B-pillar, as taught by Enders, in order to provide this additional protection. Pet. 82 (citing Ex. 1003 ¶ 252).

Patent Owner does not address this asserted ground substantively. We agree with Petitioner, and find that Enders teaches or suggests mounting an airbag within the B-pillar, such that it would deployed from the B-Pillar as recited in claim 21, and that a person of ordinary skill in the art would have mounted the airbag system of HÅland and Stütz within the B-pillar, in order to provide additional passenger protection. Thus, we are persuaded that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of HÅland, Stütz, and Enders renders obvious claim 21.

F. Asserted Obviousness in View of HÅland and Daniel

Petitioner asserts that claims 1, 4, 6, 8, 10, 17–20, 26, 27, and 36–40 are unpatentable under 35 U.S.C. § 103(a) as obvious in view HÅland and Daniel. Pet. 55–59. Aside from its argument that certain references are not available as prior art, which we have addressed above, Patent Owner does not address Petitioner's asserted grounds substantively. For the reasons explained below, we determine that Petitioner has demonstrated, by a preponderance of the evidence, that claims 1, 4, 6, 8, 10, 17–20, 26, 27, and 36–40 would have been obvious.

1. Summary of Daniel

Daniel relates to a roof rail mounted airbag assembly. Ex. 1011, at [54]. Figures 2 and 3 of Daniel are reproduced below.

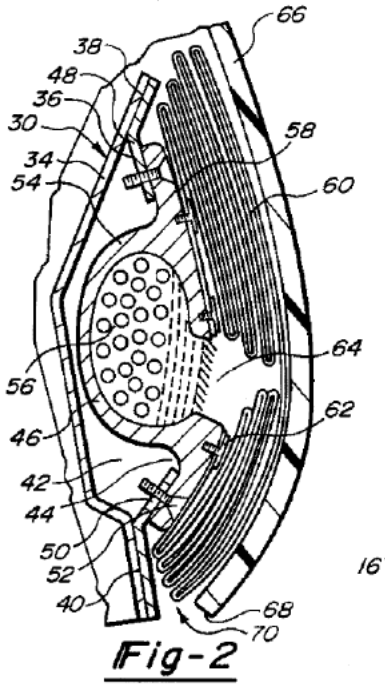


Fig-2

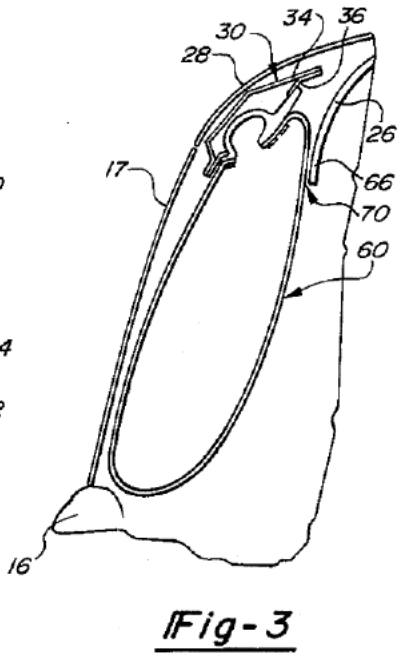


Fig-3

Figure 2 is a cross-sectional view of the airbag of Daniel, and Figure 3 is a diagrammatic cross-sectional view of the airbag of Daniel in a deployed position. *Id.* at 1:63–67. As seen in Figure 2, airbag 60 is stored "folded concentrically about a discharge passage 64 from the inflator housing 46. Laterally inwardly of the airbag 60, a trim cover 66 is fixedly secured in a known manner." *Id.* at 2:47–49. "The inflator housing 46 includes a propellant boss 54 housing stored gas or a gas generant as indicated diagrammatically at 56." *Id.* at 2:36–38. When the airbag is deployed, "gases are generated or stored gases [are] released through the discharge passage 64 into the airbag 60 to expand the airbag 60 from the stored condition shown in FIG. 2 to its inflated condition as shown in FIG. 3." *Id.* at 2:55–59.

