

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HYUNDAI MOBIS CO., LTD. and MOBIS ALABAMA, L.L.C.,
Petitioners,

v.

AUTOLIV ASP, INC.,
Patent Owner.

Case IPR2014-01005
Patent 7,347,450 B2

Before JONI Y. CHANG, WILLIAM V. SAINDON, and
TRENTON A. WARD, *Administrative Patent Judges*.

CHANG, *Administrative Patent Judge*.

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

I. INTRODUCTION

Hyundai Mobis Co., Ltd. and Mobis Alabama, L.L.C. (collectively, “Petitioner”) filed a corrected Petition requesting *inter partes* review of claims 1, 2, 4, 6, 8–12, 14, 16, and 18–20 of U.S. Patent No. 7,347,450 B2 (“the ’450 patent”). Paper 6 (“Pet.”). Autoliv ASP, Inc. (“Patent Owner”) filed a Preliminary Response. Paper 8 (“Prelim. Resp.”). We determined that there was a reasonable likelihood that Petitioner would prevail in challenging those claims as unpatentable. Pursuant to 35 U.S.C. § 314, we authorized an *inter partes* review to be instituted, on January 14, 2015. Paper 10 (“Dec.”).

After institution, Patent Owner filed a revised Patent Owner Response (Paper 37, “PO Resp.”) and a Declaration of Mr. Hendrik B. Helleman (Ex. 2038).¹ Petitioner filed a Reply to the Patent Owner Response (Paper 41, “Reply”). An oral hearing was held on August 12, 2015.² A transcript of the hearing has been entered into the record of this proceeding as Paper 52 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6(c), and this Final Written Decision is entered pursuant to 35 U.S.C. § 318(a). For the reasons set forth below, we conclude that Petitioner has not demonstrated by a preponderance of the evidence that claims 1, 2, 4, 6, 8–12, 14, 16, and 18–20 of the ’450 patent are unpatentable.

¹ Citations are to the public version of the revised Patent Owner Response and the public version of Mr. Helleman’s Declaration.

² The oral arguments for the instant proceeding and Case IPR2014-01006 were consolidated.

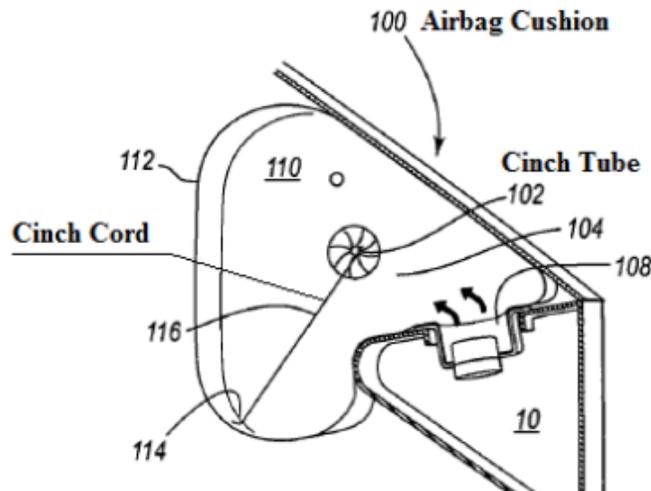
A. Related Matters

The '450 patent was asserted in *Autoliv ASP, Inc. v. Hyundai Mobis Co., LTD*, No.2:13-cv-141-MHT (D. Ala.). Pet. 59.

B. The '450 Patent

The '450 patent describes an airbag protective system with a cinch tube and cinch cord for restricting the opening of a vent hole on an airbag. Ex. 1001, Abs., 1:56–63. The airbag system is said to prevent injuries by providing a softer airbag deployment. *Id.* at 1:64–2:9. According to the '450 patent, the airbag responds to the occupant's position during deployment, and releases the inflating gas from the airbag accordingly, to avoid excessive impact from deployment on the occupant. *Id.*

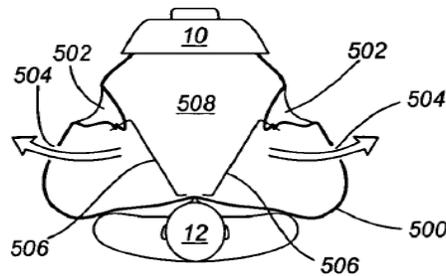
Figure 1C of the '450 patent, reproduced below, illustrates a deployed airbag (annotations added by Petitioner, Pet. 1).



As shown in annotated Figure 1C of the '450 patent above, airbag cushion 100 includes cinch tube 102 and cinch cord 112, which is coupled to cinch tube 102 and to a surface of the airbag. *Id.* at Abs. Upon deployment,

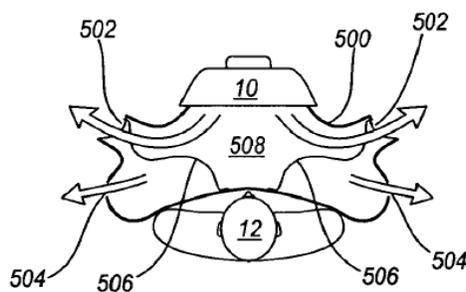
cinch cord 112 extends until taut, unless the airbag cushion encounters an obstruction (e.g., an out-of-position occupant—an occupant who is positioned closely to the airbag). *Id.*

Figure 5C of the '450 patent, reproduced below, illustrates an airbag deploying where there is no obstruction from an out-of-position occupant.



