

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

UNIFIED PATENTS, LLC,
Petitioner,

v.

JOSEPH Y. YOON INTELLECTUAL PROPERTY LLC,
Patent Owner.

IPR2022-00002
Patent 9,376,076 B2

Before MICHAEL L. WOODS, RYAN H. FLAX, and
BRENT M. DOUGAL, *Administrative Patent Judges*.

WOODS, *Administrative Patent Judge*.

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

I. INTRODUCTION

Petitioner, Unified Patents, LLC, filed a Petition (Paper 1, “Pet.”) requesting *inter partes* review of claims 1–12 (“the Challenged Claims”) of U.S. Patent No. 9,376,076 B2 (Ex. 1001, “the ’076 patent”). See Pet. 1. We issued a decision to institute an *inter partes* review of these claims. Paper 13 (“Institution Decision” or “Inst. Dec.”).

After institution, Joseph Y. Yoon Intellectual Property LLC (“Patent Owner”) did not file a Patent Owner Response. Nevertheless, Petitioner filed a Reply (Paper 17 (“Pet. Reply” or “Reply”)) as permitted under our trial guidance (*see* Patent Trial and Appeal Board Consolidated Trial Practice Guide 14 (Nov. 2019) (“Guide”) (“the Board will permit the petitioner, in its reply brief, to address issues discussed in the institution decision.”)).

Oral argument was held on January 26, 2023, and the transcript of the hearing has been entered as Paper 21 (“Transcript” or “Tr.”). Patent Owner attended the final hearing, confirmed that it intentionally did not file a Response in this proceeding, but otherwise did not participate in the hearing. Tr. 4:8–16.

We have jurisdiction under 35 U.S.C. § 6. Petitioner bears the burden of proving unpatentability of the challenged claims, and the burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To prevail, Petitioner must prove unpatentability by a preponderance of the evidence. See 35 U.S.C. § 316(e) (2018); 37 C.F.R. § 42.1(d) (2019). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Petitioner has shown by a

preponderance of the evidence that claims 1–12 of the '076 patent are unpatentable.

A. Related Proceedings

The parties identify *Joseph Y. Yoon Intellectual Prop. LLC v. Toyota Motor Corp.*, No. 21-cv-207 (E.D. Tex. June 8, 2021) as a related matter. Pet. 2; Paper 3, 1. This matter is no longer active, however, as the district court dismissed this proceeding without prejudice on November 16, 2021. *See* Paper 12, 2–3 (“On November 16, 2021, the district court issued an Order dismissing all pending claims and causes of action in the case without prejudice.”).

The parties do not identify any other matters related to this *inter partes* review. *See* Paper 12, 2–3; *see also* Paper 3, 1.

B. Real Parties-In-Interest

Petitioner identifies itself as the only real-party-in-interest. Paper 12, 2. Patent Owner identifies itself as the only real-party-in-interest. Paper 3, 1.

C. The '076 Patent (Ex. 1001)

The '076 patent is titled “Method and Apparatus for Deployment of an Airbag” (Ex. 1001, code (54)) and describes “a passive inflatable restraint system wherein driver and passenger air bags are employed each having two independently actuatable gas generators . . . which are activated in a fixed time sequence” (*id.* at code (57)). Such airbags are used, for example, in passenger cars, to restrain movement of the driver or passengers upon rapid deceleration. *Id.* at 1:20–27. To illustrate an embodiment, the '076 patent provides Figure 1, which we reproduce below:

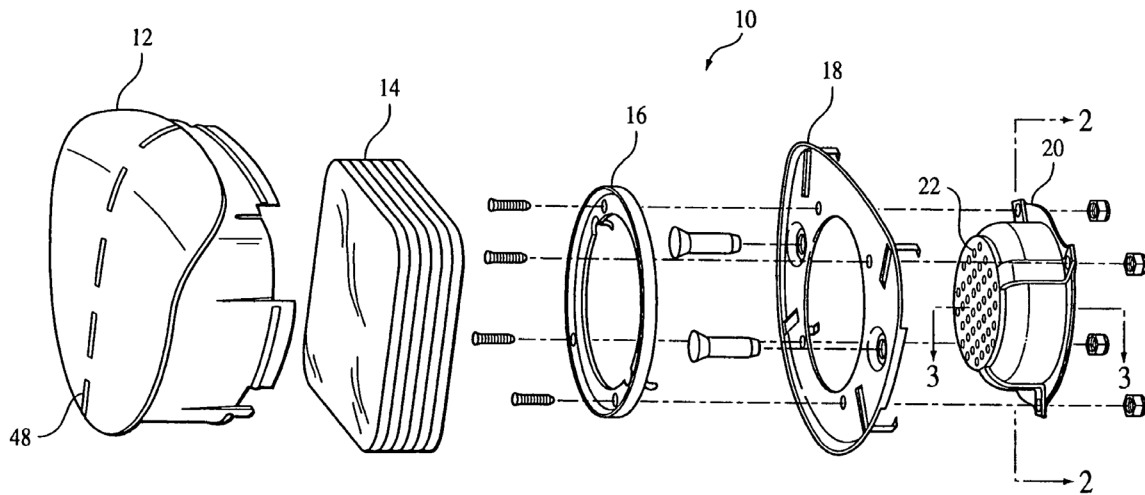


FIGURE 1

Figure 1 “is an exploded perspective view of a driver side air bag module.” *Id.* at 2:35–36. In particular, Figure 1 depicts driver’s side airbag module 10 including cover 12, air bag cushion 14, retainer 16, mounting plate 18, and inflator assembly 20. *Id.* at 3:7–10. Inflator assembly 20 includes plurality of apertures 22 and releases a volume of gas through apertures 22 into air bag cushion 14 for deploying the cushion. *See id.* at 3:10–16.

We further reproduce Figure 9 of the '076 patent, below:

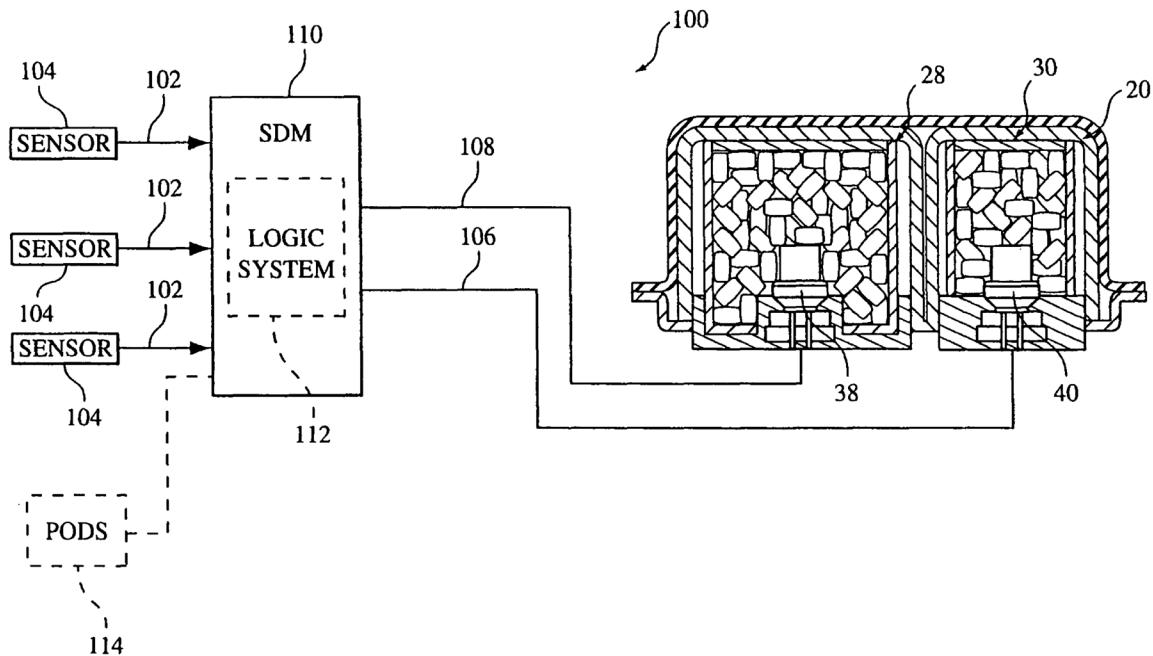


FIGURE 9

Figure 9 “is a diagrammatic view of a two-stage driver side inflator and control system.” *Id.* at 2:51–52. In particular, Figure 9 depicts control system 100 “used in the deployment of an air bag module using an inflator with a pair of initiators with a sequential firing of both initiators in accordance with an exemplary embodiment.” *Id.* at 4:46–50. Figure 9 further depicts sensing and diagnostic module (“SDM”) 110, which “receives a plurality of inputs 102 from a plurality of sensors 104 and determines whether an air bag deployment is necessary.”¹ *Id.* at 4:56–58. “If the SDM determines that an air bag deployment is necessary, SDM 110 generates a first signal 108 and a second signal 106.” *Id.* at 4:58–60.

¹ Bold emphasis of reference numerals in the '076 Patent and other U.S. Patent Documents is omitted throughout this Decision.

Signals 106, 108 instruct first and second squibs (38, 40)² of first and second initiators (28, 30) to fire. *See id.* at 4:61–64; *see also id.* at 3:37–42 (“second initiator 30 has a squib 40 for igniting a propellant 42, the resultant gas passes through vent openings 44 in a housing 46 of second initiator 30. In an exemplary embodiment, typically, first initiator 28 is larger than second initiator 30.”).

The ’076 patent further discloses that, in a particular embodiment, the first initiator fires first to provide a first amount of gas for deploying the air bag cushion into a first deployment position. The amount of gas provided to the air bag cushion is sufficient enough to cause the cushion to break through a tear line of the air bag cover, and the second initiator fires after a fixed time delay to provide a second amount of gas to the air bag cushion in order to fully deploy the air bag cushion.

Id. at 4:22–29.

D. Illustrative Claims

Claim 1 is the sole independent claim. Ex. 1001, 10:59–12:52. We reproduce independent claim 1, below, and add brackets with numbers that correspond to Petitioner’s reference numbers of the claimed limitations (*see, e.g.,* Pet. viii–ix):

1. [1.0] A restraint system for a vehicle, comprising:
[1.1] an airbag module having an inflator with a pair of initiators;

² We understand squib to mean “a small electric or pyrotechnic device used to ignite a charge.” Available at <https://www.merriam-webster.com/dictionary/squib> (last visited March 2, 2023); Ex. 3002.