2. Claims 1, 10, 17–20, 26, 27, and 36–40

Regarding claims 1, 10, 17–20, 26, 27, and 36–40, Petitioner refers back to its prior discussion regarding how HÅland discloses each of the limitations of these claims, with the exception of the claimed cover. Pet. 55–56; Ex. 1003 ¶¶ 159–160. Petitioner points to trim cover 66, shown in Figures 2 and 3 of Daniel, as teaching the claimed cover. Pet. 55 (citing Ex. 1011, Figs. 2, 3); Ex. 1003 ¶ 159. Petitioner asserts that "[c]overs were well known features of airbag systems," and "[t]he advantages of having an airbag cover were well known." Pet. 56 (citing Ex. 1003 ¶¶ 147, 159–160). According to Petitioner, a person of ordinary skill in the art "would have known to use a cover . . . because it was a combination of familiar elements according to known methods to yield predictable results." *Id.* at 59 (citing Ex. 1003 ¶ 170). Petitioner asserts that Daniel also teaches the use of a single inflator, which as discussed above, we find is also taught or suggested in HÅland. *See id.* at 56 (citing Ex. 1011, 2:55–67; Ex. 1003 ¶¶ 148, 160 (noting the advantages of directed gas from a single inflator were well known)).

Patent Owner does not address this asserted ground substantively. We agree with Petitioner, and find that Daniel teaches or suggests a cover, as claimed, and that a person of ordinary skill in the art would have added Daniel's cover to the airbag system of HÅland, in view of the well-known advantages of a cover, including protecting the airbag and providing a deployment path. As discussed in detail above, we find that HÅland teaches or suggests all remaining limitations of 1, 10, 17–20, 26, 27, and 36–40. We also agree with Petitioner, and find that Daniel teaches or suggests using a single inflator. Thus, we are persuaded that Petitioner has demonstrated, by

a preponderance of the evidence, that the combination of HÅland and Daniel renders obvious claims 1, 10, 17–20, 26, 27, and 36–40.

3. Claims 4, 6, and 8

Regarding dependent claims 4, 6, and 8, Petitioner provides arguments and evidence as to how each claim limitation is taught or suggested by the cited combination of HÅland and Daniel. *See* Pet. 56–58 (citing Ex. 1011, 2:36–38, 2:47–50, Figs. 2, 3); Ex. 1003 ¶¶ 162–167. In particular, regarding claims 6 and 8, which recite "stored gas," Petitioner notes that "[a] stored gas system is one of the three common inflation systems," and that a person of ordinary skill in the art "would have known to use . . . a stored gas system," such as the one disclosed in Daniel in the airbag system of HÅland "because it was a combination of familiar elements according to known methods to yield predictable results." Pet. 59 (citing Ex. 1003 ¶¶ 169–170).

We agree with Petitioner, and find that Daniel teaches or suggests the additional features regarding the cover, as recited in claim 4, and that a person of ordinary skill in the art would have used the cover of Daniel in the airbag system of HÅland, as discussed above with respect to claim 1. We also find that Daniel teaches or suggests using stored gas, as recited in claims 6 and 8, and that a person of ordinary skill in the art would have used the stored gas system of Daniel in the airbag system of HÅland, because it would have been a combination of known elements (i.e., to use one of the three common inflation systems). *See KSR*, 550 U.S. at 416 ("The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results."). Thus, we are persuaded that Petitioner has demonstrated, by a preponderance of the

evidence, that the combination of HÅland and Daniel renders obvious claims 4, 6, and 8.

G. Asserted Obviousness in View of HÅland and Tanase

Petitioner asserts that claims 1, 10, 12–15, 17–20, 26, 27, 33, and 36–40 are unpatentable under 35 U.S.C. § 103(a) as obvious in view HÅland and Tanase. Pet. 72–80. Petitioner further asserts that claims 34 and 35 are unpatentable under 35 U.S.C. § 103(a) as obvious in view HÅland, Tanase, and Kaji. *Id.* at 80. Aside from its argument that certain references are not available as prior art, which we have addressed above, Patent Owner does not address Petitioner's asserted grounds substantively. For the reasons explained below, we determine that Petitioner has demonstrated, by a preponderance of the evidence, that claims 1, 10, 12–15, 17–20, 26, 27, and 33–40 would have been obvious.

1. Summary of Tanase

Tanase relates to a "head protecting airbag device." Ex. 1018, at [57]. Figures 1 and 3 of Tanase are reproduced below.