As depicted in Figure 5C above, airbag 500 has two closeable vents with cinch tubes 502 and two fixed vents 504. *Id.* at 3:25–48. In the situation where occupant 12 is in a normal position, airbag 500 can fully inflate and occupant 12 contacts airbag 500 only after full deployment. In this situation, cinch cord 506 is taut, tightening cinch tubes 502, and fixed vents 504 remain open during the entire deployment, venting the gas from the airbag continuously. *Id.*

Figure 5E of the '450 patent, reproduced below, illustrates an airbag deploying where there is an obstruction from an out-of-position occupant.



As shown in Figure 5E above, airbag 500 impacts out-of-position occupant 12, who obstructs the deployment and prevents airbag 500 from fully inflating. *Id.* at 3:50–53. In this situation, cinch cords 506 remain slack, and cinch tubes 502 as well as fixed vents 504 remain open. *Id.* at 3:54–57. Occupant 12 receives less than the full deployment impact. *Id.* at 3:58–62.

C. Illustrative Claim

Claims 1, 11, and 20 of the '450 patent are independent. Claims 2, 4, 6, 8, 9, and 10 depend ultimately from claim 1; and claims 12, 14, 16, 18, and 19 depend ultimately from claim 11. Claim 1, reproduced below, is illustrative:

1. An airbag cushion module, comprising:
 - an inflatable airbag cushion defining an interior;
 - a *cinch tube* having a base end opposite from a terminal end, wherein the terminal end has an aperture; and
 - a *cinch cord* coupled to the terminal end of the cinch tube and extending around a majority of the aperture of the terminal end of the cinch tube, the cinch cord further coupled to a surface of the airbag cushion such that upon inflatable airbag deployment with obstruction, the cinch cord does not fully extend and the cinch tube remains open, and upon inflatable airbag deployment without obstruction, the cinch cord extends and at least partially closes the aperture at the terminal end,
 - wherein the cinch tube is configured such that the aperture at the terminal end at least partially closes, upon inflatable airbag deployment without obstruction, without necessitating closure of the base end of the cinch tube, and
 - wherein the configuration of the cinch tube and the length of the cinch cord enables the aperture to at least partially

close, upon inflatable airbag deployment without obstruction, such that *the terminal end is at least partially within the interior of the inflatable airbag cushion after the aperture becomes at least partially closed.*

Ex. 1001, 5:21–45 (emphases added).

D. Prior Art Relied Upon

Petitioner relies upon the following prior art references:

Nonaka	US 2,116,037	May 3, 1938	(Ex. 1005)
Wolanin	US 5,280,953	Jan. 25, 1994	(Ex. 1008)
Rogerson	US 5,405,166	Apr. 11, 1995	(Ex. 1009)
Pinsenschaum	US 2004/0012179 A1	Jan. 22, 2004	(Ex. 1007)
Kassman	US 2004/0056459 A1	Mar. 25, 2004	(Ex. 1010)
Inoue ³	JP H05-85295	Apr. 6, 1993	(Ex. 1003)
Tajima	JP 2003-137060	May 14, 2003	(Ex. 1011)
Narin	DE 100 59 956	Jun. 13, 2002	(Ex. 1004)
Riedinger	DE 344591	Nov. 25, 1921	(Ex. 1006)

³ Citations to Inoue, Tajima, Narin, and Riedinger are to the certified English-language translations submitted by Petitioner in Exhibits 1003, 1011, 1004, and 1006, respectively.

E. Instituted Grounds of Unpatentability

We instituted the instant trial based on the following grounds of unpatentability (Dec. 45):

Claims	Basis	References
1, 2, 6, and 20	§ 103(a)	Inoue and Narin
8, 9, 11, 12, 16, and 18	§ 103(a)	Inoue, Narin, and Pinsenschaum
4 and 14	§ 103(a)	Inoue, Narin, Pinsenschaum, and Rogerson
10 and 19	§ 103(a)	Inoue, Narin, Pinsenschaum, and Kassman

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, claim terms in an unexpired patent are given their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *see also In re Cuozzo Speed Techs., LLC.*, 793 F.3d 1268, 1277–1279 (Fed. Cir. 2015) (“Congress implicitly approved the broadest reasonable interpretation standard in enacting the AIA,”⁴ and “the standard was properly adopted by PTO regulation.”). Under this standard, claim terms are given their ordinary and customary meaning as would be understood by one of ordinary skill in the

⁴ Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”).

art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). An inventor may rebut that presumption by providing a definition of the term in the specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). In the absence of such a definition, limitations are not to be read from the specification into the claims. *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993).

“cinch tube”

Claim 1 recites “a cinch tube having a base end opposite from a terminal end, wherein the terminal end has an aperture.” Ex. 1001, 5:22–23. Both independent claims 11 and 20 require a similar limitation. *Id.* at 6:45–47, 8:13–20. Figures 2A and 2B of the ’450 patent are reproduced below.

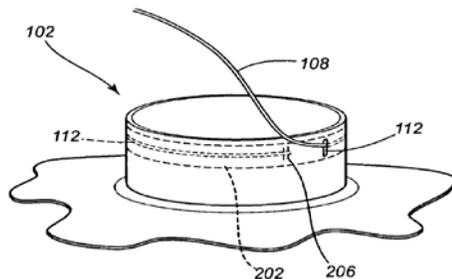


Fig. 2A

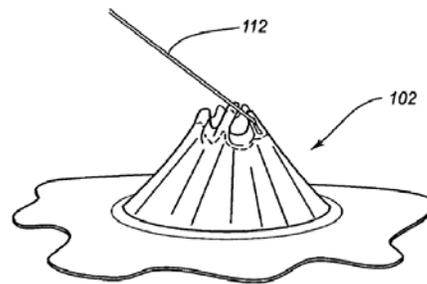


Fig. 2B

As shown in Figures 2A and 2B above, cinch tube 102 is coupled to a surface of the airbag, and it extends from the airbag, encircling an aperture in the surface. *Id.* at 2:34–39. Cinch cord 112 encircles a majority of the perimeter of cinch tube 102 in order to tighten and restrict cinch tube 102. *Id.* at 2:65–67. The cinch tube may be embodied with a height that is

sufficient to achieve desired closure, and may extend into the airbag cushion interior or from the airbag cushion. *Id.* at 2:32–33, 38–39.

