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Paper No. 7
Entered: March 23, 2017

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*.

DECISION
Institution of *Inter Partes* Review
37 C.F.R. § 42.108

I. INTRODUCTION

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 relies on the Declaration of Stephen W. Rouhana, Ph.D. (Ex. 1003) to support its positions. American Vehicular Sciences, LLC ("Patent Owner") filed a Preliminary Response. Paper 6 ("Prelim. Resp."). Patent Owner submits a Declaration of Michael Nranian P.E. (Ex. 2008) in support of its positions.

We have authority to determine whether to institute *inter partes* review. *See* 35 U.S.C. § 314(b); 37 C.F.R. § 42.4(a). Upon consideration of the Petition and the Preliminary Response, and for the reasons explained below, we determine that the information presented shows a reasonable likelihood that Petitioner would prevail with respect to all of the challenged claims. *See* 35 U.S.C. § 314(a). Accordingly, we institute trial as to claims 1–44 of the '093 patent.

A. Related Proceedings

The parties indicate that the '093 patent is the subject of the following ongoing 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.*

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

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. Petitioner also challenges claims 1–44 of the '093 patent in IPR2016-01790.

B. 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 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.[2] *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 "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.

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

C. 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 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.

D. The Applied References and Evidence

Petitioner relies on the following references in the asserted grounds. Pet. 5–6.

Reference	Date	Exhibit No.
U.S. Patent No. 5,788,270 ("HÅland")	Aug. 4, 1998	Ex. 1008
U.S. Patent No. 5,957,487 ("Stütz")	Sept. 28, 1999	Ex. 1009
U.S. Patent No. 6,176,518 ("Faigle")	Jan. 23, 2001	Ex. 1010
U.S. Patent No. 5,540,459 ("Daniel")	July 30, 1996	Ex. 1011
U.S. Patent No. 5,222,761 ("Kaji")	June 29, 1993	Ex. 1012
U.S. Patent No. 5,524,924 ("Steffens")	June 11, 1996	Ex. 1013
U.S. Patent No. 5,269,561 ("Davis")	Dec. 14, 1993	Ex. 1014
U.S. Patent No. 3,966,225 ("Marlow")	June 29, 1976	Ex. 1015
U.S. Patent No. 5,507,890 ("Swann")	Apr. 16, 1996	Ex. 1016
U.S. Patent No. 4,021,058 ("Suzuki")	May 3, 1977	Ex. 1017
U.S. Appl. Pub. 2002/0180192 ("Tanase")	Dec. 5, 2002	Ex. 1018
U.S. Patent No. 5,845,935 ("Enders")	Dec. 8, 1998	Ex. 1019

E. The Asserted Grounds

Petitioner sets forth its challenges to claims 1–44 as follows. Pet. 7, 32–85.

References	Basis	Claims Challenged
HÅland and Stütz	§ 103	1, 10, 17–20, 26, 27, 36–40
HÅland, Stütz, and Faigle	§ 103	2, 3
HÅland and Daniel	§ 103	1, 4, 6, 8, 10, 17–20, 26, 27, 36–40
HÅland, Stütz, and Kaji	§ 103	5, 7
HÅland, Stütz, and Steffens	§ 103	9
HÅland, Stütz, and Davis	§ 103	11, 28–32, 41
HÅland, Stütz, and Swann	§ 103	16
HÅland, Stütz, and Suzuki	§ 103	22, 24, 25

References	Basis	Claims Challenged
HÅland, Stütz, Suzuki, and Marlow	§ 103	23
HÅland and Tanase	§ 103	1, 10, 12–15, 17–20, 26, 27, 33, 36–40
HÅland, Tanase, and Kaji	§ 103	34, 35
HÅland, Stütz, and Enders	§ 103	21
HÅland	§ 103	42–44