[1.2] an airbag module controller for providing a sequential firing of both said pair of initiators such that there will be no unfired initiator left in said airbag module;

[1.3] a plurality of sensors for providing input signals to said airbag module controller,

[1.4] said airbag module controller providing activation signals to said pair of initiators; and

[1.5] an airbag module suppression system, said airbag module suppression system instructs said airbag module controller to suppress said airbag module;

[1.6] wherein said airbag module controller is a sensing and diagnostic module,

[1.7] said sensing and diagnostic module generating a first signal and a second signal, said first signal activating one of said pair of initiators and said second signal activating the other one of said pair of initiators, said second signal being delayed a predetermined time after said first signal; and

[1.8] wherein said airbag module suppression system is a passive occupant detection system comprising a means for detecting a vehicle occupant, said passive occupant detection system instructs said airbag module controller to suppress said airbag module when a predetermined condition has been met;

[1.9] wherein said sensing and diagnostic module receives a third signal indicative of the proper attachment and usage of a seatbelt, a fourth signal indicative of the approximate size by weight of the vehicle occupant, a fifth signal indicative of whether a seatbelt is fully extended or extended above a predetermined length and a sixth signal indicative of a threshold impact.

Ex. 1001, 10:59–24.

E. References Relied Upon

Petitioner’s challenges rely on the following references (Pet. 3):

Name	Reference	Ex. No.
Foo	US Patent No. 6,341,252 B1, issued Jan. 22, 2002	1004
Mazur	US Patent No. 5,454,591, issued Oct. 3, 1995	1005
Canterberry	US Patent No. 6,149,193, issued Nov. 21, 2000	1006
Stanley	US Patent No. 6,260,879 B1, issued July 17, 2001	1007

F. Alleged Grounds of Unpatentability

Petitioner contends that the Challenged Claims are unpatentable based on the following grounds (Pet. 3):

Ground	Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis ³
1	1, 4, 6, 9	103(a) ⁴	Foo
2	1, 2, 4–9, 11, 12	103(a)	Foo, Mazur
3	3	103(a)	Foo, Canterbury
4	1, 4, 6, 9, 10	103(a)	Foo, Stanley

Petitioner supports its challenge with a declaration from Scott Andrews (Ex. 1003). Pet. 4.

³ As with all issues presented in this matter, there is no dispute that each asserted reference is prior art to the claims of the ’076 patent.

⁴ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. § 103, effective March 16, 2013. Because the application from which the ’076 patent issued was filed before this date, the pre-AIA version of § 103 applies. Our decision, however, would not change regardless of which version of the statute applies.

II. ANALYSIS

A. *Level of Ordinary Skill in the Art*

The level of ordinary skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). The person of ordinary skill in the art (“POSITA”) is a hypothetical person presumed to have known the relevant art at the time of the invention. *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). In determining the level of ordinary skill in the art, we may consider certain factors, including the “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.” *Id.*

Petitioner contends, and is supported by the accompanying declaration testimony of Mr. Andrews, that a POSITA would have had “at least a [B]achelor’s degree in electrical engineering, or a related field, and at least two years of practical experience in automotive safety systems.” Pet. 9 (citing Ex. 1003 ¶¶ 80–83). Petitioner adds that “[t]hese descriptions are approximate, and a higher level of education or skill might make up for less experience, and vice-versa.” *Id.*

In our Institution Decision, we adopted Petitioner’s definition of the level of ordinary skill in the art. Pet. 9. We invited the parties to address this definition in further briefing if there was any disagreement. *See id.* Neither party disputed the initial definition and we maintain that definition in this Decision. In particular, we adopt Petitioner’s proposed definition of the level of ordinary skill in the art.

B. Claim Construction

As set forth in *Phillips*, claim terms are generally given their ordinary and customary meaning as would be understood by one with ordinary skill in the art in the context of the specification, the prosecution history, other claims, and even extrinsic evidence including expert and inventor testimony, dictionaries, and learned treatises, although extrinsic evidence is less significant than the intrinsic record. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–17 (Fed. Cir. 2005) (en banc) (“*Phillips*”).

Petitioner addresses three different claim limitations in its Claim Construction portion of the Petition. *See* Pet. 8–12. We address Petitioner’s proposed construction of “means for detecting a vehicle occupant” and “airbag module controller.” *See id.*

1. “means for detecting a vehicle occupant”

Petitioner submits that the claim language, “means for detecting a vehicle occupant,” which appears in independent claim 1, is a means-plus-function limitation and identifies a function and corresponding structure. *See* Pet. 9. Specifically, Petitioner submits that the recited function of “detecting a vehicle occupant” is described in the ’076 patent as being performed by “a weight sensor located in a seat, and equivalents thereof,” making this the corresponding structure. *Id.* (citing in relevant part Ex. 1001, Figs 9–10, Abstr., 2:16–17, 5:49–51, 6:56–58).

“Section 112, paragraph six, allows a patentee to express a claim limitation by reciting a function to be performed rather than by reciting structure or materials for performing that function.” *Northrop Grumman Corp. v. Intel Corp.*, 325 F.3d 1346, 1350 (Fed. Cir. 2003). Use of the term “means” creates a rebuttable presumption that a claim term is a means-plus-

function limitation. *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015). This presumption may be rebutted if the claim recites structure sufficient to perform the described functions in their entirety. *TriMed, Inc. v. Stryker Corp.*, 514 F.3d 1256, 1259 (Fed. Cir. 2008). A term written in means-plus-function form is construed to cover “the corresponding structure, material, or acts described in the specification and equivalents thereof” for performing the recited functions. 35 U.S.C. § 112, ¶ 6. Construction of means-plus-function claim terms is a two-step process. *Noah Sys., Inc. v. Intuit Inc.*, 675 F.3d 1302, 1311 (Fed. Cir. 2012). First, we determine the claimed function. *Id.* Second, we “identify the corresponding structure in the written description of the patent that performs the function.” *Id.*; *see also Williamson*, 792 F.3d at 1351. A “[s]tructure disclosed in the specification qualifies as ‘corresponding structure’ if the intrinsic evidence clearly links or associates that structure to the function recited in the claim.” *Williamson*, 792 F.3d at 1352. In conducting this analysis, we may not incorporate structure from the written description beyond that which is necessary to perform the claimed function(s). *See Micro Chemical, Inc. v. Great Plains Chemical Co.*, 194 F.3d 1250, 1258 (Fed. Cir. 1999).

Because the claim limitation recites the term “means,” there is a rebuttable presumption that the claim term is a means-plus-function limitation. *Williamson*, 792 F.3d at 1348. Furthermore, claim 1 does not identify sufficient structure for the “means for detecting a vehicle occupant.” Accordingly, on the record, we agree with Petitioner that this limitation should be interpreted as a means-plus-function term. *Cf. TriMed*, 514 F.3d at 1259. Based on the evidence in the record, we further agree with

Petitioner’s proposed claim construction. In particular, we identify the claimed function as “detecting a vehicle occupant” and the structure corresponding to the function is a “seat mounted sensor,” such as, *but not necessarily including*, one “used to detect the approximate size of the passenger occupant by weight,” and equivalent structures. Ex. 1001, 6:56–58; *see also Micro Chemical*, 194 F.3d at 1258 (“[T]he statute [does not] permit incorporation of structure from the written description beyond that necessary to perform the claimed function.”).

For these reasons, we adopt Petitioner’s proposed construction that the “means for detecting a vehicle occupant” shall be construed under 35 U.S.C. § 112, ¶ 6, and that the corresponding structure for performing the function of “*detecting a vehicle occupant*” is “a weight sensor located in a seat, and equivalents thereof.” *See* Pet. 9.

2. “*airbag module controller*”

Petitioner submits that the claim language “airbag module controller,” which also appears in independent claim 1, should *not* be construed as a means-plus-function limitation. Pet. 10.

We agree with Petitioner.

The claim language does not use the word “means” or other nonce words and does not recite a function to be performed. Rather, the language connotes structure.

The ’076 patent uses the term “sensing and diagnostic module” (*see, e.g.*, Ex. 1001, 11:4–5) and we find persuasive Mr. Andrews’s unrebutted testimony that a “POSITA would have understood that a ‘sensing and diagnostic module’ or ‘SDM’ was the name for a known component of vehicle restraint system—namely, the airbag microcontroller that was typical

as of the asserted priority date” (Ex. 1003 ¶ 93). We further agree with Mr. Andrews’s testimony that an “airbag microcontroller” is often referred to as a “sensing and diagnostic module.” *Id.* ¶ 94.

Giving the claim language “airbag module controller” its ordinary and customary meaning, in light of the Specification and in agreement with Mr. Andrews’s testimony, we interpret the term “airbag module controller” as an airbag microcontroller, including, but not limited to, the “sensing and diagnostic modules” described in the ’076 patent. *Phillips*, 415 F.3d at 1312–17.

3. *“indicator means for indicating when said [passenger side] airbag module is suppressed”*

The claim language, which appears in claim 5, uses the term “means,” thereby creating a presumption that the term is a means-plus-function limitation. *Williamson*, 792 F.3d at 1348. Because we do not find sufficient structure in the claim for performing this function, the presumption is not rebutted. *See TriMed*, 514 F.3d at 1259.

Petitioner submits that a “POSITA would understand that the disclosed structure corresponding to the recited function of ‘*indicating when said [passenger side] airbag module is suppressed*’ is an indicator light, and equivalents thereof.” Pet. 10 (citing Ex. 1001, Fig. 10 (element 326), 7:42–47, 10:8–13 (“indicator light 472 to indicate that the airbag has been suppressed”), 12:17–18 (“said indicator means is an indicator light”); Ex. 1003 ¶¶ 89–92). Petitioner explains that the ’076 patent does not describe other structure for performing this function. *See id.*

We adopt Petitioner’s proposed construction that the “**indicator means for indicating when said [passenger side] airbag module is suppressed**” shall be construed under 35 U.S.C. § 112, ¶ 6, and that the

corresponding structure for performing the function of “indicating” is an indicator light and equivalents thereof. *See* Pet. 10.

4. *Other Claim Terms*

We determine that there are no other terms that require express construction. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Ltd. Matal*, 868 F.3d 1013, 1017 (Fed. Cir. 2017); *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

C. *Principles of Law*

“In an . . . [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016). This burden never shifts to Patent Owner. *Dynamic Drinkware*, 800 F.3d at 1378.

Petitioner’s challenges are based on obviousness. Pet. 3. A claim is unpatentable as obvious 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 skill in

the art;⁵ and (4) where in evidence, objective indicia of non-obviousness or so-called secondary considerations.⁶ *Graham*, 383 U.S. at 17–18.

D. Ground 1: Unpatentable Over Foo

Petitioner contends that claims 1, 4, 6, and 9 are unpatentable as obvious over Foo. Pet. 12.

1. Foo (Ex. 1004)

Foo is titled “Method and Apparatus for Controlling an Actuatable Occupant Protection Device” (Ex. 1004, code (54)) and describes a “method and apparatus for controlling an actuatable occupant restraint device [such as an air bag and seat belt pretensioner] having a plurality of sensor inputs” (*see id.* at 1:8–15). Foo was filed as U.S. Application 09/468,807 on December 21, 1999, and issued as a U.S. Patent on January 22, 2002. *Id.* codes (21), (22), (45). The ’076 patent indicates on its face that it is entitled to priority to U.S. Provisional Application 60/248,997, which was filed November 1, 2000. Ex. 1001, code (60), 1:8–10. Thus, on this record, Foo is prior art under 35 U.S.C. § 102(e) to the claims of the ’076 patent.