In the Decision on Institution, we adopted Patent Owner’s proposed construction for the claim term “cinch tube” in light of the Specification, as the broadest reasonable interpretation—namely, “a tubular structure having opposing open ends separated by a length of material and capable of being cinched at least partially closed.” Dec. 8–10. Subsequent to institution, neither party proposes a different claim construction as to this term. *See generally* Reply, PO Resp. 19–20. Upon review of this entire record before us, we discern no reason to change this claim construction for purposes of this Final Written Decision.

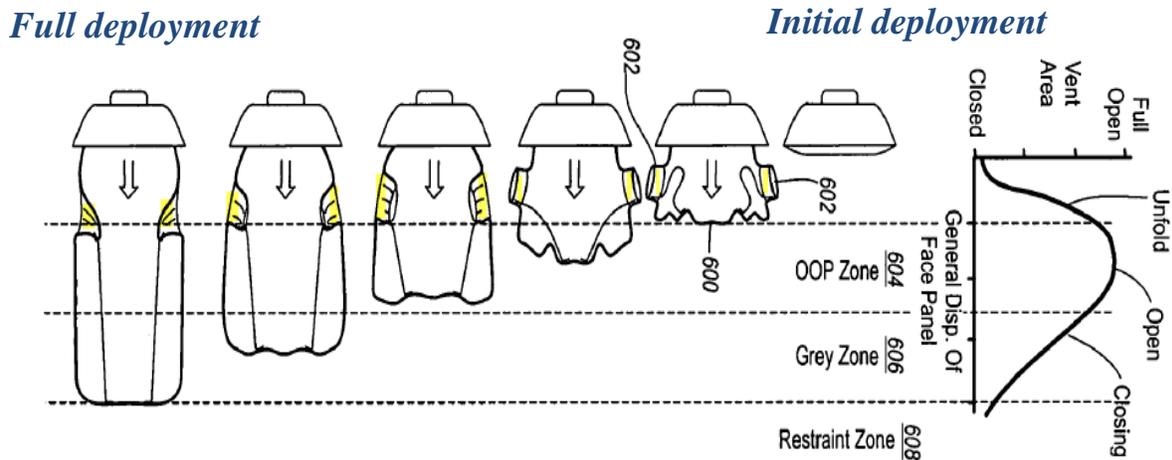
“the terminal end is at least partially within the interior of the inflatable airbag cushion”

Claim 1 recites:

wherein the configuration of the cinch tube and the length of the cinch cord enables the aperture to at least partially close, upon inflatable airbag deployment without obstruction, such that *the terminal end is at least partially within the interior of the inflatable airbag cushion* after the aperture becomes at least partially closed.

Ex. 1001, 5:33–37 (emphases added). Petitioner proposes that the claim term “the terminal end is at least partially within the interior of the inflatable airbag cushion” should be construed as “inside the volume defined by the inner surface of the airbag cushion.” Pet. 10–12.

Figure 6 of the '450 patent is reproduced below, with blue annotations and yellow highlights added.



Annotated Figure 6 of the '450 patent illustrates cinch tubes 602 (in yellow) venting as a function of airbag cushion displacement. Ex. 1001, 3:63–64. Airbag cushion 600, during initial deployment, is unfolding and cinch tubes 602 provide little or no venting, and then it expands into an out-of-position zone 604 where, if obstructed, cinch tubes 602 will remain completely or nearly open. *Id.* at 3:67–4:5. In the embodiment shown in Figure 6, cinch tubes 602 are pulled into the airbag cushion 600 during deployment. *Id.* at 4:9–11. If unobstructed, airbag cushion 600 fully expands to restraint zone 608, and cinch tubes 602 close completely. *Id.* at 4:11–15.

Petitioner argues that the claims recite the airbag “cushion,” and “cinch tube,” as distinct elements, and its proposed claim construction would clarify that the “interior of the inflatable airbag cushion” does not include any portion of the interior of the cinch tube. Pet. 10–12. We decline to adopt Petitioner’s proposed construction, which would import an extraneous feature (e.g., “volume”) into the claim, and would not provide further clarity,

as alleged by Petitioner. *See E.I. du Pont de Nemours & Co. v. Phillips Petroleum Co.*, 849 F.2d 1430, 1433 (Fed. Cir. 1988). Rather, in light of the Specification, we agree with Patent Owner that the claim term “the terminal end is at least partially within the interior of the inflatable airbag cushion” should be construed as “the terminal end of the cinch tube crosses the theoretical plane into the interior of the inflatable airbag cushion.”⁵
Tr. 39:14–20.

Means-Plus-Function Claim Elements

Petitioner identifies two claim elements recited in claim 20—namely, “means for venting gas out of the airbag” and “means for restricting gas venting”—as means-plus-function limitations, invoking 35 U.S.C. § 112, ¶ 6.⁶ Pet. 12–13. Petitioner proposes the claim constructions for the means-plus-function elements and Patent Owner does not dispute those proposed claim constructions. Pet. 12–13; Prelim. Resp. 27, n. 8. In the Decision on Institution, we agreed with Petitioner that those claim elements are written in means-plus-function format and fall within the purview of § 112, ¶ 6, and adopted Petitioner’s claim constructions. Dec. 10–11. Subsequent to institution, neither party offers a different claim construction as to these claim elements. *See generally* Reply; PO Resp. 17–22.