II. ANALYSIS

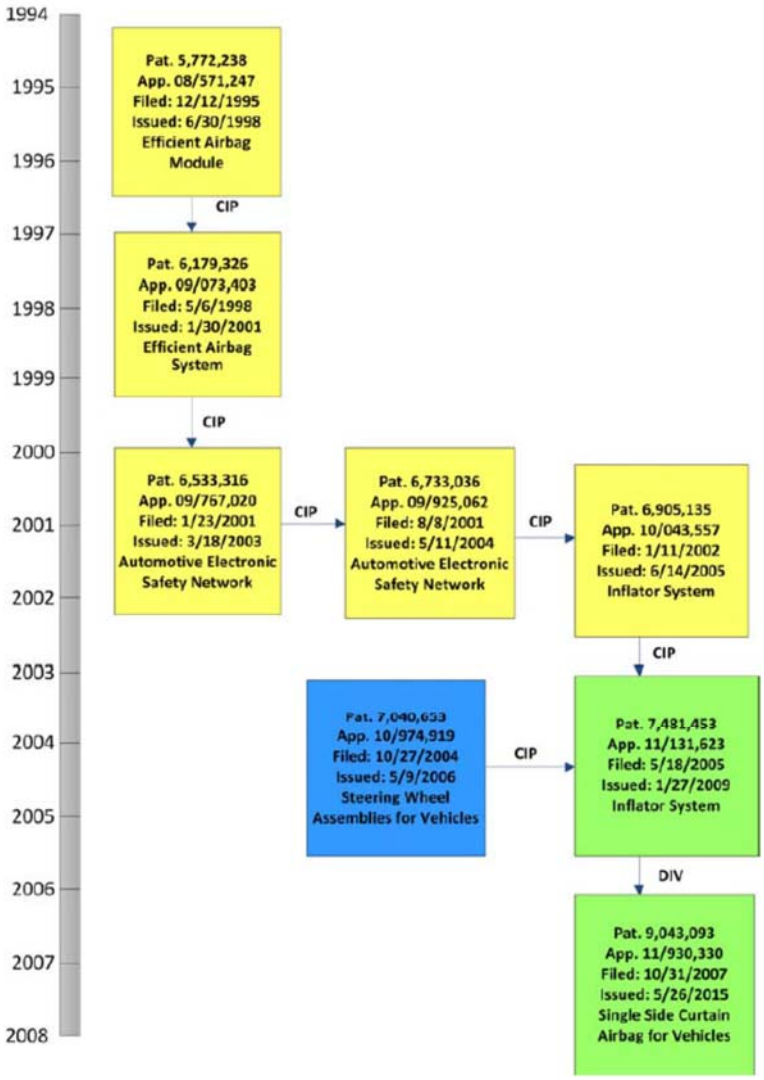
A. Effective Filing Date of the '093 Patent Claims and Status of Asserted References as Prior Art

Patent Owner argues that asserted references HÅland, Stütz, Faigle, Tanase, Daniel, Steffens, Swann, and Enders are not available as prior art to the claims of the '093 patent. Prelim. Resp. 18–25. 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.* at 25–46. 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. We note 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* Ex. 1011, at [22]; Ex. 1013, at [22]; Ex. 1016, at [22]. 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.[3] *See* Ex. 1010, at [22], [45]; Ex. 1018, at [22], [43].

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.

[3] Patent Owner has not, at this stage of the proceeding, addressed whether the claims of the '093 patent are entitled to the filing date of any of the intervening applications, but focuses its discussion solely on the disclosure of the '247 application.



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). "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.'" *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1331–32 (Fed. Cir. 2008) (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); *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.[4] Prelim. Resp. 26–43. Based on the record now before us, and for the reasons discussed below, we are persuaded for purposes of this decision that the '247 application does not provide sufficient

[4] Throughout its Preliminary Response, Patent Owner cites to the disclosure of U.S. Patent No. 5,772,238 ("the '238 patent"), which matured from the '247 application. For purposes of our analysis at this stage of the proceeding, we presume that the '238 patent and the '247 application contain the same disclosure. We note, however, that to show entitlement to priority to the earlier applications, Patent Owner must show written description support for the claims in *each* ***application*** in the chain leading back to the earliest application. *See Zenon Envt'l*, 506 F.3d at 1378.

written description support for at least the limitation "wherein the plurality of compartments are in flow communication with each other."[5]

Regarding this "flow communication" limitation, Patent Owner asserts, with supporting testimony from Mr. Nranian, that "a person of ordinary skill in the art would have understood in December of 1995 from reading the Specification of the '238 patent that the plurality of compartments of the airbag are in flow communication with each other." Prelim. Resp. 34 (citing Ex. 2008 ¶ 71). In support of this assertion, Patent Owner argues that the '238 patent "does not disclose that different compartments . . . are filled from different conduits from one or more inflators." *Id.* (citing Ex. 2008 ¶ 71). According to Patent Owner, "[a]lthough one compartment of an airbag may receive gas directly from an inflator, the compartments that are not directly connected to the inflator *must necessarily* receive gas from another compartment." *Id.* (citing Ex. 2008 ¶ 71) (emphasis added).