⁵ *See supra* § II.A defining the level of ordinary skill in the art.

⁶ There is no evidence of record concerning objective indicia of non-obviousness.

We first reproduce Foo's Figure 1, below:

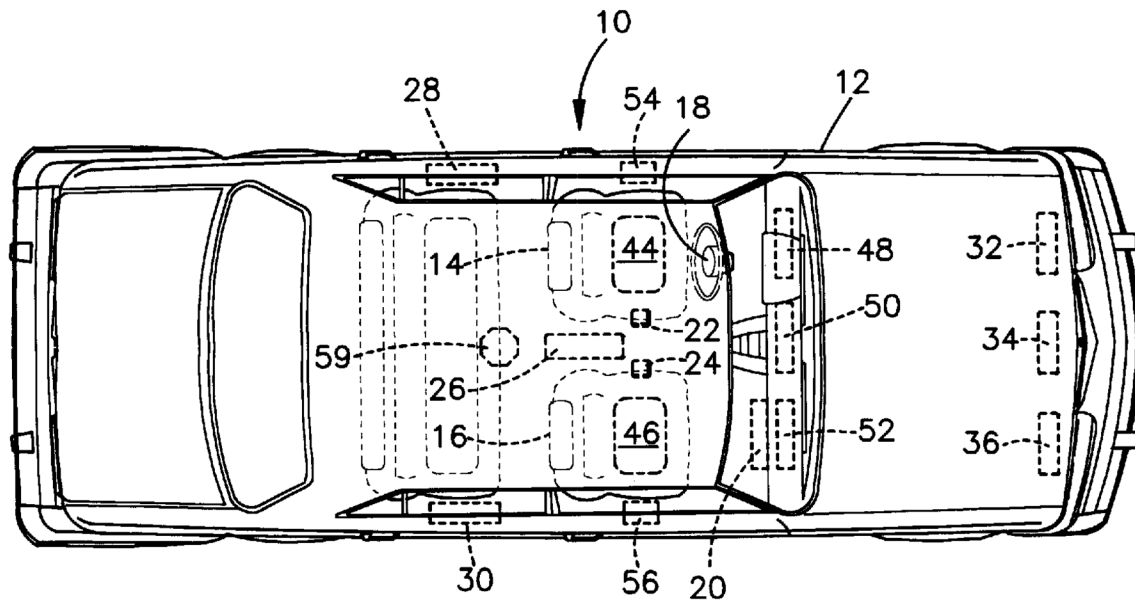


Fig.1

Figure 1 “is a schematic diagram of a vehicle equipped with a system in accordance with [Foo’s] invention.” Ex. 1004, 2:61–62. Specifically, Figure 1 depicts actuable occupant restraint system 10 for use in vehicle 12. *Id.* at 3:8–10. Vehicle 12 includes driver side seat 14 with airbag 18 and passenger side seat 16 with air bag 20. *See id.* at 3:10–14. In a preferred embodiment, the air bags have multiple actuable stages that can be simultaneously or sequentially actuated to provide controlled inflation. *Id.* at 3:14–17. Foo further discloses that sensor devices are provided to central control unit or controller 26 for controlling actuation of air bags 18, 20. *See id.* at 3:22–30.

An embodiment of Foo's system 10 with controller 26 is depicted in Figure 2, reproduced below:

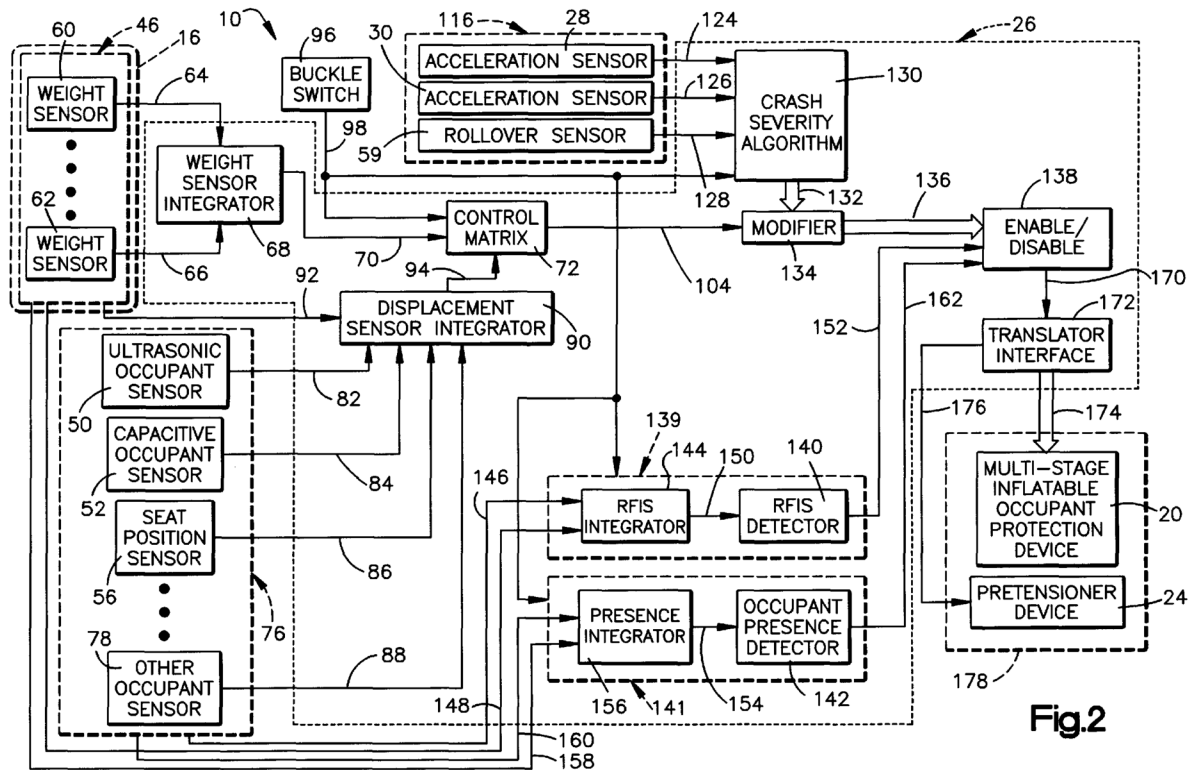


Figure 2 “is a function diagram representing the system of FIG. 1 configured for a passenger seat in accordance with [Foo’s] invention.” *Id.* at 2:61–62. Figure 2 depicts controller 26 within Foo’s restraint system 10, including acceleration sensors 28, 30 and crush zone sensors 32, 34, 36 (shown in Figure 1). *See id.* at 3:44–46, 3:59–62. System 10 further includes weight sensing system 44, 46, which is preferably formed from a plurality of sensors that indicate the weight of an object located on respective seats 14, 16 (all shown in Figure 1). *See id.* at 4:3–8. “The weight sensors of each weight sensing system 44 and 46 provide signals to the controller 26 which are used to determine weight and position of an object located on each respective seat 14 and 16.” *Id.* at 4:12–15. System 10 also includes a

rearward facing infant seat (“RFIS”) detection system and occupant presence detection system 141, that may provide signals to disable actuation of the air bags. *See id.* at 11:50–56.

In response to a crash condition, controller 26 actuates its air bags. *See id.* at 3:51–53. If, for example, the sensed weight is less than 14 kg, the RFIS may disable deployment of the air bags. *See id.* at Fig. 4, 11:33–48. Additionally, the system may include “a seat back angle sensor, a seat belt payout sensor, an infrared sensor, a radar position sensor, a microwave position sensor and/or any other known occupant sensors.” *Id.* at 4:51–58.

2. Claim 1

a. “[1.0] A restraint system for a vehicle, comprising”

Petitioner submits that the preamble is not a limitation, but “to the extent that the preamble is considered a limitation, Claim Element [1.0] is disclosed or rendered obvious by Foo.” Pet. 16 (citation and emphasis omitted).

Foo discloses an air bag and seat belt restraint system for vehicles. *See, e.g.*, Ex. 1004, Fig. 1 (depicting air bags 18, 20 in vehicle 12); *see also id.* at 3:7–10 (“restraint system **10** for use in vehicle **12**”); *see also* Pet. 16 (citing the same).

Petitioner has demonstrated by a preponderance of the evidence that Foo satisfies the limitation (if considered such) recited in the preamble (i.e., limitation 1.0).

b. “[1.1] an airbag module having an inflator with a pair of initiators”

Petitioner submits that Foo discloses element [1.1], citing Foo’s airbags 18, 20. Pet. 16.

Foo discloses that its multi-stage air bags 18, 20 have “two or more separate sources of inflation fluid controlled by actuation of associated squibs.” Ex. 1004, 1:48–50, 3:14–18; *see also* Pet. 16–17 (citing the same). Specifically, Foo discloses that “each of the air bags 18 and 20 has multiple actuatable stages that can be simultaneously or sequentially activated to provide controlled inflation.” Ex. 1004, 3:14–17. Mr. Andrews testifies that “each of Foo’s multi-stage air bags 18, 20 has an inflator with at least two initiators,” that is, “two or more separate sources of inflation fluid controlled by actuation of associated squibs.” Ex. 1003 ¶ 146 (quoting Ex. 1004, 3:14–18) (emphasis omitted).

Petitioner has demonstrated by a preponderance of the evidence that Foo satisfies the limitations recited in 1.1.

c. “[1.2] an airbag module controller for providing a sequential firing of both said pair of initiators such that there will be no unfired initiator left in said airbag module”

Petitioner submits that Foo discloses this limitation (Pet. 18) and, in the alternative, that a POSITA would have included such a feature in Foo’s system for safety and/or convenience reasons (*see id.* at 20).

Petitioner first cites to Foo’s disclosure that its “controller 26 controls actuation of the actuatable restraint devices, such as the air bags 18 and 20 and pretensioner devices 22 and 24, in response to signals from the sensors and a control process in accordance with the present invention.” *Id.* (citing Ex. 1004, 3:25–31) (emphasis omitted). Foo further discloses that “each of the air bags 18 and 20 has multiple actuatable stages that can be simultaneously or *sequentially actuated to provide controlled inflation.*” Ex. 1004, 3:14–17. Mr. Andrews testifies that “a POSITA would have

recognized that because each stage of the airbag system is fired, ‘*there will be no unfired initiator left in said airbag module.*’” Ex. 1003 ¶ 154.

In the alternative, Petitioner reasons that, to the extent that Foo does not expressly disclose this limitation, it would have been obvious to a POSITA “at the time of filing to ensure that no unfired initiator remained following airbag deployment, for example, to prevent the risk of unintentional follow-on explosions at the crash scene, which could harm the vehicle occupants and emergency responders.” Pet. 20. Mr. Andrews testifies that “[i]t was also critical that no unreacted propellant remained in the air bag module and that the combustion reaction went to completion to prevent the risk of unintentional follow-on explosions at the crash scene, which could cause further harm to the vehicle occupants and emergency responders.” Ex. 1003 ¶ 158 (citing as evidence Ex. 1011, 4:17–23).