⁵ The “theoretical plane” here would be the plane defined by the aperture in the airbag from which the cinch tubes extend.

⁶ Section 4(c) of the AIA re-designated § 112, ¶ 6, as § 112(f). Pub. L. No. 112-29, 125 Stat. 284, 296 (2011). Because the ’450 patent has a filing date before September 16, 2012 (effective date of § 4(c)), we will refer to the pre-AIA version of § 112.

Based on this entire record, we also discern no reason to modify our prior claim constructions, which are reproduced in the table below.

Claim elements (recited functions in italics)	Corresponding structures
Means for <i>venting gas out of the airbag</i> (claim 20)	Cinch tube. <i>See</i> Ex. 1001, 5:8–9 (“Venting means refers to cinch tubes 102, 300, 400, 502, 602, 702, 802, and 900.”), Figs. 1–9.
Means for <i>restricting gas venting</i> (claim 20)	Cinch cords. <i>See Id.</i> at 5:9–10 (“Restricting means refers to cinch cords 112, 302, 410, 506, 706, 800, and 902.”), Figs. 1–9.

B. Principles of Law

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). 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; *see also Translogic*, 504 F.3d at 1259.

We analyze the asserted grounds of unpatentability in accordance with the above-stated principles.

C. Level of Ordinary Skill in the Art

In determining the level of ordinary skill in the art at the time of the invention, we note that various factors may be considered, including “type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citing *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986)). We also are mindful that the level of ordinary skill in the art is reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978).

Although the parties agree that the educational level of active workers in the relevant field is relatively high (e.g., at least a Bachelor of Science degree in Mechanical Engineering or a related field), the parties dispute whether the relevant field is limited to *frontal* airbag design and development. *See, e.g.*, PO Resp. 2; Reply 1–3; Ex. 1017 ¶ 15; Ex. 2015 ¶ 22. For instance, Petitioner’s expert, Ms. Karen Balavich, submits that “a person having ordinary skill in the art relevant to the ’450 patent would likely have had at least a Bachelor of Science degree in Mechanical Engineering or a related field, and at least three (3) years of professional or

practical experience in the field of *automotive safety technologies*, including inflatable air bags.” Ex. 1017 ¶ 15 (emphasis added). In contrast, Patent Owner’s expert, Mr. Helleman, testifies that “a person of ordinary skill in the art of *frontal* airbag design and development at the time of the alleged invention would have had at least a bachelor’s degree in a relevant technical field such as mechanical or aerospace engineering, and at least six years of experience in the design, development, and testing of *frontal* airbags.” Ex. 2015 ¶ 22 (emphases added).

As Petitioner notes, the claims of the ’450 patent are not limited to *frontal* airbags. Reply 2; Ex. 1001, 5:20–8:29. The ’450 patent also is said to be related generally to the field of *automotive protective systems*, specifically inflatable airbags for automobiles. Ex. 1001, 1:6–9. The Specification of the ’450 patent further states:

As those of skill in the art will appreciate, the principles of the invention may be applied to and used with *a variety of airbag deployment systems including frontal driver and passenger airbags, knee airbags, overhead airbags, curtain airbags, and the like*. Thus, the present invention is applicable to airbag cushions of various shapes and sizes.

Id. at 1:57–63 (emphasis added).

Based on the written description of the ’450 patent, we determine that the relevant field is not limited to *frontal* airbag design and development, and that persons with ordinary skill in the art would not be only those who had “at least six years of experience in the design, development, and testing of *frontal* airbags,” as alleged by Patent Owner (PO Resp. 2; Ex. 2015 ¶ 22).

D. Ms. Balavich's Declaration

Patent Owner argues that Ms. Balavich's Declaration (Ex. 1002) should be accorded no weight because Ms. Balavich allegedly has no experience designing *frontal* airbags. PO Resp. 1–2. Petitioner counters that Patent Owner's argument contradicts the '450 patent. Reply 1–3.

We determine that Patent Owner has not articulated a persuasive reason for giving Ms. Balavich's Declaration (Ex. 1017), as a whole, little or no weight. We have reviewed Ms. Balavich's testimony and cross-examination testimony. Exs. 1002, 2017. Ms. Balavich's qualification and experience are sufficient to qualify her as an expert in the pertinent field under Federal Rule of Evidence 702. *See, e.g.*, Ex. 1002 ¶¶ 4–12 (“I received a Bachelor of Science degree in Mechanical Engineering. . . . I am a named inventor on seven (7) United States patents for automotive airbag technology. . . . I have authored or co-authored five (5) publications, including technical papers, articles, and conference papers on automotive safety technologies.”). As we discuss above, the relevant field is not limited to *frontal* airbags, as alleged by Patent Owner, but rather is related generally to the field of *automotive protective systems*, specifically inflatable airbags for automobiles, as described by the Specification of the '450 patent. Ex. 1001, 1:6–9. Therefore, the relevant field as well as the description in the '450 patent are broad enough to encompass Ms. Balavich's qualifications. In addition, there is no requirement of a perfect match between the expert's experience and the relevant field. *SEB S.A. v. Montgomery Ward & Co.*, 594 F.3d 1360, 1373 (Fed. Cir. 2010).