Fig. 1

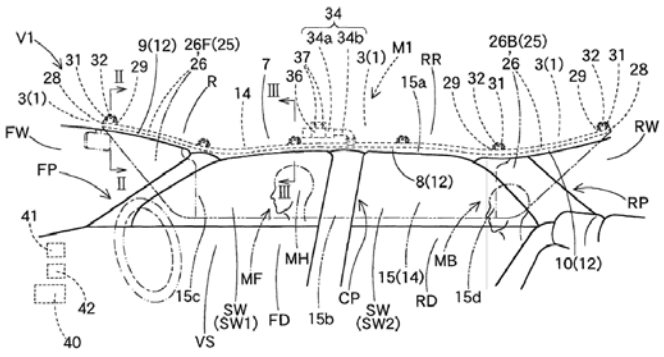


Fig. 3

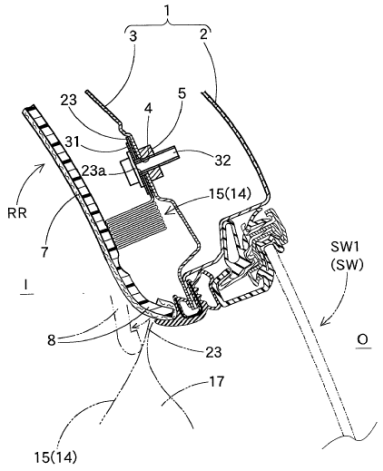


Figure 1 is a view of a head protecting device according to an embodiment of Tanase. *Id.* ¶ 44. Figure 3 is an enlarged schematic sectional view taken along arrows III-III of Figure 1. *Id.* ¶ 46. Airbag device M1 includes airbag 14 and inflator 34. *Id.* ¶ 56. Body portion 15 of airbag 14 is housed above the upper edges of side windows SW1, SW2 and is covered by portions 8, 9, 10, collectively forming cover 12, and with roof head lining 7. *Id.* ¶ 71.

2. Claims 1, 10, 12–15, 17–20, 26, 27, 33, and 36–40: Obviousness in view of HÅland and Tanase

Regarding claims 1, 10, 17–20, 26, 27, and 36–40, Petitioner refers back to its prior discussion regarding how HÅland discloses each of the limitations of these claims, with the exception of the claimed cover. Pet. 72; Ex. 1003 ¶ 221. Petitioner relies on Tanase as teaching the claimed cover, described above. Pet. 72 (citing Ex. 1018 ¶ 71); Ex. 1003 ¶ 221. Petitioner asserts that "[c]overs were well known features of airbag systems," and "[t]he advantages of having an airbag cover were well known." Pet. 72 (citing Ex. 1003 ¶¶ 147, 221). Dr. Rouhana testifies that a person of ordinary skill in the art "would have been motivated to combine the cover of Tanase with HÅland for the same reasons [he] would have been motivated to use Stütz's cover," namely "protecting the airbag and providing a deployment path." Ex. 1003 ¶ 242; *see* Pet. 51. Petitioner asserts that Tanase also teaches the use of a single inflator, which as discussed above, we find is also taught or suggested in HÅland, and notes that "[t]he advantages of directed gas from a single inflator were also well known." *See* Pet. 72 (citing Ex. 1018 ¶ 78; Ex. 1003 ¶ 221).

Claims 12–15 and 33 depend from claim 1 and recite generally that the airbag and/or the inflator of the airbag system are housed in the ceiling of a vehicle, or more specifically within the headliner of the vehicle. Petitioner relies on Tanase as teaching these claim limitations. *See id.* at 73–79 (citing Ex. 1018 ¶¶ 56, 67, 71, 72, 75, 76, Figs. 1, 3, 4; Ex. 1008, Fig. 6); Ex. 1003 ¶¶ 223–241. As described above, Tanase teaches the airbag and inflator being housed in the ceiling of a vehicle, and within the headliner thereof. Petitioner, relying on testimony from Dr. Rouhana, asserts that a person of ordinary skill in the art "would have been motivated to combine HÅland with Tanase to mount the airbag and inflator at the ceiling or roof of a vehicle to improve the safety of the vehicle." Pet. 80; Ex. 1003 ¶ 242.