Although we do not find that Foo *explicitly discloses* that there will be no unfired initiator remaining in Foo’s airbags are actuated, Petitioner has demonstrated by a preponderance of the evidence that it would have been obvious to modify Foo’s airbag module controller, if necessary, so that it provides “a sequential firing of both said pair of initiators such that there will be no unfired initiator left in said airbag module” for the purpose of improving safety, thereby satisfying the limitations recited in 1.2.

d. “[1.3] a plurality of sensors for providing input signals to said airbag module controller”

Petitioner submits that Foo discloses limitation 1.3. Pet. 23. Petitioner cites Foo’s crash sensors 28, 30, weight sensors 14, 16, occupant sensing devices 48, 50, 52, 54, 56 and buckle switch detector 96. *Id.* at 23–24 (citing Ex. 1004, Figs. 1–2, 3:32–35, 3:46–4:62, 6:30–40).

Foo discloses that its “controller 26 preferably is a microcomputer programmed to control actuation of the occupant protection devices system 18–24 in response to input signals from a plurality of sensors.” Ex. 1004, 3:32–35; *see also id.* at Fig. 2 (depicting multiple sensors providing input signals to controller 26).

Petitioner has demonstrated by a preponderance of the evidence that Foo satisfies the limitations recited in 1.3.

e. “[1.4] said airbag module controller providing activation signals to said pair of initiators”

Petitioner submits that Foo discloses limitation 1.4. Pet. 18. In support Petitioner cites Foo’s Figure 2, including signals 174 from controller 26. *Id.* at 20. Although Figure 2 only shows one arrow 174, Petitioner relies on Mr. Andrews’s testimony, “explaining that wider arrows [(like the one indicating signal 174)] are used for multiple signals in Foo.” *Id.* at 21–22 (citing Ex. 1003 ¶ 188).

Foo discloses that its control signal 174 is provided “to the inflatable occupant protection device[] 20.” Ex. 1004, 13:33–35; *see also id.* at Fig. 2 (depicting signal 174 from translator interface 172 to multi-stage inflatable occupant device 20). Foo further discloses that control signal 174 is provided “to appropriate driver circuits (not shown) to provide sufficient electrical current to actuate each stage of the multi-stage air bag” (*id.* at 13:40–43) for the purpose of “control[ling] when, if at all, to fire the second stage of the device 20” (*see id.* at 13:46–47).

Petitioner has demonstrated by a preponderance of the evidence that Foo satisfies the limitations recited in 1.4.

f. “[1.5] an airbag module suppression system, said airbag module suppression system instructs said airbag module controller to suppress said airbag module”

Petitioner submits that Foo discloses element 1.5. Pet. 25. Petitioner cites to Foo’s occupant presence detection system, shown in Figure 2, and submits that this “generates a signal that ‘instructs said airbag module controller to suppress said airbag module.’” *Id.* Petitioner also cites to Foo’s disclosure that “detection system[] . . . 141 provide[s] signals that are used in Boolean logic operations with the signal 136 from the modifier function 134 to either enable or disable actuation of the protection devices 20 and 24.” *Id.* (quoting Ex. 1004, 11:53–56) (emphases omitted).

Petitioner further cites to Foo’s signals for disabling the airbag when passenger weight is below 14 kg. *Id.* at 28 (citing Ex. 1004, 8:4–26 (“[W]hether a deployment or non-deployment condition exists . . . depends on (i) the value of the buckle switch signal 98, (ii) the range value where the weight sensor integrator signal 70 falls, and (iii) the range value where the displacement sensor integrator signal 94 falls”), 11:9–44 (“[W]hen the vehicle occupant is determined to be too light or out-of-position, the control matrix signal 104 also may have a value which disables the actuatable protection devices 20 and 24.”)).

Mr. Andrews testifies that, “via signal 162, system 141 can override a deployment of the airbag that would otherwise occur based on crash severity.” Ex. 1003 ¶ 170 (citing Ex. 1004, 12:55–57 (“an output signal 162 . . . having a value either to enable or disable the occupant protection devices 20”)). Mr. Andrews further testifies that

A POSITA would have understood that the “disabling” function of Foo is the same as, or equivalent to, the overriding, or “suppressing” function of the ’076 Patent. That is, it

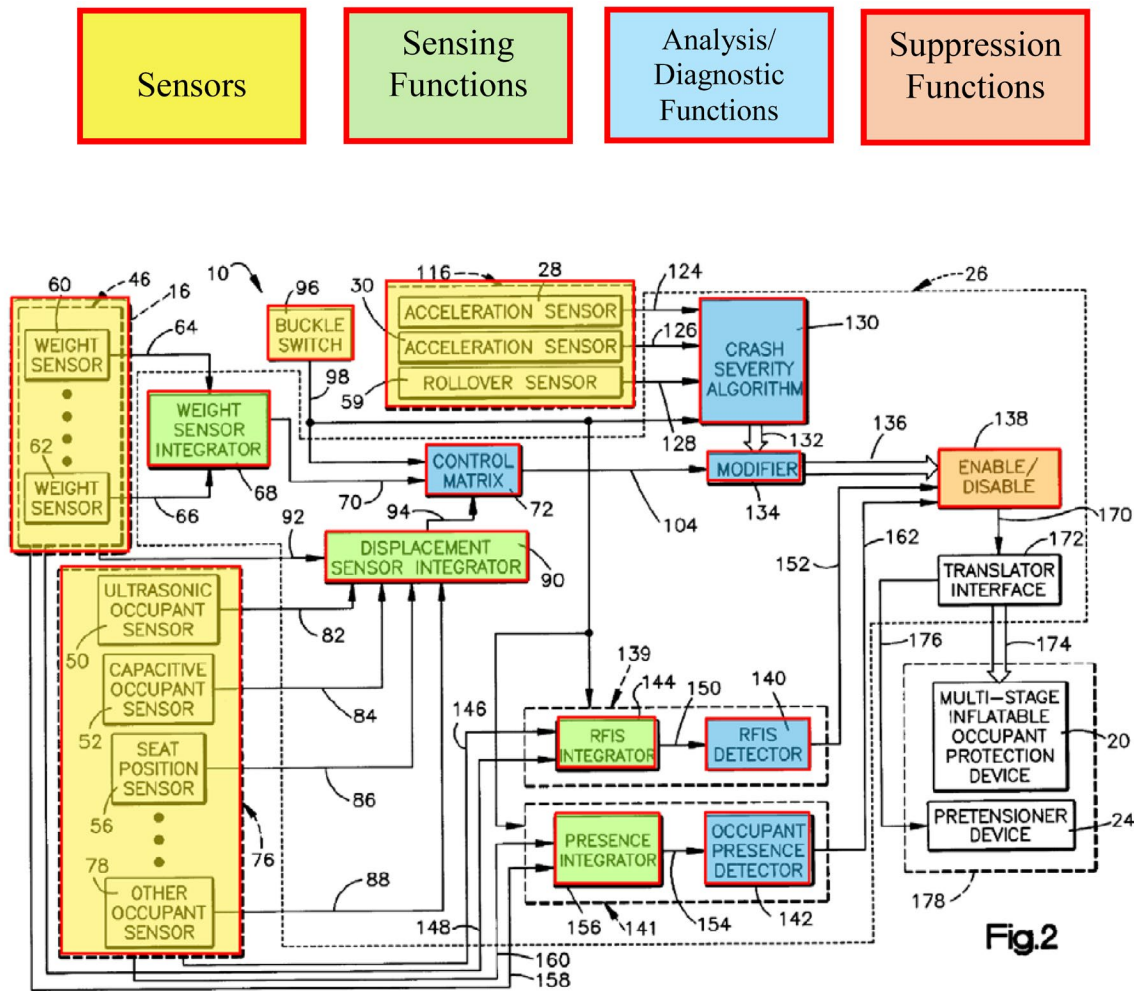
prevents deployment where the crash would have otherwise resulted in deployment. As was well-known in the art, although a vehicle crash may warrant airbag deployment, certain conditions may require overriding (i.e., suppressing) the deployment for safety reasons (e.g., where the occupant is in the wrong position, is unbelted, or is too close to the air bag at the time of deployment). Thus, it was typical for airbag systems to have numerous sensors—not only to detect the crash, but to detect conditions requiring suppression of the airbag to optimize the safety benefits.

Id. ¶ 171.

Petitioner has demonstrated by a preponderance of the evidence that Foo satisfies the limitations recited in 1.5.

g. “[1.6] wherein said airbag module controller is a sensing and diagnostic module”

Petitioner submits that “a POSITA would have understood that the controller 26 of Foo . . . is a ‘*sensing and diagnostic module*.’” Pet. 31. In support of this assertion, Petitioner submits an annotated version of Foo’s Figure 2 (*id.* at 32), which we reproduce, below:



Annotated Figure 2 has been modified to indicate what Petitioner asserts are “sensors” (shown in yellow), “sensing functions” (shown in green), “analysis/diagnostic functions” (shown in blue), and “suppression functions” (shown in red). *Id.* Mr. Andrews testifies that annotated Figure 2

shows that the vehicle restraint system of Foo comprises a variety of external sensors (labeled in yellow), and a variety of sensor interfaces or sensing functions (labeled in green) that receive and process the outputs of the external sensors. Foo then passes the results of these sensed signals to various analysis or “diagnostic” functions (labeled in blue), for example: (1) the crash severity algorithm 130, control matrix 72, and modifier 134 that determine if the airbag should be deployed and if so, in what way; (2) analysis or “diagnostic

functions such as the RFIS detector 140 and the occupant presence detector 142 that determine if the signals indicate that the air bag operation should be suppressed; and finally (3) an enable/disable function (labeled in orange) that is used to suppress the indication to fire the airbag based on some of the sensed conditions. Thus, a POSITA would have recognized that Foo's module controller 26 is a "sensing and diagnostic module," as claimed.

Ex. 1003 ¶ 185.

Petitioner has demonstrated by a preponderance of the evidence that Foo satisfies the limitations recited in 1.6.

h. "[1.7] said sensing and diagnostic module generating a first signal and a second signal, said first signal activating one of said pair of initiators and said second signal activating the other one of said pair of initiators, said second signal being delayed a predetermined time after said first signal"

Petitioner asserts that Foo discloses limitation 1.7. Pet. 32–33.

Petitioner submits that "activation signals 174 (i.e., the recited 'first signal' and 'second signal,' as explained for Claim Element [1.4]) are 'generat[ed]' in the 'translator interface 172' of controller 26." *Id.* at 33 (citing Ex. 1004, 13:11–47) (emphases omitted). Petitioner explains that "signals 174 activate the first and second initiators, respectively." *Id.* (citing Ex. 1004, 13:40–47).