For the reasons stated above, we decline to accord Ms. Balavich's Declaration, as a whole, little or no weight, as urged by Patent Owner. Rather, we exercise our discretion to determine the appropriate weight to be accorded to the evidence presented, including expert opinion, based on the disclosure of the underlying facts or data upon which that opinion is based.

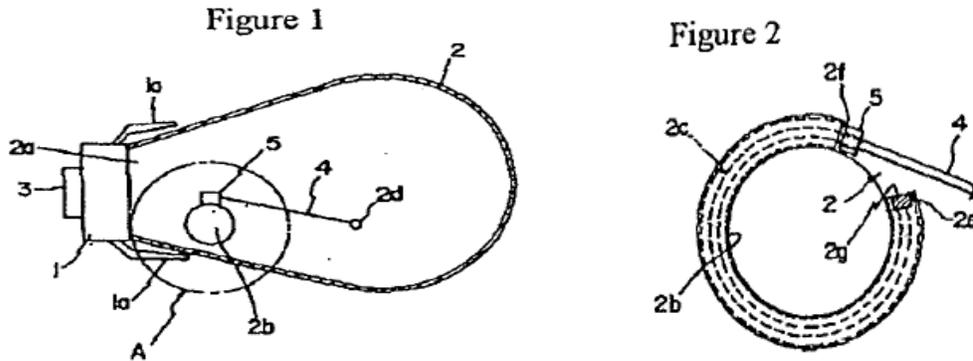
E. Obviousness

Petitioner asserts that independent claims 1 and 20 are unpatentable under § 103(a) as obvious over the combination of Inoue and Narin, and that independent claim 11 is unpatentable over the combination of Inoue and Narin in further view of Pinsenschaum. Pet. 15–31, 43–54. As indicated above, Petitioner also asserts that dependent claims 2, 4, 6, 8–10, 12, 14, and 18–19 are unpatentable over the combination of Inoue and Narin, alone, or in further view of Pinsenschaum, Rogerson, and/or Kassman. *Id.* at 15–31, 43–59. In support of these asserted grounds of unpatentability, Petitioner proffers a Declaration of Ms. Balavich along with its Petition. Ex. 1002.

Inoue (Ex. 1003)

Inoue discloses an airbag apparatus designed to protect an out-of-position occupant from injuries caused by the deploying airbag and to ensure the protective performance for normal situations. Ex. 1003, Abs., ¶¶ 1, 7. Inoue's airbag includes an outlet hole for venting the inflating gas from the airbag during deployment. *Id.* ¶ 10. When an out-of-position occupant collides with the airbag at an early stage of deployment, the outlet hole remains open, venting out the inflating gas to reduce the impact force on the occupant. *Id.* ¶¶ 12, 29.

Figures 1 and 2 of Inoue, reproduced below, illustrate a deployed airbag, and a detailed view of the outlet hole, respectively.



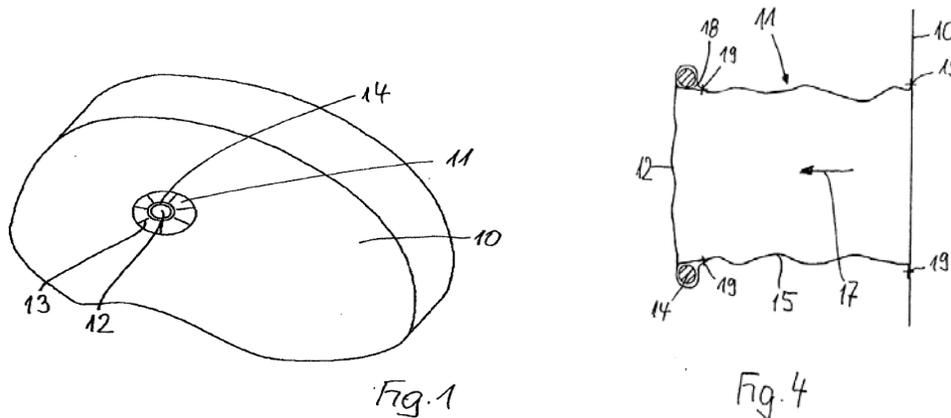
As shown in Figures 1 and 2 of Inoue above, outlet hole 2b having a wide opening is formed as part of airbag 2. Ring-shaped drawstring through-hole 2c is formed on the circumference of outlet hole 2b and on the inner surface of airbag 2. *Id.* ¶ 19. Drawstring through-hole 2c can be formed by either turning back the material forming airbag 2, or sewing on a separate, long, bag-shaped item. *Id.*

Drawstring 4 is inserted inside drawstring through-hole 2c from one end 2f. *Id.* ¶ 20. Drawstring 4 is anchored to airbag 2 at end 2g of drawstring through-hole 2c. *Id.* End 2d of drawstring 4 is anchored at a position towards the deployment direction side from outlet hole 2b inside airbag 2. *Id.* The length of drawstring 4 is established so that drawstring 4 becomes taut when airbag 2 is deployed completely, constricting the opening of outlet hole 2b. *Id.*

Narin (Ex. 1004)

Narin describes an airbag having a tubular fabric nozzle for venting the inflating gas from the airbag during deployment. Ex. 1004 ¶¶ 2, 6.

Figure 1 of Narin shows an inflated airbag with a tubular fabric nozzle, and Figure 4 shows a detailed cross-sectional view of the tubular fabric nozzle. Figures 1 and 4 of Narin are reproduced below.