This argument, however, is not supported by the express disclosure of the '238 patent. For example, nowhere in the '238 patent is there an express disclosure of the compartments being in "flow communication." Further, 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

[5] For purposes of this Decision we do 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."

along, at least a significant portion of, the length of airbag 110. *See* Ex. 1004, 13:62–14:41, Fig. 2F; *see also id.* at 16:60–64 ("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."). Contrary to Patent Owner's assertion, the '238 patent does not disclose any compartments that receive are receiving gas indirectly from an inflator, via other compartments, but instead, the disclosure at least suggests, that tube 121 directs gas to the entire airbag 110 along the length thereof. We, thus, are not persuaded, based on the record now before us, that the '247 application provides written description support for "the plurality of compartments [being] in flow communication with each other." *See In re 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.").

Further, although Mr. Nranian testifies that "a person of ordinary skill in the art would have understood in December of 1995 from reading the Specification of the '238 patent that the plurality of compartments of the airbag are in flow communication with each other" (Prelim. Resp. 34 (citing Ex. 2008 ¶ 71)), Petitioner's declarant Dr. Rouhana testifies to the contrary that the '238 patent does not teach that a plurality of compartments are in flow communication with each other (*see, e.g.*, Ex. 1003 ¶ 69). *See* 37 C.F.R. § 108(c) ("The Board's decision will take into account a patent owner preliminary response where such a response is filed, including any testimonial evidence, but a genuine issue of material fact created by such testimonial evidence will be viewed in the light most favorable to the

petitioner solely for purposes of deciding whether to institute an *inter partes* review.").

Accordingly, for the reasons discussed above, we are persuaded based on the record now before us and for purposes of this Decision, that HÅland, Stütz, Faigle, Tanase, Daniel, Steffens, Swann, and Enders are each available as prior art to the claims of the '093 patent.

B. Claim Construction

Petitioner indicates that the '093 patent will expire during this proceeding. Pet. 21. Thus, according to Petitioner, the *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–1315 (Fed. Cir. 2005) (en banc) standard of claim construction should be applied to the claims in this proceeding. *Id.* (citing *In re CSB-System Int'l, Inc.*, 832 F.3d 1335, 1341 (Fed. Cir. 2016) (holding that the *Phillips* standard for claim construction should be used by the Board when a patent expires during a reexamination proceeding)). Patent Owner does not address the expiration of the patent, or the claim construction standard to be applied, but proposes construction for several terms under the broadest reasonable interpretation standard. *See* Prelim. Resp. 14–18; *see also* 37 C.F.R. § 42.100(b) (providing that claim terms in an unexpired patent are given their broadest reasonable interpretation in an *inter partes* review).

Petitioner asserts that "[a]ll 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"; (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." Prelim. Resp. 14–18. Upon review of the parties' contentions and supporting evidence, we determine no issue in this Decision requires express construction of any claim term. *See, e.g.*, *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011) ("[C]laim terms need only be construed '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)). Accordingly, for purposes of this Decision, we do not provide any express claim construction.

We direct the parties to expressly address the expiration of the '093 patent, and the claim construction standard to be applied, in the subsequent briefing in this proceeding.

C. Principles of Law

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

In that regard, an obviousness analysis "need not seek out precise teachings directed to the specific subject matter of the challenged claim, for

a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *KSR*, 550 U.S. at 418; *accord In re Translogic Tech., Inc.*, 504 F.3d 1249, 1259 (Fed. Cir. 2007). A prima facie case of obviousness is established when the prior art, itself, would appear to have suggested the claimed subject matter to a person of ordinary skill in the art. *See In re Rinehart*, 531 F.2d 1048, 1051 (CCPA 1976).

We analyze the asserted grounds of unpatentability in accordance with these principles.

D. 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 the Preliminary 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. 2008 ¶ 36.

For purposes of this Decision, and based on the parties' proposed definitions and the record now before us, we adopt the following 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. The level of ordinary skill in the art 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).

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.

Patent Owner argues that HÅland, Stütz, Faigle, Steffens, Swann, and Enders are not available as prior art (Prelim. Resp. 20–25), which we have

addressed above. We have reviewed the parties' contentions and supporting evidence. Given the evidence on this record, and for the reasons explained below, we determine that the information presented shows a reasonable likelihood that Petitioner would prevail on these asserted grounds.