Foo discloses that "signal 174 controls the time to fire the first stage (e.g., when TTF_LOW is exceeded) of the multiple stage device 20" and that "[t]he signals 174 also control when, if at all, to fire the second stage of the device 20 based on the ΔT value." Ex. 1004, 13:43–47. Foo further discloses a predetermined time delay between the activation of the first initiator and the second initiator. *See id.* at 8:9–11 ("a desired amount of time delay to impose between stages").

Petitioner has demonstrated by a preponderance of the evidence that Foo satisfies the limitation recited in 1.7.

i. “[1.8] wherein said airbag module suppression system is a passive occupant detection system comprising a means for detecting a vehicle occupant, said passive occupant detection system instructs said airbag module controller to suppress said airbag module when a predetermined condition has been met”

Petitioner submits that “[w]ith respect to Claim Element [1.8], and as described above with respect to Claim Element [1.5], Foo discloses that ‘said airbag module suppression system . . . instructs said airbag module controller to suppress said airbag module.’” Pet. 28 (emphases omitted). Petitioner further submits that Foo’s “airbag module suppression system is a passive occupant detection system comprising a means for detecting a vehicle occupant” and that “the instruction to suppress is ‘when a predetermined condition has been met.’” *Id.* at 28–29 (emphasis omitted).

Foo’s occupant detection system is weight-based, and Petitioner submits that this satisfies a “passive occupant detection system comprising a means for detecting a vehicle occupant,” as recited in claim 1. *See id.* at 29 (citing Ex. 1004, Fig. 2, 5:11–28); *see also supra* § II.B.1 (construing “means for detecting a vehicle occupant” under 35 U.S.C. § 112, ¶ 6, and determining the corresponding structure as a “a weight sensor located in a seat, and equivalents thereof”).

Foo discloses that “weight sensors 60 and 62 are operatively mounted within the seat 16 to provide weight sensor signals 64 and 66.” Ex. 1004, 5:11–28; *see also id.* at Fig. 2 (depicting signals 64, 66 emanating from weight sensors 60, 62, respectively to weight sensor integrator 68). Foo further discloses that its “occupant presence detection system 141 determines whether an occupant is present on the seat 16.” *Id.* at 12:33–34. Foo further discloses that “[i]n certain situations, such as when the vehicle occupant is determined to be too light or out-of-position, the control matrix

signal 104 [] may have a value switch which disables the actuatable protection devices 20 and 24.” *Id.* at 11:34–37. For example, if the weight of the occupant is less than 14 kg, Foo’s system will suppress deployment of the air bag. *See, e.g., id.* at Fig. 4, 7:14–20.

Mr. Andrews testifies that “signal 70 gives a suppression or deployment override instruction [when the passenger weight is below 14 kg, that is, the *predetermined condition*] even though the crash signal 132 from the crash severity algorithm 130 would otherwise result in air bag deployment.” *See* Ex. 1003 ¶ 173.

Petitioner has demonstrated by a preponderance of the evidence that Foo satisfies the limitations recited in 1.8.

j. “[1.9] wherein said sensing and diagnostic module receives a third signal indicative of the proper attachment and usage of a seatbelt, a fourth signal indicative of the approximate size by weight of the vehicle occupant, a fifth signal indicative of whether a seatbelt is fully extended or extended above a predetermined length and a sixth signal indicative of a threshold impact”

Petitioner submits that “[a]s described with respect to Claim Element [1.3], the system of Foo has a plurality of sensors” and that “[t]he communication of signals from these sensors to the controller discloses ‘said sensing and diagnostic module receiv[ing]’ the third, fourth, fifth, and six signals required by Claim Element [1.9].” Pet. 34 (citing Ex. 1003 ¶¶ 93–99) (emphasis omitted). In particular, Petitioner submits the following summary of each of the third, fourth, fifth, and six signals.

With respect to the “*third signal indicative of the proper attachment and usage of a seatbelt,*” Appellant submits the following annotated figure (a detail of Foo’s Figure 2) (*id.* at 35) (bold emphasis omitted):

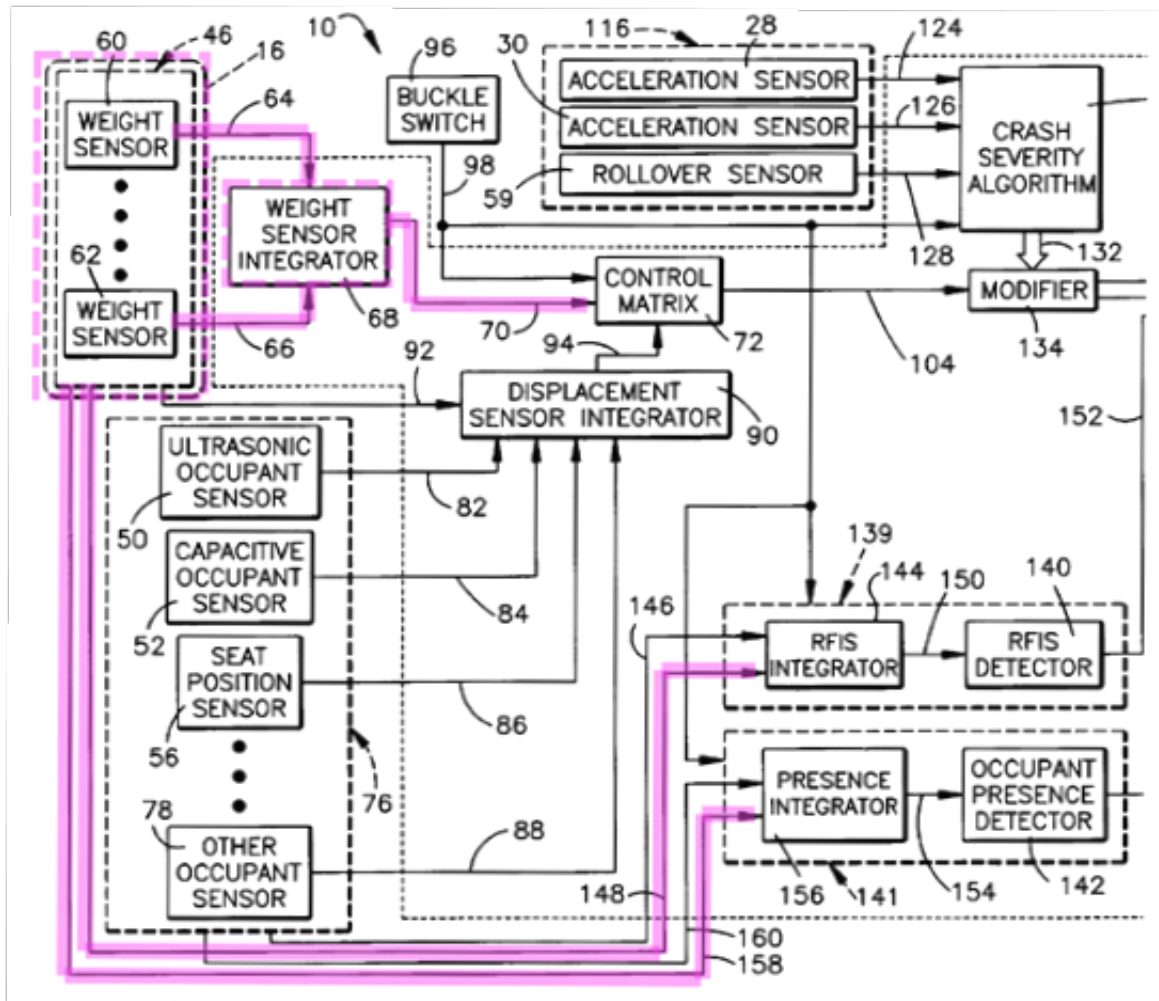
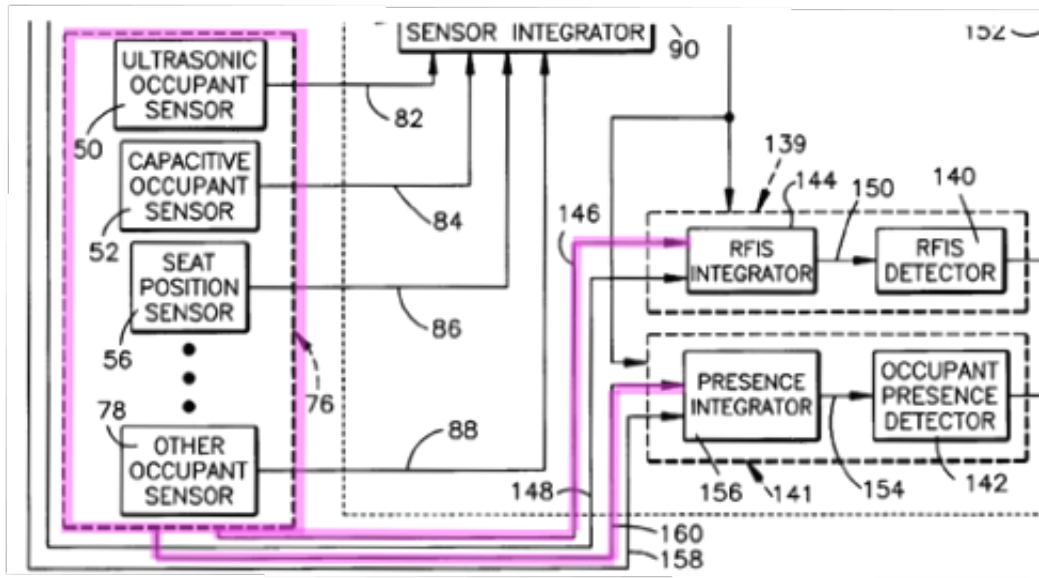


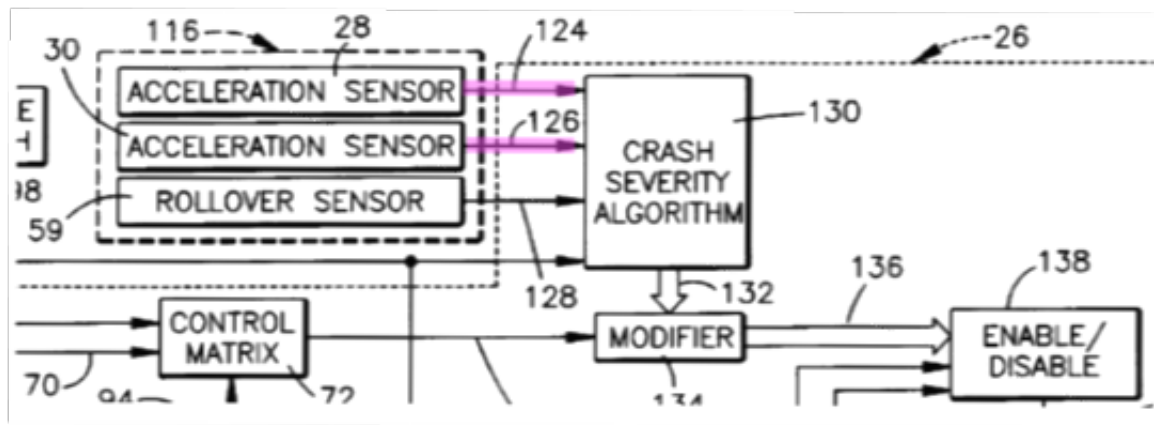
Figure 2 depicts a portion of Foo’s Figure 2 with purple annotations from Foo’s weight sensor system 46. Petitioner submits that “the weight sensor system 46 provides signals 64, 66 to integrator 68 and signals 148 and 158 to subsystems 139 and 141, respectively.” Pet. 36 (emphasis omitted). Foo discloses that its “weight sensor integrator 68 resolves and/or integrates the output signals 64 and 66 from the various weight sensors 60 and 62 of the weight sensing system 46 to provide a signal 70 having a value indicative of integrated occupant weight information of an object located on the seat 16.”). Ex. 1004, 5:30–35.