As shown in Figures 1 and 4 of Narin above, airbag 10 has tubular fabric nozzle 11 with outflow opening 12 for venting the inflating gas from airbag 10. Spring element 14 extends around tubular fabric nozzle 11 and is inserted in pocket 18, which is formed on the circumference of opening 12. *Id.* ¶ 20. Tubular fabric nozzle 11 varies the outflow opening size, depending on the pressure inside the airbag. *Id.* at Abs., ¶ 1.

Discussion

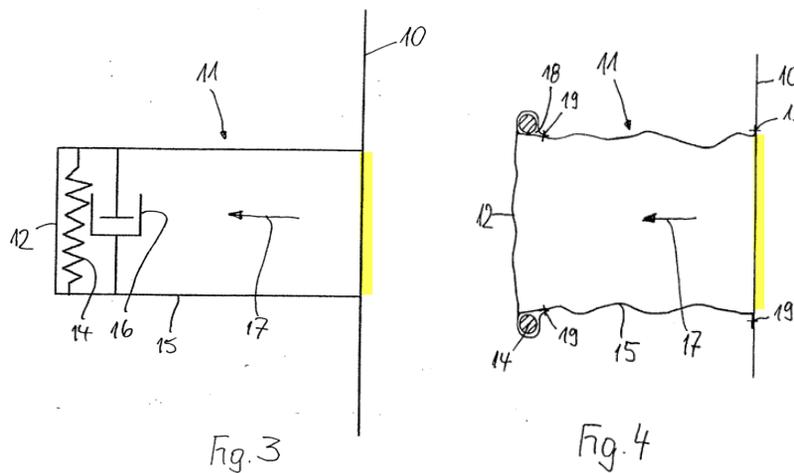
Claim 1 recites:

wherein *the configuration of the cinch tube and the length of the cinch cord* enables the aperture to at least partially close, upon inflatable airbag deployment without obstruction, such that *the terminal end is at least partially within the interior of the inflatable airbag cushion* after the aperture becomes at least partially closed.

Ex. 1001, 5:33–37 (emphases added) (hereafter the “within airbag” limitation). Independent claims 11 and 20 each recite a similar limitation.

By virtue of their dependency, each of claims 2, 4, 6, 8–10, 12, 14, and 18–19 also requires the aforementioned “within airbag” limitation.

Petitioner asserts that the combination of Inoue and Narin would render the aforementioned claim limitation obvious. Pet. 15–31, 53. In particular, Petitioner relies upon Narin to disclose “a cinch tube.” Pet. 18–20. Each of Figures 3 and 4 of Narin (reproduced below with yellow highlights) illustrates an airbag with a fabric nozzle (cinch tube).



As illustrated in Figures 3 and 4 of Narin above, fabric nozzle 11, protruding from the external surface of airbag 10, has sidewall 15 and outflow opening 12 at the terminal end. Ex. 1004 ¶¶ 6, 18, 19. Spring 14 is arranged transversely to outflow direction 17 of the gas. *Id.* ¶¶ 6, 19, 20. Opening 12 is regulated by spring 14, alone, or along with damping element 16. *Id.*

As shown in the figures above, the outflow opening of Narin’s nozzle closes *on the outside of the airbag*. *Id.* Nothing in Narin discloses that the terminal end of the nozzle is pulled partially within the airbag—crossing the theoretical plane (highlighted in yellow) into the interior of the airbag. In fact, the force of the inflating gas will push the terminal end away from the

airbag during deployment. *Id.*; Ex. 2038 ¶ 75. At most, the terminal end would be folded within *the interior of the nozzle* when the outflow opening closes. Narin discloses that “the necessary degrees of freedom for controlling the opening cross section of the outflow opening are provided by *the folding in the area of the fabric nozzle.*” Ex. 1004 ¶ 6 (emphasis added). As Petitioner confirms, the interior of the airbag does not include any portion of the interior of the cinch tube (or nozzle). Pet. 10–11. Therefore, Narin does not disclose “the terminal end is at least partially within the interior of the inflatable airbag cushion after the aperture becomes at least partially closed,” as required by the claims at issue.

Further, Petitioner relies upon Inoue to disclose a “cinch cord.” Pet. 15–17. As discussed above, Inoue discloses a drawstring vent hole formed by turning back the airbag cushion fabric. Ex. 1003 ¶¶ 19, 20. Inoue also discloses another embodiment that has a separate, long, bag-shaped item sewn around the vent hole. *Id.* Inoue, however, does not describe using the drawstring to pull the terminal end of the long, bag-shaped item partially within the airbag. *Id.* Consequently, nothing in Narin or Inoue describes or suggests pulling the terminal end of a cinch tube partially within the airbag, as required by the challenged claims.

Nonetheless, Petitioner asserts that, by coupling Narin’s nozzle with Inoue’s airbag and using Inoue’s drawstring around the terminal end of Narin’s nozzle (replacing Narin’s spring element), “the pulling action of Inoue’s drawstring inside the airbag will *necessarily and predictably* cause the terminal end of Narin’s cinch tube to be at least partially closed and to be within the interior of the inflatable airbag cushion, upon airbag deployment

without obstruction.” Pet. 22 (emphasis added). Petitioner argues that the pulling action from Inoue’s drawstring anchored to the interior of the airbag and the length of the drawstring, which Inoue states is taut upon deployment without obstruction, will cause the terminal end of the cinch tube to be pulled within the airbag. *Id.* Petitioner alleges that this is the expected result of the forces acting on the cinch tube and the drawstring. *Id.*