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:

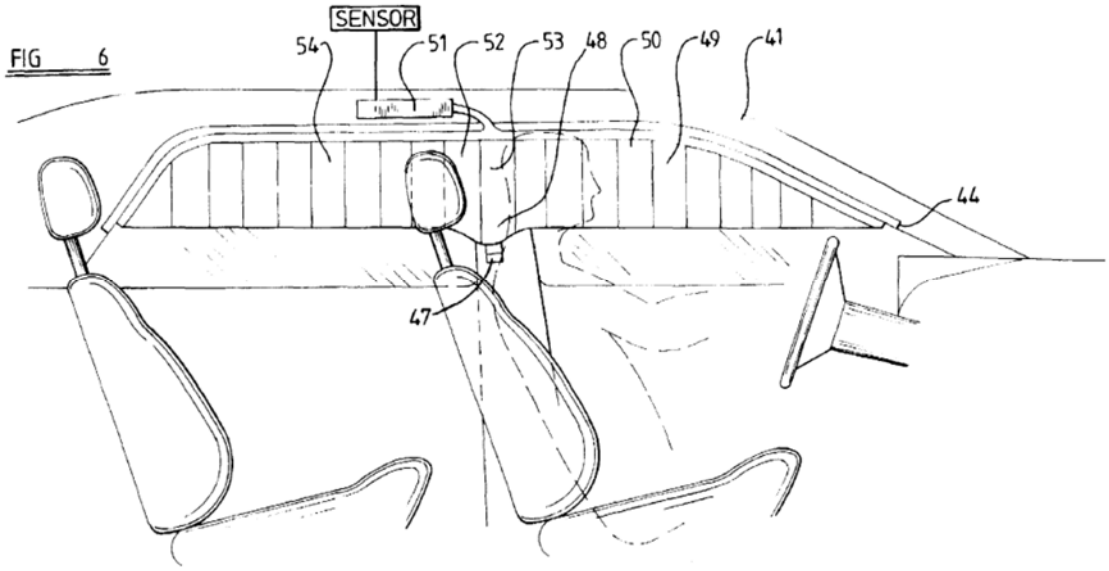


Figure 6 shows a side view of the interior of a motor vehicle, including a safety device (i.e., an airbag) in accordance with the invention of HÅland, when the safety device is in the operative state (i.e., when the airbag is inflated). Ex. 1008, 2:55–60. As seen in Figure 6, the inflatable element "provide[s] 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 5:47–51.

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 6:14–15, 6:20–21. 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 6:21–23.

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 4:29–32.

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:

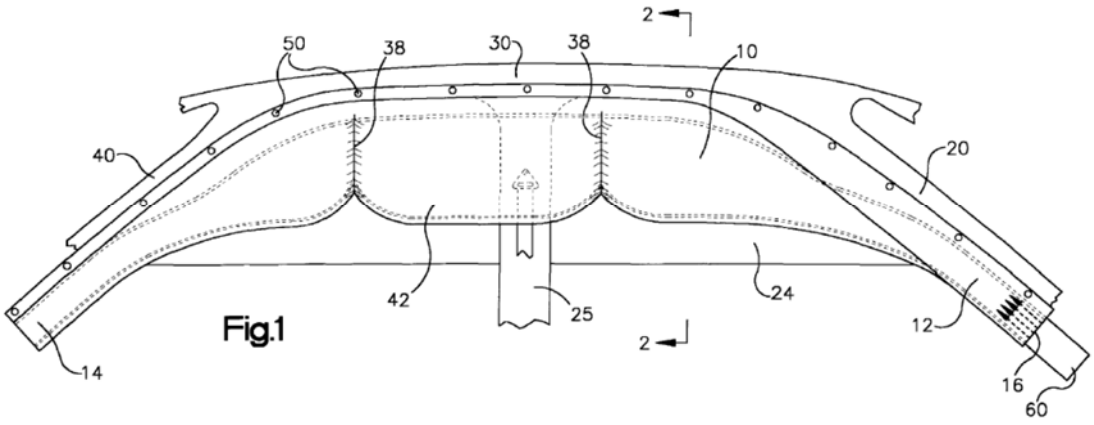


Fig.1

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:

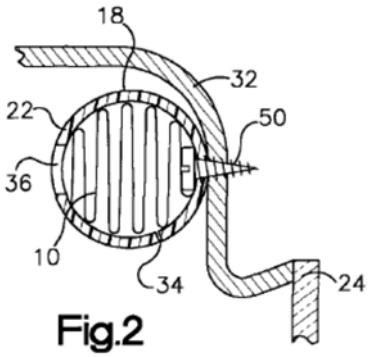


Fig.2

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 3:24–26.

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.

According to Petitioner, both HÅland and Stütz teach these claim features. *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." *Id.* at 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).

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." Pet. 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.

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)).

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.

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).

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.