Patent Owner does not address this asserted ground substantively. We agree with Petitioner, and find that Tanase teaches or suggests a cover, as claimed, and that a person of ordinary skill in the art would have added Tanase's cover to the airbag system of HÅland, in view of the well-known advantages of a cover, including protecting the airbag and providing a deployment path. We also agree with Petitioner, and find that Tanase teaches or suggests using a single inflator. As discussed in detail above, we find that HÅland teaches or suggests all remaining limitations of 1, 10, 17–20, 26, 27, and 36–40. We also agree with Petitioner, and find that Tanase teaches or suggests housing the airbag and/or the inflator of the airbag system in the ceiling of a vehicle, or more specifically within the headliner of the vehicle, as recited in claims 12–15 and 33, and that a person of ordinary skill in the art would have used this teaching of Tanase in the airbag system of HÅland, in order to improve the safety of the vehicle. Thus, we are persuaded that Petitioner has demonstrated, by a

preponderance of the evidence, that the combination of HÅland and Tanase renders obvious claims 1, 10, 12–15, 17–20, 26, 27, 33, and 36–40.

3. Claims 34 and 35: Obviousness in view of HÅland, Tanase, and Kaji

Claim 34 depends from claim 33, and further recites that "the single airbag comprises at least one layer of film." Claim 35 depends from claim 34, and further recites that "said at least one layer of film comprises an outermost layer of the single airbag." Petitioner relies on Kaji as disclosing these additional claim limitations. Pet. 80; Ex. 1003 ¶¶ 244–247. Kaji discloses, in relevant part, forming an airbag of a "cloth laminated by a plastic film." Ex. 1012, 2:47–53. Petitioner refers back to its earlier discussion of Kaji, and asserts that a person of ordinary skill in the art "would have been motivated to combine HÅland and Tanase with Kaji to achieve a lightweight airbag." Pet. 80 (citing Ex. 1003 ¶ 248).

Patent Owner does not address this asserted ground substantively. We agree with Petitioner, and find that Kaji teaches or suggests an airbag with a film layer, as recited in claims 34 and 35, and that a person of ordinary skill in the art would have used the airbag material of Kaji in the airbag system of HÅland and Tanase, in order to provide a lightweight airbag, which HÅland expressly indicates is desirable. Thus, we are persuaded that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of HÅland, Tanase, and Kaji renders obvious claims 34 and 35.

H. Asserted Obviousness in View of HÅland Alone

Petitioner asserts that claims 42–44 are unpatentable under 35 U.S.C. § 103(a) as obvious in view HÅland. Pet. 82–85. Petitioner refers back to its previous discussion of HÅland's disclosure with respect to claims 1 and

38 for the corresponding limitations of independent claim 42. *Id.* at 82–83. Petitioner refers back to its previous discussion of HÅland's disclosure with respect to claims 1, 2, and 39 for the corresponding limitations of independent claim 43. *Id.* at 83–84. Petitioner refers back to its previous discussion of HÅland's disclosure with respect to claim 38 for the corresponding limitation of claim 44. *Id.* at 84–85. For the same reasons discussed above with respect to claims 1, 2, 38, and 39, we are persuaded that Petitioner has demonstrated, by a preponderance of the evidence, that the combination of HÅland teaches or suggest all the limitations of claims 42–44, and thus renders obvious these claims.

III. CONCLUSION

For the foregoing reasons, we determine that Petitioner has demonstrated, by a preponderance of the evidence, that claims 1–44 are unpatentable based on the following grounds:

claims 1, 10, 17–20, 26, 27, and 36–40 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland and Stütz;

claims 2 and 3 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland, Stütz, and Faigle;

claims 5 and 7 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland, Stütz, and Kaji;

claim 9 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland, Stütz, and Steffens;

claims 11, 28–32, and 41 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland, Stütz, and Davis;

claim 16 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland, Stütz, and Swann;

claims 22, 24, and 25 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland, Stütz, and Suzuki;

claim 23 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland, Stütz, Suzuki, and Marlow;

claim 21 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland, Stütz, and Enders;

claims 1, 4, 6, 8, 10, 17–20, 26, 27, and 36–40 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland and Daniel;

claims 1, 10, 12–15, 17–20, 26, 27, 33, and 36–40 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland and Tanase;

claims 34 and 35 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland, Tanase, and Kaji; and

claims 42–44 would have been obvious under 35 U.S.C. § 103(a) in view of HÅland.

IV. ORDER

Accordingly, it is

ORDERED, based on a preponderance of the evidence, that claims 1–44 of U.S. Patent No. 9,043,093 B2 are *unpatentable*.

Because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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