To support its arguments, Petitioner directs our attention to the Declaration of Ms. Balavich, who testifies that by adding Narin’s tubular nozzle onto Inoue’s airbag and using Inoue’s drawstring to close the aperture at the terminal end of the tubular nozzle, “the terminal end of the tubular nozzle *necessarily* will be pulled within the interior of the inflatable airbag cushion after the aperture becomes at least partially closed.” Ex. 1002 ¶ 47 (emphasis added). As Patent Owner points out (PO Resp. 26–28), however, Ms. Balavich acknowledges in her cross-examination testimony that the terminal end of a cinch tube resulting from a combination of Inoue and Narin would not “necessarily” be pulled within the airbag cushion. *See, e.g.*, Ex. 2017, 126:13–16, 127:21–128:4, 169:25–170:12. Rather, Ms. Balavich confirms that, depending on the relationship between the length of the cinch cord and the length of the cinch tube, the opening of the cinch tube could close without any portion of the terminal end being pulled within the airbag cushion. *See, e.g.*, Ex. 2017, 132:4–10. Thus, Ms. Balavich concedes that the pulling action of Inoue’s drawstring inside the airbag will *not necessarily* cause the terminal end of Narin’s cinch tube to be at least partially within the interior of the inflatable airbag cushion, upon airbag deployment without obstruction. *See id.* In view of Ms. Balavich’s cross-examination testimony

contradicting her original testimony (Ex. 1002 ¶ 47), we agree with Patent Owner (PO Resp. 26–28) that Petitioner fails to establish by a preponderance of evidence that the terminal end of the cinch tube in the combination of Inoue and Narin, as proposed by Petitioner, would “necessarily” be pulled partially within the interior of the airbag cushion.

Petitioner also fails to provide sufficient explanation or credible evidence to support its contention that pulling the terminal end of a cinch tube partially within the airbag cushion would be the expected or predictable result from the tension force of the drawstring. Pet. 21–23. Petitioner relies upon Inoue’s disclosure that the length of a drawstring is established such that the drawstring becomes taut and the vent hole is constricted when the airbag is fully deployed without obstruction. *Id.*; Ex. 1003 ¶ 20. That disclosure of Inoue, however, merely describes using the drawstring to constrict the opening of the vent hole. Ex. 1003 ¶ 20. Petitioner points to nothing in Inoue regarding the use of a drawstring to pull the terminal end of a cinch tube partially within the airbag cushion.

Petitioner’s arguments improperly conflate “constricting a vent hole” with “pulling the terminal end partially within the interior of the airbag cushion.” Constricting a vent hole with a drawstring does not expectedly or predictably cause the terminal end of a cinch tube to be pulled partially within an inflating airbag cushion. As Mr. Helleman testifies, an ordinarily skilled artisan would have understood that the tension that is needed to close a vent hole has no bearing on whether the terminal end of a cinch tube would be pulled within the airbag. Ex. 2038 ¶ 71. Ms. Balavich also confirms in her cross-examination testimony that, depending on the length of the cinch

tube and the length of the drawstring, the opening of the cinch tube could close without any portion of the terminal end being pulled within the airbag cushion. *See, e.g.*, Ex. 2017, 132:4–10.

Petitioner’s own conjecture does not supply the requisite evidence. “To render a claim obvious, prior art cannot be vague and must collectively, although not explicitly, guide an ordinarily skilled artisan toward a particular solution.” *Unigene Labs., Inc. v. Apotex Corp.*, 655 F.3d 1352, 1361 (Fed. Cir. 2011). Independent claim 1 expressly requires that “the terminal end is at least partially within the interior of the inflatable airbag cushion,” and independent claims 11 and 20 recite similar limitations.

In its Reply, Petitioner maintains that pulling the terminal end of a cinch tube partially within an airbag cushion is a predictable result of combining the nozzle of Narin with the drawstring and through-hole of Inoue. Reply 9–10; Ex. 1027 ¶¶ 6–8. In particular, Petitioner asserts that such a combination was an obvious improvement of the Inoue airbag because the cinch tube would decouple the closure of the vent from the distension of the airbag cushion. Reply 10. This alleged obvious improvement does not address whether the terminal end of the nozzle would end up partially within the airbag as claimed, however. *Id.* In fact, Narin describes closing the nozzle *on the outside of the airbag* in the embodiment for decoupling the closure of the nozzle from the distension of the airbag cushion fabric. Ex. 1004 ¶¶ 6, 18. Specifically, Narin states that:

Because the outflow opening is arranged at the end of an outwardly protruding tubular fabric nozzle, the necessary degrees of freedom for controlling the opening cross section of the outflow opening are provided by the folding in the area of

the fabric nozzle. The influence of the distension of the gas bag fabric on the opening characteristics of the outflow opening is thereby avoided.

Ex. 1004 ¶ 6 (emphasis added). Petitioner does not articulate, nor can we identify, an adequate reason why an ordinarily skilled artisan would have designed an airbag system to pull the terminal end of Narin's nozzle within the airbag, contrary to Narin's explicit teaching of closing the terminal end of the nozzle on the *outside* of the airbag. Pet. 20; Reply 10; Ex. 1027 ¶ 6. Thus, even assuming that such an artisan would have combined Narin's nozzle with Inoue's airbag using Inoue's drawstring to close the terminal end of Narin's nozzle, as proposed by Petitioner, Petitioner's argument, without more, does not suffice as articulated reasoning with rational underpinning why an ordinarily skilled artisan would have pulled the terminal end of Narin's nozzle partially within the airbag. *See KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (“[O]bviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some underpinning to support the legal conclusion of obviousness”). An obviousness analysis must provide a sufficient and specific reasoning to guard against the impermissible use of hindsight, even for a structurally simple claimed invention, as here. *See id.* at 421 (“A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.”).