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:

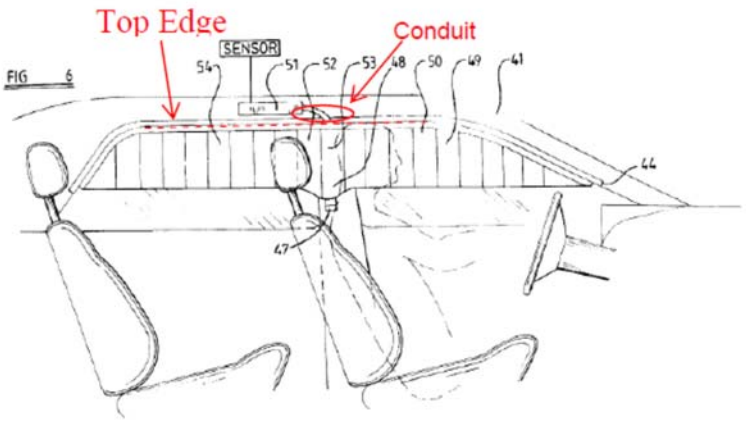


Figure 6 of HÅland, above, illustrates a side view of the interior of a motor vehicle, including an airbag, and is annotated to highlight the top edge of the airbag and the conduit. *Id.*; *see* Ex. 1003 ¶¶ 130–134.

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.

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.

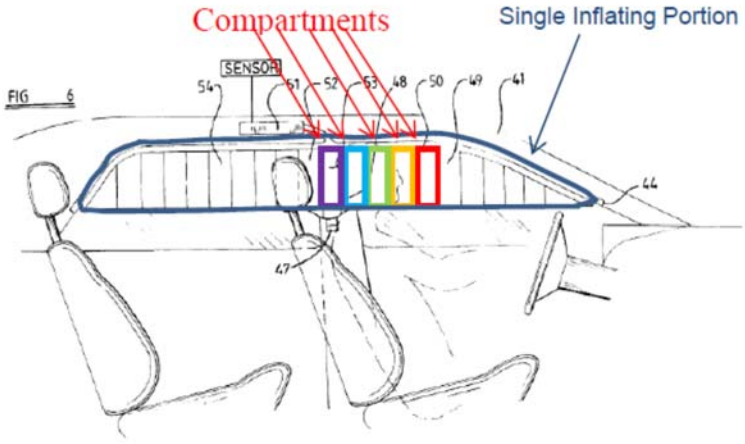


Figure 6 of HÅland, above, illustrates a side view of the interior of a motor vehicle, including an airbag, and is annotated to highlight the "single inflating portion" and the plurality of compartments. *See id.* (citing Ex. 1008, 4:16–22, 6:2–7, Fig. 6); Ex. 1003 ¶¶ 139–144.

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.

At this stage of the proceeding, Patent Owner has not yet substantively addressed claims 1, 10, 17–20, 26, 27, and 36–40, apart from its assertion that HÅland and Stütz are not available as prior art to the claims

of the ’093 patent, which we have addressed above. We are persuaded, on the record now before us, that Petitioner has shown sufficiently 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. Based on the record now before us, we are persuaded that Petitioner has demonstrated a reasonable likelihood of succeeding in showing 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.

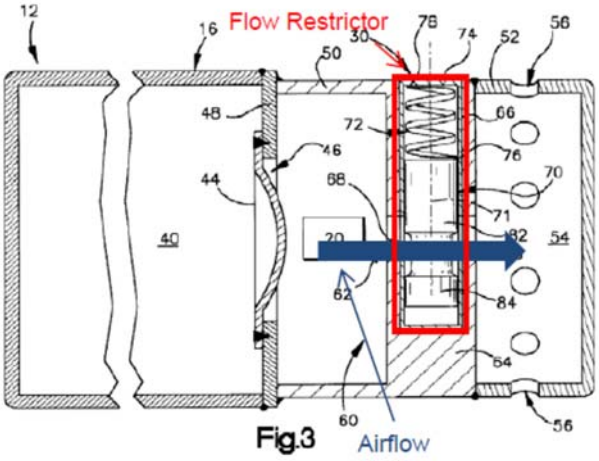


Fig.3

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).

At this stage of the proceeding, Patent Owner has not yet substantively addressed claims 2 and 3, apart from its assertion that HÅland, Stütz, and Faigle are not available as prior art to the claims of the '093 patent, which we have addressed above. We are persuaded, on the record now before us, that Petitioner has shown sufficiently that the combination of HÅland, Stütz, and Faigle teaches or suggests all of the limitations of claims 2 and 3, and has articulated sufficient reasoning why it would have been obvious to combine these references in the proposed manner. Based on the record now before us, we are persuaded that Petitioner has demonstrated a reasonable likelihood of succeeding in showing 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. 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.