With respect to the “*fifth signal* indicative of whether a seatbelt is fully extended or extended above a predetermined length,” Petitioner submits another annotated detail version of Foo’s Figure 2 (Pet. 38), a copy of which we reproduce, below:



Petitioner’s annotations to a detail of Foo’s Figure 2 include purple highlighting to emphasize control signals from Foo’s occupant sensing devices 50, 52. Petitioner submits that these sensing devices “would provide a signal that indicates ‘*whether a seatbelt is fully extended or extended above a predetermined length*’ and that “this is how a payout sensor works.” Pet. 38. Foo discloses that “other types of sensors could be used to monitor occupant position . . . [s]uch other sensors include . . . a seat belt payout sensor.” Ex. 1004, 4:53–56. Mr. Andrews testifies that “[t]he length of the paid out portion of the belt may be indicative of the size of the occupant or of an inanimate object secured to the passenger seat.” Ex. 1003 ¶ 198.

With respect to the “*sixth signal* indicative of a threshold impact,” Petitioner submits another annotated detail version of Foo’s Figure 2 (Pet. 38), a copy of which we reproduce, below:



Petitioner’s annotations to a detail of Foo’s Figure 2 highlights (in purple) signals 124, 126 from acceleration sensors 28, 30, respectively. Petitioner submits that signals 124, 127 are “indicative of vehicle crash acceleration” and explains that vehicle acceleration/deceleration “is indicative of a collision or crash event.” Pet. 39 (citing Ex. 1004, 9:55–57, 10:50–67, 1:16–18, 9:46–49).

Petitioner has demonstrated by a preponderance of the evidence that Foo satisfies the limitations recited in 1.9.

k. Summary of Claim 1

Petitioner has demonstrated by a preponderance of the evidence that claim 1 is unpatentable over Foo.

3. Claim 4

Claim 4 depends from claim 1 and further recites, “seatbelt switches for providing a signal to said sensing and diagnostic module, said signal indicating whether a seatbelt is properly fastened.” Ex. 1001, 11:47–51.

Petitioner points out that Foo discloses

[a] buckle switch detector 96 detects whether a seat belt tongue and corresponding buckle are in a latched condition, i.e., whether the seat belt of the seat 16 is belted (buckled) or unbelted (unbuckled)...[and] provides a buckle switch signal 98

to the control matrix 72 indicating the detected status of the seat belt buckle switch.

Pet. 40 (quoting Ex. 1004, 6:29–40) (emphasis omitted); *see also* Ex. 1003 ¶¶ 202–204) (explaining that when a seatbelt is “buckled,” it is “fastened.”).

Petitioner has demonstrated by a preponderance of the evidence that Foo satisfies the limitations recited in claim 4.

4. Claim 6

Claim 6 depends from claim 1 and further recites,

[6.1] a seat mounted sensor for detecting a vehicle occupant by weight, said seat mounted sensor provides a first suppression signal to said sensing and diagnostic module to suppress a passenger side airbag module when the weight of same vehicle occupant is below a pre-determined weight; and

[6.2] a seatbelt sensor for determining whether an infant seat is secured to a passenger seat via a seatbelt, said seatbelt sensor provides a second suppression signal to said sensing and diagnostic module to suppress said passenger side airbag module when said infant seat is fastened to said passenger seat.

Ex. 1001, 12:1–12 (numbering added for clarity).

To address 6.1, Petitioner cites to Foo’s disclosure that

The weight sensors 60 and 62 are operatively **mounted within the seat 16 to provide weight sensor signals 64 and 66**, respectively, to . . . the controller 26. The weight sensor signals 64 and 66 have electrical characteristics indicative of a measured weight of an object located on the seat 16.

The weight sensors 60 and 62, for example, may be located **within the seat cushion** of the seat 16 The signals 64 and 66 of the weight sensor system 46 also **provide an indication as to whether an object is located on the seat 16. If no weight is sensed, it is assumed there is no object on the seat 16.**

Pet. 41 (quoting Ex. 1004, 5:8–27); *see also* Ex. 1003 ¶¶ 205–206 (testifying in support of the same).

To address 6.2, Petitioner cites to Foo’s disclosure that

[T]he RFIS detector **determines whether a rearward facing infant seat is present on seat 16 based on** an input signal 150 from an RFIS integrator 144. The RFIS integrator 144 receives the **buckle switch signal 98** and a signal 148 from the weight-sensing system 46 and a signal 146 from the occupant-sensing system 76.

Pet. 42–43 (citing Ex. 1004, 11:57–66).

Petitioner has demonstrated by a preponderance of the evidence that Foo satisfies the limitations recited in claim 6

5. *Claim 9*

Claim 9 depends from claim 6 and further recites,

[9.1] a pre-tensioner disposed on said seatbelt, said pretensioner being adapted to remove slack from said seatbelt in response to pre-determined conditions sensed by said plurality of sensors,

[9.2] said sensing and diagnostic module being configured to suppress said pre-tensioner in response to either said first suppression signal or said second suppression signal.

Ex. 1001, 12:18–25 (adopting Petitioner’s numbering and bracketing added for clarity); *see also* Pet. 43 (providing bracketing and numbering of claim elements).

Mr. Andrews testifies that “seatbelt pretensioners are used to rapidly tighten the seatbelt in a collision” and that the “objective is to ensure that the occupant is firmly restrained in their seat.” Ex. 1003 ¶ 212.

To address 9.1, Petitioner cites to Foo’s disclosure that “controller 26 controls actuation of the actuatable restraint devices, such as the air bags 18 and 20 **and pretensioner devices 22 and 24, in response to signals from**

the sensors.” Pet. 43–44 (quoting Ex. 1004, 3:25–30). Petitioner further cites to Foo’s disclosure that “[w]hen a deployment crash event is determined to be occurring, the restraint is actuated, e.g., an air bag is deployed and/or a seat belt pretensioner is actuated.” *Id.* at 44 (quoting Ex. 1004, 11:1–20); *see also* Ex. 1003 ¶¶ 211–214.

To address 9.2, Petitioner cites to Foo’s disclosure that “disabling the airbag 20 **and the pretensioner device 24.**” Pet. 44 (quoting Ex. 1004, 11:33–49); *see also* Ex. 1003 ¶¶ 215–216. Mr. Andrews testifies that “Foo teaches that its restraint system suppression techniques can be applied with respect to the pre-tensioner, just as with the air bags” and that this “includes suppression when the weight of the vehicle occupant is below a predetermined weight (i.e., in response to the first suppression signal) or when an RFIS is detected (i.e., in response to the second suppression signal).” Ex. 1003 ¶ 215.

Petitioner has demonstrated by a preponderance of the evidence that Foo satisfies the limitations recited in claim 9.

6. Summary of Ground 1

Petitioner has demonstrated by a preponderance of the evidence that claims 1, 4, 6, and 9 would have been obvious over Foo.

E. Ground 2: Unpatentable Over Foo and Mazur

Petitioner contends that claims 1, 2, 4–9, 11, and 12 are unpatentable as obvious over Foo in view of Mazur. Pet. 45.

1. *Mazur (Ex. 1005)*

Mazur is a U.S. Patent titled “Method and Apparatus for Sensing a Rearward Facing Child Restraining Seat.” Ex. 1005, code (54). We reproduce Figure 1 of Mazur, below:

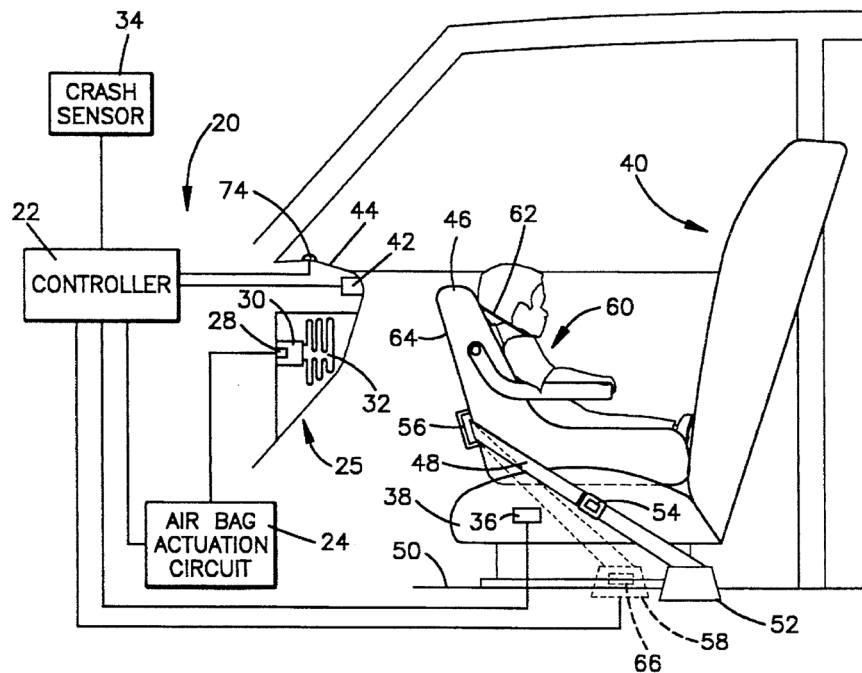


Fig.1

Figure 1 “is a schematic of an apparatus for controlling an air bag restraint.” Ex. 1005, 2:67–3:1. In particular, Figure 1 depicts apparatus 20 with controller 22 operatively connected to air bag actuation circuit 24. *Id.* at 3:13–15. Actuation circuit 24 is operatively coupled to air bag assembly 25 and is electrically connected to squib 28 and a source of electrical energy. *Id.* at 3:17–19. Controller 22 is connected to the base of transistor 26 and when controller 22 turns on transistor 26, current passes through squib 28 to ignite the squib. *Id.* at 3:20–23. Apparatus 20 also includes crash sensor 34 connected to controller 22 and weight sensor 36 mounted in seat cushion 38 of seat 40 and electrically-connected to controller 22. *Id.* at 3:30–33.