In its Reply, Petitioner further asserts that an ordinarily skilled artisan would have been motivated “to optimize the length of the cord and the location of the cord anchor point to achieve the cord in a taut state when the

airbag is at maximum deployment, as disclosed in Inoue.” Reply 11–12; Ex. 1027 ¶¶ 7–8. Petitioner’s assertion, however, is again conclusory and without sufficient factual support. As we discussed above, nothing in Narin and Inoue teaches or suggests using a cinch cord to pull the terminal end of a cinch tube partially within the airbag cushion, as required by the claims at issue. For instance, notwithstanding that Inoue discloses a separate, long, bag-shaped item, structurally similar to a nozzle, Inoue does not describe using a drawstring to pull the terminal end of the long, bag-shaped item partially within the airbag. Ex. 1003 ¶¶ 19, 20.

Petitioner also does not articulate with sufficient specificity the nature of the problem to be solved, or the design incentive and benefits, in connection with pulling the terminal end of the cinch tube partially within the airbag. Petitioner merely alleges that “the most logical cord length to use would be one that *achieves maximum closure* of the terminal end,” and “the cord would have to be short enough to *close or partially close the tube quickly*, but long enough so that it neither closes too soon nor places excessive stress on the airbag fabric.” Reply 11; Ex. 1027 ¶¶ 7–8 (emphases added). Petitioner’s argument once again improperly conflates “closing a vent hole” with “pulling the terminal end partially within the interior of the airbag cushion.”

More importantly, although Inoue uses a drawstring to constrict the vent hole, Inoue explicitly discloses maintaining *the vent hole in an open position*, even at full deployment when the drawstring is taut, allowing the inflating gas to exit, in order to minimize the impact force on the occupant during collision—providing a softer deployment. Ex. 1003 ¶¶ 12, 27–29,

Figs. 3(3), 4. Yet, Petitioner does not explain adequately why, in light of that disclosure of Inoue, an ordinarily skilled artisan would *close the terminal end quickly to achieve maximum closure*, as proposed by Petitioner. Petitioner also does not take into account that closing the terminal end *quickly* could increase the impact force on an out-of-position occupant when the occupant collides with the airbag during the deployment, increasing the risk of injuring the occupant. Nor does Petitioner provide sufficient or credible evidence to show that the terminal end of a cinch tube would close significantly or meaningfully faster when the terminal end is pulled partially within the airbag cushion. Petitioner's reasoning therefore is inadequate as to why an ordinarily skilled artisan would have considered it obvious to pull the terminal end partially within the airbag cushion, as required by the claims at issue.

In this light, Petitioner's arguments and expert testimony are nothing more than impermissible hindsight. *See Mintz v. Dietz & Watson, Inc.*, 679 F.3d 1372, 1379 (Fed. Cir. 2012) (“Indeed, where the invention is less technologically complex, the need for *Graham* findings can be important to ward against falling into the forbidden use of hindsight.”). “Simply because the technology can be easily understood does not mean that it will satisfy the legal standard of obviousness.” *Id.*

For the foregoing reasons, we determine that Petitioner has not shown by a preponderance of the evidence that the combination of Inoue and Narin renders obvious the “within airbag” limitation. Petitioner does not argue that any other references, including Pinsenschaum, Rogerson, and Kassman, would render this limitation obvious. Pet. 15–31, 43–54; Reply 8–16.

Therefore, Petitioner has not demonstrated by a preponderance of the evidence that claims 1, 2, 4, 6, 8–12, 14, 16, and 18–20 of the '450 patent are unpatentable under § 103(a) as obvious over the combination of Inoue and Narin, alone, or in view of Pinsenschaum, alone, or in further view of Rogerson or Kassman.

F. Confidential Documents

During this trial, the parties filed several papers (e.g., Paper 38) and exhibits (e.g., Ex. 2037) under seal, alleging that these documents contain confidential information. Papers 21, 25. Because there is an expectation that information will be made public where the information is identified in a final written decision, confidential information that is subject to a protective order ordinarily would become public 45 days after final judgment in a trial, unless a motion to expunge is granted. 37 C.F.R. § 42.56; Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,761 (Aug. 14, 2012). We, however, did not rely upon or identify any confidential information in rendering the instant Final Written Decision. Furthermore, a party who is dissatisfied with this Final Written Decision may appeal this Decision pursuant to 35 U.S.C. § 141(c), and has 63 days after the date of this Decision to file a notice of appeal. 37 C.F.R. § 90.3(a).

In view of the foregoing, the confidential documents filed in the instant proceeding will remain under seal, at least until the time period for filing a notice of appeal has expired or, if an appeal is taken, the appeal process has concluded. The record for the instant proceeding will be preserved in its entirety, and the confidential documents will not be

expunged or made public, pending possible appeal. Notwithstanding 37 C.F.R. § 42.56 and the Office Patent Trial Practice Guide, neither a motion to expunge confidential documents nor a motion to maintain these documents under seal is necessary or authorized at this time. *See* 37 C.F.R. § 42.5(b).

III. CONCLUSION

For the foregoing reasons, we determine that Petitioner has not demonstrated by a preponderance of the evidence that claims 1, 2, 4, 6, 8–12, 14, 16, and 18–20 of the '450 patent are unpatentable.

IV. ORDER

In consideration of the foregoing, it is:

ORDERED that claims 1, 2, 4, 6, 8–12, 14, 16, and 18–20 of the '450 patent have not been shown to be unpatentable; and

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

IPR2014-01005
Patent 7,347,450 B2

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