At this stage of the proceeding, Patent Owner has not yet substantively addressed claims 5 and 7, apart from its assertion that HÅland and Stütz are not available as prior art to the claims of the '093 patent, which we have addressed above. We are persuaded, on the record now before us, that Petitioner has shown sufficiently that the combination of HÅland, Stütz, and Kaji teaches or suggests all of the limitations of claims 5 and 7, and has articulated sufficient reasoning why it would have been obvious to combine these references in the proposed manner. Based on the record now before us, we are persuaded that Petitioner has demonstrated a reasonable likelihood of succeeding in showing 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.

At this stage of the proceeding, Patent Owner has not yet substantively addressed claim 9, apart from its assertion that HÅland, Stütz, and Steffens are not available as prior art to the claims of the '093 patent, which we have addressed above. We are persuaded, on the record now before us, that Petitioner has shown sufficiently that the combination of HÅland, Stütz, and Steffens teaches or suggests all of the limitations of claim 9, and has articulated sufficient reasoning why it would have been obvious to combine these references in the proposed manner. Based on the record now before us, we are persuaded that Petitioner has demonstrated a reasonable likelihood of succeeding in showing 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 claim limitations of these claims and of claim 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 as a function of 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 as a function of 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.

At this stage of the proceeding, Patent Owner has not yet substantively addressed claims 11, 28–32, and 41, apart from its assertion that HÅland and Stütz are not available as prior art to the claims of the '093 patent, which we have addressed above. We are persuaded, on the record

now before us, that Petitioner has shown sufficiently that the combination of HÅland, Stütz, and Davis teaches or suggests all of the limitations of claims 11, 28–32, and 41, and has articulated sufficient reasoning why it would have been obvious to combine these references in the proposed manner. Based on the record now before us, we are persuaded that Petitioner has demonstrated a reasonable likelihood of succeeding in showing 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. Of these layers, "[o]ne 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).

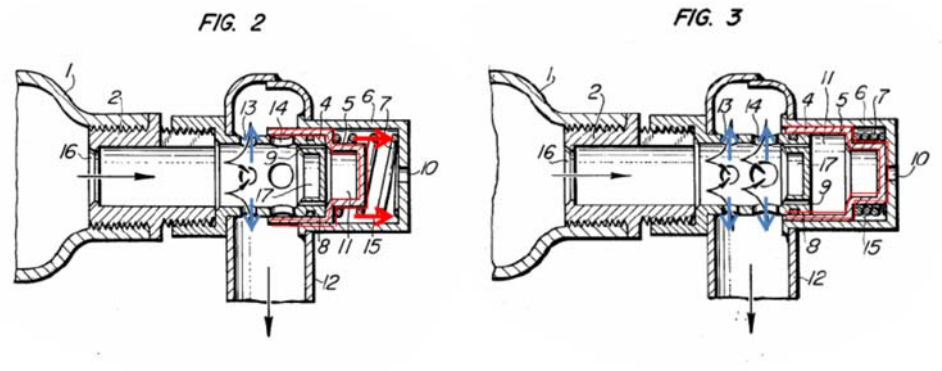
At this stage of the proceeding, Patent Owner has not yet substantively addressed claim 16, apart from its assertion that HÅland, Stütz, and Swann are not available as prior art to the claims of the '093 patent, which we have addressed above. We are persuaded, on the record now before us, that Petitioner has shown sufficiently that the combination of HÅland, Stütz, and Swann teaches or suggests all of the limitations of claim 16, and has articulated sufficient reasoning why it would have been obvious to combine these references in the proposed manner. Based on the record now before us, we are persuaded that Petitioner has demonstrated a reasonable likelihood of succeeding in showing 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.[6] Pet. 70 (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

[6] 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.

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.

At this stage of the proceeding, Patent Owner has not yet substantively addressed claims 22, 24, and 25, apart from its assertion that HÅland and Stütz are not available as prior art to the claims of the '093 patent, which we have addressed above. We are persuaded, on the record now before us, that Petitioner has shown sufficiently that the combination of HÅland, Stütz, and Suzuki teaches or suggests all of the limitations of claims 22, 24, and 25, and has articulated sufficient reasoning why it would have been obvious to combine these references in the proposed manner. Based on the record now before us, we are persuaded that Petitioner has demonstrated a reasonable likelihood of succeeding in showing 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).