2. Claim 1

Petitioner maintains its position that Foo alone discloses every element of claim 1, but “to the extent it [may be] argued that Foo alone does not teach or suggest the ‘fifth signal . . .’ of Claim Element 1.9, this feature would have been obvious to a POSITA.” Pet. 47. Petitioner submits that Mazur teaches that “[w]hen a child restraining seat is secured in a rearward facing direction, a belt payout equal to or greater than a predetermined amount occurs.” *Id.* (citing Ex. 1005, 4:29–31, Fig. 2). Petitioner explains that “a POSITA would have recognized an additional benefit of simplifying the design of Foo by eliminating the need for one or more of Foo’s ultrasonic, capacitive, and/or seat position sensors.” *Id.* (citing Ex. 1003 ¶ 224).

Based on Mazur’s teachings, Petitioner reasons, *inter alia*, that a “POSITA would have been motivated to use Mazur’s RFIS detection based on payout sensors in the airbag system of Foo” (*id.* (citing Ex. 1003 ¶¶ 221–224)) and that the proposed combination would have improved Foo’s system by allowing it to “efficiently identify an RFIS [rearward facing infant seat]” (*id.* at 45 (citing Ex. 1003 ¶¶ 225–228)).

Petitioner has demonstrated by a preponderance of the evidence that Foo in view of Mazur satisfies the limitations recited in claim 1.

3. Claim 2

Claim 2 recites:

[2.0] The restraint system as set forth in claim 1 wherein the air bag module includes a passenger air bag and the sensing and diagnostic module includes control logic wherein upon the detection of a threshold event a determination is made as to whether a seatbelt is extended above a predetermined length

[2.1] when the seatbelt is extended above the predetermined length,

deployment of the passenger airbag is suppressed

[2.2] when the seatbelt is not extended above the predetermined length, a determination is made as to whether an occupant, less than a predetermined weight, is present in a passenger seat

[2.3] when an occupant, less the predetermined weight, is present in the passenger seat, deployment of the passenger airbag is suppressed

[2.4] when an occupant, not less than the predetermined weight, is present in the passenger seat, the passenger airbag is deployed.

Ex. 1001, 11:25–43; *see also* Pet. 50 (adopting Petitioner’s sub-numbering of the claim elements).

Petitioner submits that the “combination of Foo and Mazur would have suggested controlling air bag deployment and suppression according to the decision matrix of claim 2.” Pet. 49 (citing Ex. 1003 ¶¶ 230–232).

To address element 2.0, Petitioner submits that Mazur discloses that “a determination is made as to whether a seatbelt is extended above a predetermined length,” citing in-part Mazur’s disclosure that its “presence sensing means further includes a seat belt payout sensor for providing a signal indicative of the amount of seat belt extracted from a seat belt retractor . . . [and that an] amount of seat belt greater than a threshold amount needs to be extracted to secure a rearward facing child seat to the occupant seat.”). *Id.* at 51 (citing Ex. 1005, 1:51–56, 2:15–20) (emphasis omitted).

To address limitation 2.1, Petitioner submits that Mazur discloses “when the seatbelt is extended above the predetermined length, deployment

of the passenger airbag is suppressed,” and cites to Mazur’s disclosure that “if the belt payout is greater than the predetermined amount, it is assumed that a rearward facing seat is present” and that if “controller 22 determines from the sensor signals that a rearward facing child seat is present . . . the enable function 68 disables air bag actuation circuit 24.” *Id.* (citing Ex. 1005, 5:29–33, 5:3–11, 5:34–57, Fig. 4 (step 112); Ex. 1003 ¶ 235) (emphasis omitted)).

To address limitation 2.2, “a determination is made as to whether an occupant, less than a predetermined weight, is present in a passenger seat,” Petitioner cites to Mazur’s teaching that it “determine[s] whether an object on the occupant seat 40 weighs more than a predetermined value.” Pet. 52 (citing Ex. 1005, 2:24–59, 3:32–43, Figs. 3–5, Ex. 1003 ¶¶ 237–238). Mr. Andrews testifies that

[A] POSITA would understand that the combination of Foo and Mazur would have Foo’s threshold weight cutoff for air bag deployment **in addition to** Mazur’s further suppression based on belt payout. This is suggested by—and consistent with—the teachings of Foo, which has two systems (RFIS detection system 139 and occupant detection system 141) that can independently disable the airbag.

Ex. 1003 ¶ 239 (citing Ex. 1004, 11:33–48, 12:20–58; 13:5–8).

To address limitation 2.3, “when an occupant, less the predetermined weight, is present in the passenger seat, deployment of the passenger airbag is suppressed,” Petitioner submits that both Foo and Mazur disclose this limitation, cross-referencing its analysis of element 2.2. *See* Pet. 53 (citing in part Ex. 1003 ¶¶ 240–241).

To address limitation 2.4, “when an occupant, not less than the predetermined weight, is present in the passenger seat, the passenger airbag

is deployed,” Petitioner cites to Mr. Andrews’s testimony. Pet. 53. Mr. Andrews testifies that “[t]his is, in effect, nothing more than normal deployment of the air bags.” Ex. 1003 ¶ 242.

Petitioner has demonstrated by a preponderance of the evidence that Foo in view of Mazur satisfies the limitations recited in claim 2.

4. *Claim 4*

Petitioner relies on the same analysis in its challenge of claim 4 under Ground 2 as in its challenge of that claim under Ground 1. *See* Pet. 45 (“For these same reasons, claims 4 and 9, which depend from claims 1 and 6, respectively, would have been obvious in view of Foo and Mazur”); *see also supra* § II.D.4 (addressing claim 4 under Ground 1).

Petitioner has demonstrated by a preponderance of the evidence that Foo in view of Mazur satisfies the limitations recited in claim 4.

5. *Claims 5, 7, and 8*

Claims 5, 7, and 8 are related and each depends from claim 1. *See* Ex. 1001, 11:52–12:17. These claims further recite:

5. The restraint system as in claim 1, further comprising an indicator means for indicating when said passenger side airbag module is suppressed.

...

7. The vehicle restraint system as in claim 6, further comprising an indicator means for indicating when said airbag module is suppressed.

8. The vehicle restraint system as in claim 7, wherein said indicator means is an indicator light.

Id. (emphasis omitted).

To address these limitations, Petitioner cites to Mazur’s disclosure that “[w]hen the air bag system is disabled, the controller 22 provides an

electric signal to an **indicator 74 on the instrument panel/dashboard 44 to alert the vehicle occupants that the air bag assembly 25 is disabled.**”

Pet. 54 (citing Ex. 1005, 5:28–58); *see also* Ex. 1003 ¶ 246 (testifying that a POSITA would recognize that Fig. 1 of Mazur depicts an indicator light 74 on dashboard 44).

Based on Mazur’s teachings, Petitioner reasons that

[a] POSITA would have been motivated to use Mazur’s dash-mounted airbag deactivation indicator lights, with respect to Claims 5, 7, and 8, as described above. . . . A benefit of including such indicators was to keep the occupants informed of airbag status, allowing them to recognize if the status was inconsistent with the seat’s occupancy. . . . Indeed, such indicator lights were commonplace at the time of filing.

Pet. 55 (citing in part Ex. 1003 ¶¶ 225–228.).

Petitioner has demonstrated by a preponderance of the evidence that Foo in view of Mazur satisfies the limitations recited in claims 5, 7, and 8.

6. *Claim 6*

Claim 6 recites,

[6.0] The restraint system as in claim 1, further comprising:

[6.1] a seat mounted sensor for detecting a vehicle occupant by weight, said seat mounted sensor provides a first suppression signal to said sensing and diagnostic module to Suppress a passenger side airbag module when the weight of same vehicle occupant is below a predetermined weight; and

[6.2] a seatbelt sensor for determining whether an infant seat is secured to a passenger seat via a seatbelt, said seatbelt sensor provides a second suppression signal to said sensing and diagnostic module to suppress said passenger side airbag module when said infant seat is fastened to said passenger seat.

Ex. 1001, 12:1–12; *see also* Pet. 56 (adopting Petitioner’s sub-numbering of the claim language).

Petitioner submits that combination of Foo and Mazur satisfies elements 6.1 and 6.2. *See* Pet. 56–59.

As to element 6.1, Petitioner cites to Mazur’s disclosure of “[s]ensors 36, 42, 66 [that] provide electrical signals to controller” and “[i]f controller 22 determines from the sensor signals that a rearward facing child seat is present . . . the enable function 68 **disables air bag actuation of circuit.**” *Id.* at 57 (quoting Ex. 1005, 5:3–11).

As to element 6.2, Petitioner cites to Foos’s teaching of a rearward facing infant seat detector for determining whether an infant seat is present. *See* Pet. 57–58 (citing Ex. 1004, 11:50–63, 12:22–24). Petitioner further cites to Mazur’s teaching of sensor 66 for sending a suppression signal to controller 22 when an infant seat is present if the belt payout is greater than 35 inches. *See id.* at 58 (citing Ex. 1005, 6:47–7:2, 4:23–45); *see also* Ex. 1003 ¶¶ 251–252 (testifying in support of the same).

Petitioner has demonstrated by a preponderance of the evidence that Foo in view of Mazur satisfies the limitations recited in claim 6.

7. *Claim 9*

Petitioner relies on the same analysis in its challenge of claim 9 under Ground 2 as in its challenge under Ground 1. *See* Pet. 45 (“For these same reasons, claims 4 and 9, which depend from claims 1 and 6, respectively, would have been obvious in view of Foo and Mazur”); *see also supra* § II.D.5 (addressing claim 9 under Ground 1)

Petitioner has demonstrated by a preponderance of the evidence that Foo in view of Mazur satisfies the limitations recited in claim 9.

8. *Claim 11*

Claim 11 depends from claim 2 and further recites “a passenger side airbag module having an inflator with a first initiator and a second initiator.” Ex. 1001, 12:29–31. To address this limitation, Petitioner submits that Foo discloses that its multi-stage airbag can be implemented on both the driver and passenger side of the vehicle. Pet. 59 (citing, *inter alia*, Ex. 1003 ¶¶ 253–256). Petitioner cites to Foo’s disclosure that the “described features of the system 10 shown and described with respect to FIGS. 2-4 are equally applicable to system for the driver seat 14 (FIG. 1).” *Id.* (quoting Ex. 1004, 13:56–67).

Petitioner has demonstrated by a preponderance of the evidence that Foo in view of Mazur satisfies the limitations recited in claim 11.

9. *Claim 12*

Claim 12 depends from claim 11 and further recites,

[12.1] wherein said sensing and diagnostic module employs all received signals to provide for a sequential firing of said first and second initiators such that there will be no unfired initiator left in said passenger airbag module,

[12.2] said first initiator configured to cause said inflatable airbag to break through or open an airbag cover when said first initiator is ignited, and said second initiator configured to inflate said airbag to fully inflate said airbag.

Ex. 1001, 12:32–40; see also Pet. 60 (adopting Petitioner’s sub-numbering of the claim language).

To address claim language 12.1, Petitioner references the analysis of claim elements 1.2, 1.6, and 1.7. *See* Pet. 60–61.

To address claim language 12.2, Petitioner cites to the testimony of Mr. Andrews, who testifies that “[t]his is merely a description of how a multi-stage airbag works.” *Id.* at 62 (citing Ex. 1003 ¶¶ 48–64); *see also*

Ex. 1003 ¶ 260 (testifying that claim 12.2 is “just a description of how a multi-stage airbag works”).

Petitioner has demonstrated by a preponderance of the evidence that Foo in view of Mazur satisfies the limitations recited in claim 12.

10. Summary of Ground 2

Petitioner has demonstrated by a preponderance of the evidence that claims 1, 2, 4–9, 11, and 12 would have been obvious over Foo in view of Mazur.

F. Ground 3: Unpatentable Over Foo and Canterbury

Petitioner contends that claim 3 is unpatentable as obvious over Foo in view of Canterbury. Pet. 62.

1. Canterbury (Ex. 1006)

Canterberry is a U.S. Patent titled “Variable Output Inflator.” Ex. 1006, code (54). Canterbury discloses “a multi-stage gas bag inflator, operable initially, when activated, to cause the gas bag to deploy slowly and then, after a delay, to deploy rapidly.” *Id.* at code (57).

2. Claim 3

Claim 3 depends from claim 1 and further recites, “wherein said predetermined time ranges from about 5 milliseconds to about 35 milliseconds.” Ex. 1001, 11:43–45.

To address claim 3, Petitioner cites to Figure 3 of Canterbury (Pet. 66), which we reproduce, below:

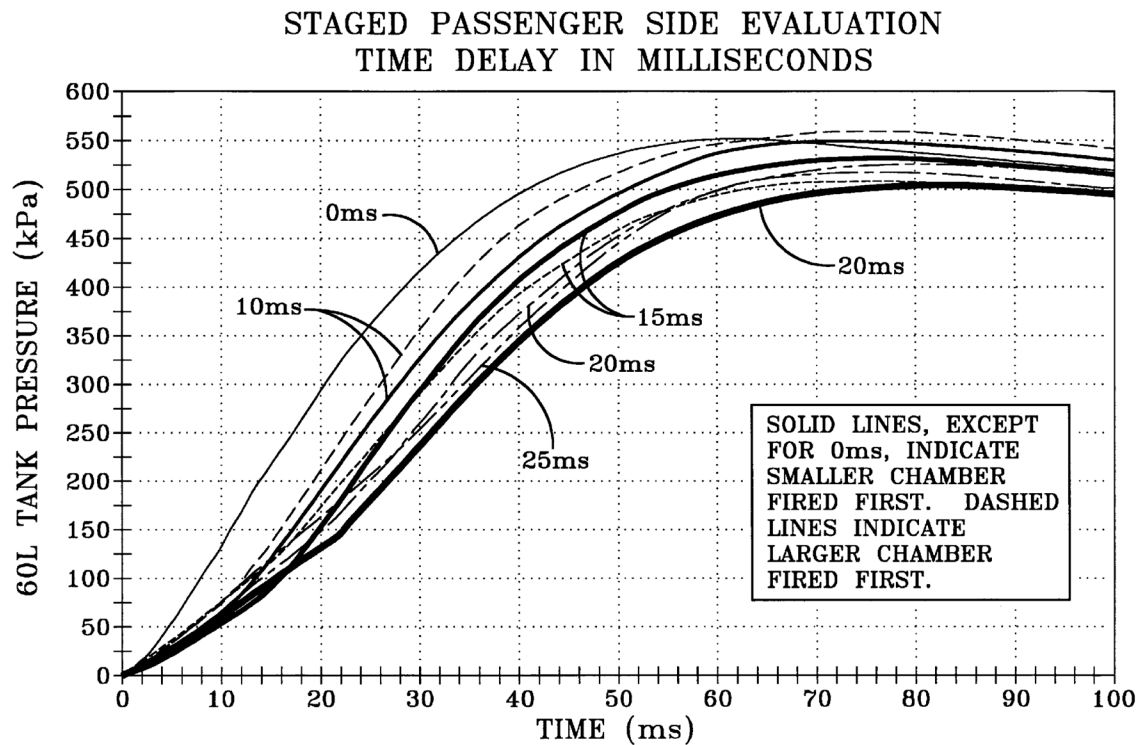


FIG-3

Figure 3 “illustrates a number of pressure-time curves from the firing of the inventive inflator with time delays between the firing of the first chamber and the second chamber varying from 0 to 25 micro seconds.” Ex. 1006, 5:21–24. Canterbury further discloses that “if the interval is too short, it may cause injury, but if the interval is too long, the shock absorption action of the air bag will be weakened and may result in injuries to the vehicle occupant. For this reason, a high degree of precision is required for the delayed ignition.” *Id.* at 1:52–58.

Petitioner asserts that a POSITA would have combined Canterbury’s firing time delay teaching with Foo to arrive at the recited 35 ms time delay for improving safety. *See* Pet. 65 (citing Ex. 1003 ¶¶ 266–268).

Petitioner has demonstrated by a preponderance of the evidence that Foo in view of Canterbury satisfies the limitations recited in claim 3.

G. Ground 4: Unpatentable Over Foo and Stanley

Petitioner contends that claims 1, 4, 6, 9, and 10 are unpatentable as obvious over Foo in view of Stanley. Pet. 66.

1. Stanley (Ex. 1007)

Stanley is a U.S. Patent titled “Air Bag Suppression System Using a Weight Sensor, a Seat Belt Tension Monitor, and a Capacitive Sensor in the Instrument Panel.” Ex. 1007, code (54). In particular, Stanley discloses a “system and method for controlling the inflation of an air bag in a vehicle utiliz[ing] a seat weight sensor, a seat belt tension measurement sensor, and a capacitive position sensor . . . mounted at a point relative to an air bag inflator door and responsive to the proximity thereto of an object to be sensed.” *Id.* at code (57).

2. Claim 1

Petitioner reiterates that Foo teaches, or renders obvious, all of the limitations of claim 1. *See* Pet. 67.

Focusing on claim elements 1.4 and 1.7, Petitioner *also* submits that “Stanley confirms that sending multiple signals to sequentially activate the various stages of a multi-stage airbag was well known at the time of filing, and would have been an obvious design choice in Foo to accomplish sequential firing.” *Id.* at 68 (citing Ex. 1007, 6:29–32, Fig. 7). Mr. Andrews testifies in support of this combination. Ex. 1003 ¶ 284.

Petitioner has demonstrated by a preponderance of the evidence that Foo in view of Stanley satisfies the limitations recited in claim 1.

3. Claim 4

Petitioner relies on the same analysis in its challenge of claim 4 under Ground 4 as in its challenge under Ground 1. *See* Pet. 67 (“For these same

reasons, claims 4 and 9, which depend from claims 1 and 6, respectively, also would have been obvious in view of Foo and Stanley”); *see also supra* § II.D.4 (addressing claim 4 under Ground 1).

Petitioner has demonstrated by a preponderance of the evidence that Foo in view of Stanley satisfies the limitations recited in claim 4.

4. Claim 6

Petitioner reiterates that Foo alone satisfies all of the limitations of claim 6, including limitation 6.2. *See* Pet. 69–70.

In further addressing limitation 6.2, Petitioner reasons in the alternative that “a POSITA would have used Stanley’s belt tension sensor approach in the system of Foo to detect an [rear-facing infant seat] and suppress deployment accordingly.” *Id.* at 70. Petitioner quotes Stanley’s disclosure that its “seat belt tension sensor 50 measures tensile force in seat belt 34 and generates an output signal 52 responsive thereto” and that when “the seat belt is under high tension, the air bag is safely disabled,” including when there is an indication of a “tightly belted infant seat.” *See* Pet. 70–71 (citing Ex. 1007, 6:59–61, 5:17–19, 8:23–26, 8:43–66, 2:65–67, Fig. 1) (emphasis omitted).

Based on these and other teachings, Petitioner reasons that

A POSITA would have been motivated to combine Foo and Stanley. Specifically, a POSITA would have been motivated to use Stanley’s RFIS detection based on belt tension sensors in the airbag system of Foo. Foo’s system uses RFIS detection and is flexible regarding the specific selection of sensors for RFIS detection . . . , and use of Stanley’s RFIS detection was an obvious design choice. There were only a relatively small number of known, predictable solutions for RFIS detection, and the combination was obvious to try.

Pet. 71 (citing Ex. 1004, 12:5–19). Mr. Andrews further testifies that a “POSITA would have recognized that using Stanley’s tension sensor in Foo’s would have had the desirable and predictable effect of avoiding unwanted deployment where a child or infant gives the (incorrect) appearance of a full-weight adult due to a belted child seat.” Ex. 1003 ¶ 280.

Petitioner has demonstrated by a preponderance of the evidence that Foo in view of Stanley satisfies the limitations recited in claim 6.

5. *Claim 9*

Petitioner relies on the same analysis in its challenge of claim 9 under Ground 4 as in its challenge under Ground 1. *See* Pet. 67 (“For these same reasons, claims 4 and 9, which depend from claims 1 and 6, respectively, also would have been obvious in view of Foo and Stanley”); *see also supra* § II.D.5 (addressing claim 9 under Ground 1).

Petitioner has demonstrated by a preponderance of the evidence that Foo in view of Stanley satisfies the limitations recited in claim 9.

6. *Claim 10*

Claim 10 depends from claim 6 and further recites, “wherein said seatbelt sensor is an automatic locking retractor switch or a belt tension sensor.” Ex. 1001, 12:26–28.

To address this limitation, Petitioner cites to Stanley’s disclosure of “a seat belt tension measurement greater than ten pounds indicates that the occupant is not a normally seated adult” and that in the “situation where the seat belt is under high tension, the air bag is safely disabled.” Pet. 73 (quoting Ex. 1007, 3:50–57).

Based on this teaching, Petitioner reasons that the proposed combination of Foo and Stanley satisfies the limitation of claim 10. *See id.* (citing Ex. 1003 ¶¶ 292–293).

Petitioner has demonstrated by a preponderance of the evidence that Foo in view of Stanley satisfies the limitations recited in claim 10.

7. *Summary of Ground 4*

Petitioner has demonstrated by a preponderance of the evidence that claims 1, 4, 6, 9, and 10 would have been obvious over Foo in view of Stanley.

III. CONCLUSION

Weighing the evidence of the disclosure of the references, the testimony, and the reasoning to combine the references, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–12 of the '076 patent are unpatentable.

Claims	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1, 4, 6, 9	103	Foo	1, 4, 6, 9	
1, 2, 4–9, 11, 12	103	Foo, Mazur	1, 2, 4–9, 11, 12	
3	103	Foo, Canterbury	3	
1, 4, 6, 9, 10	103	Foo, Stanley	1, 4, 6, 9, 10	
Overall Outcome			1–12	

IV. ORDER

Accordingly, it is:

ORDERED that claims 1–12 of the '076 patent have been shown to be unpatentable; and

FURTHER ORDERED that any party seeking judicial review must comply with the notice and service requirements of 37 C.F.R. § 90.2.⁷

⁷ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this Decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

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