At this stage of the proceeding, Patent Owner has not yet substantively addressed claim 23, apart from its assertion that HÅland and Stütz are not available as prior art to the claims of the '093 patent, which we have addressed above. We are persuaded, on the record now before us, that Petitioner has shown sufficiently for purposes of this decision that the combination of HÅland, Stütz, Suzuki, and Marlow teaches or suggests all of the limitations of claim 23, and has articulated sufficient reasoning why it would have been obvious to combine these references in the proposed manner. Based on the record now before us, we are persuaded that Petitioner has demonstrated a reasonable likelihood of succeeding in showing 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).

At this stage of the proceeding, Patent Owner has not yet substantively addressed claim 21, apart from its assertion that HÅland, Stütz, and Enders are not available as prior art to the claims of the '093 patent, which we have addressed above. We are persuaded, on the record now before us, that Petitioner has shown sufficiently that the combination of HÅland, Stütz, and Enders teaches or suggests all of the limitations of claim 21, and has articulated sufficient reasoning why it would have been obvious to combine these references in the proposed manner. Based on the record now before us, we are persuaded that Petitioner has demonstrated a

reasonable likelihood of succeeding in showing 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. Patent Owner argues that HÅland and Daniel are not available as prior art (Prelim. Resp. 20–21, 24–25), which we have addressed above. We have reviewed the parties' contentions and supporting evidence. Given the evidence on this record, and for the reasons explained below, we determine that the information presented shows a reasonable likelihood that Petitioner would prevail on this asserted ground.

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.

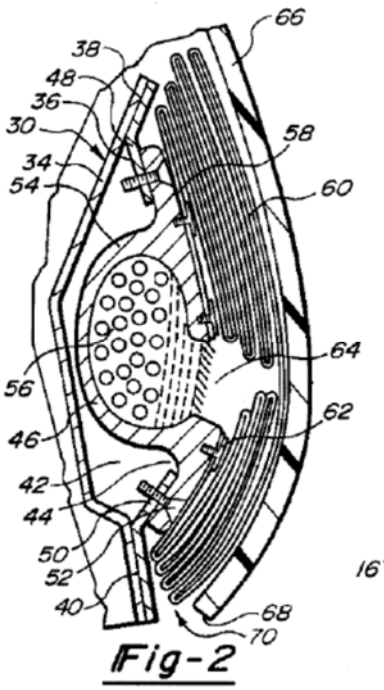


Fig-2

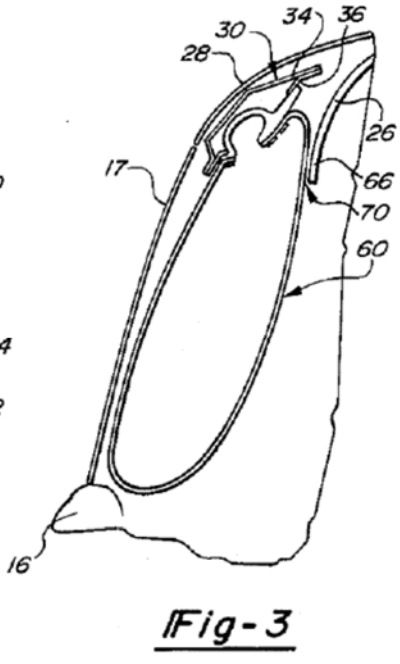


Fig-3

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 and receiving gas directed from a single inflator. 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). Petitioner also asserts that Daniel teaches the use of a single inflator. *See id.* (citing Ex. 1011, 2:55–67); *see also id.* (citing Ex. 1003 ¶¶ 148, 160 (noting the advantages of directed gas from a single inflator were well known)). 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).

At this stage of the proceeding, Patent Owner has not yet substantively addressed claims 1, 10, 17–20, 26, 27, and 36–40, apart from its assertion that HÅland and Daniel are not available as prior art to the claims of the '093 patent, which we have addressed above. We are persuaded, on the record now before us, that Petitioner has shown sufficiently that the combination of HÅland and Daniel 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. Based on the record now before us, we are persuaded that Petitioner has demonstrated a reasonable likelihood of succeeding in showing 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).

At this stage of the proceeding, Patent Owner has not yet substantively addressed claims 4, 6, and 8, apart from its assertion that HÅland and Daniel are not available as prior art to the claims of the '093 patent, which we have addressed above. We are persuaded, on the record now before us, that Petitioner has shown sufficiently that the combination of HÅland and Daniel teaches or suggests all of the limitations of claims 4, 6, and 8, and has articulated sufficient reasoning why it would have been obvious to combine these references in the proposed manner. Based on the record now before us, we are persuaded that Petitioner has demonstrated a reasonable likelihood of succeeding in showing 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. Patent Owner argues that HÅland and Tanase are not available as prior art (Prelim. Resp. 20–21, 23–24), which we have addressed above. We have reviewed the parties' contentions and supporting evidence. Given the evidence on this record, and for the reasons explained below, we determine that the information presented shows a reasonable likelihood that Petitioner would prevail on these asserted grounds.

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

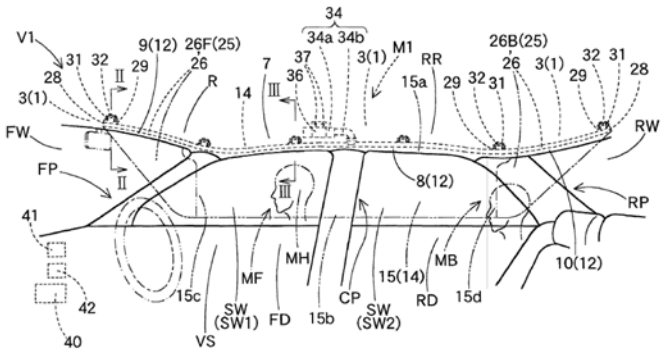


Fig.3

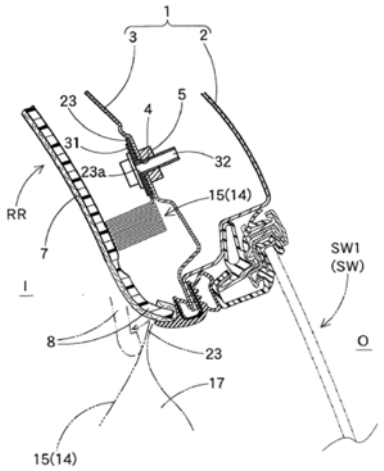


Figure 1 is a view of a head protecting device according to an embodiment of Tanase. *Id.* ¶ 44. Figure 3 is an enlarged schematic sectional view taken along arrows III-III of Figure 1. *Id.* ¶ 46. Airbag device M1 includes airbag 14 and inflator 34. *Id.* ¶ 56. Body portion 15 of airbag 14 is housed 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 and receiving gas directed from a single inflator. 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). Petitioner also asserts that Tanase teaches the use of a single inflator and notes that "[t]he advantages of directed gas from a single inflator were also well known." *See id.* (citing Ex. 1018 ¶ 78; Ex. 1003 ¶ 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.

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* Pet. 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.

At this stage of the proceeding, Patent Owner has not yet substantively addressed claims 1, 10, 12–15, 17–20, 26, 27, 33, and 36–40, apart from its assertion that HÅland and Tanase are not available as prior art

to the claims of the ’093 patent, which we have addressed above. We are persuaded, on the record now before us, that Petitioner has shown sufficiently that the combination of HÅland and Tanase teaches or suggests all of the limitations of claims 1, 10, 12–15, 17–20, 26, 27, 33, and 36–40, and has articulated sufficient reasoning why it would have been obvious to combine these references in the proposed manner. Based on the record now before us, we are persuaded that Petitioner has demonstrated a reasonable likelihood of succeeding in showing 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).

At this stage of the proceeding, Patent Owner has not yet substantively addressed claims 34 and 35, apart from its assertion that HÅland and Tanase are not available as prior art to the claims of the ’093 patent, which we have addressed above. We are persuaded, on the record now before us, that Petitioner has shown sufficiently that the combination of

HÅland, Tanase, and Kaji teaches or suggests all of the limitations of claims 34 and 35, and has articulated sufficient reasoning why it would have been obvious to combine these references in the proposed manner. Based on the record now before us, we are persuaded that Petitioner has demonstrated a reasonable likelihood of succeeding in showing 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 a reasonable likelihood of succeeding in showing that the combination of HÅland renders obvious claims 42–44.

III. CONCLUSION

As discussed above, we institute an *inter partes* review of claims 1–44 of the '093 patent. At this preliminary stage in the proceeding, we have not made a final determination with respect to the patentability of any challenged claim or the construction of any claim term.

IV. ORDER

Accordingly, it is

ORDERED that pursuant to 35 U.S.C. § 314(a), an *inter partes* review is hereby instituted as to claims 1–44 of U.S. Patent No. 9,043,093 B2 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 and Stütz;

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

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

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

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;

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

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

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

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

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 HÅland and Daniel;

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 HÅland and Tanase;

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

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

FURTHER ORDERED that no other ground of unpatentability is authorized for this *inter partes* review;

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial; the trial will commence on the entry date of this Decision.

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