

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

JTEKT CORPORATION,
Petitioner,

v.

GKN AUTOMOTIVE LTD.,
Patent Owner.

Case IPR 2016-00046

U.S. Patent No. 8,215,440 B2

**PATENT OWNER'S PRELIMINARY RESPONSE TO PETITION
FOR *INTER PARTES* REVIEW UNDER 37 C.F.R. § 42.107**

TABLE OF CONTENTS

TABLE OF AUTHORITIES	iii
LIST OF EXHIBITS	v
I. INTRODUCTION	1
II. STANDARD FOR GRANTING <i>INTER PARTES</i> REVIEW	2
III. TECHNICAL BACKGROUND	4
IV. OVERVIEW OF THE ‘440 PATENT	7
A. The Invention	7
B. Independent Claim 1	17
V. CLAIM CONSTRUCTION	18
A. “Switch-on device”/”Switch-on mechanism”	19
B. “A Shutdown Section”	20
C. “Side shaft coupling”	22
VI. GROUND 1, BASED ON THE ALLEGED ANTICIPATION BY TERAOKA OF CLAIMS 1, 4 AND 5, IS DEFICIENT	24
A. Overview Of Teraoka	24
B. Ground 1 Is Deficient Against Claims 1, 4 and 5 Because Clutch Mechanism 71 in Teraoka Does Not Constitute A <i>Side</i> <i>Shaft Coupling</i>	25
C. Ground 1 Is Deficient Against Claims 1, 4 and 5 Because Teraoka Does Not Disclose A <i>Shutdown Section</i>	26
D. Ground 1 Is Deficient Against Claims 1, 4 and 5 Because Teraoka Does Not Disclose “A Side Shaft Coupling” Or “A Shutdown Section” That Is Arranged Per Claim 1	29
VII. GROUND 2 BASED ON AN OBVIOUSNESS COMBINATION OF TERAOKA AND WATANABE AGAINST CLAIMS 2 AND 3 IS DEFICIENT	30
A. Overview of Watanabe	30
B. Dependent Claims 2 And 3	31
C. Ground 2 Is Deficient Against Claims 2 and 3 For the Same Reason that Teraoka Does Not Anticipate Claim 1, From Which Claims 2 and 3 Depend	32

D.	Ground 2 Is Deficient Against Claims 2 and 3 Because Petitioner’s Rationale To Combine Teraoka and Watanabe Lacks Rational Underpinning.....	33
1.	Petitioner’s Conclusory Arguments Are Insufficient	33
2.	No Reasonable Basis Is Provided For Why A Person Of Ordinary Skill In The Art Would Have Been Motivated To Combine Teraoka And Watanabe	35
3.	Petitioner’s Boilerplate “Simple Substitution” Statement Fails To Explain How The Combination Would Be Achieved	37
4.	Petitioner Glosses Over The Structure And Function Of Watanabe.....	38
VIII.	GROUND 3 BASED ON AN OBVIOUSNESS COMBINATION OF TERAOKA AND BURROWS AGAINST CLAIMS 6 AND 7 IS DEFICIENT.....	39
A.	Overview of Burrows	39
B.	Dependent Claims 6 And 7	41
C.	Ground 3 Is Deficient Against Claims 6 and 7 For the Same Reason that Teraoka Does Not Anticipate Claim 1, From Which Claims 6 and 7 Depend.....	42
D.	Ground 3 Is Deficient Against Claims 6 and 7 Because Petitioner’s Rationale To Combine Teraoka and Burrows is Conclusory and Lacks Sufficient Rationale.....	42
1.	No Reasonable Basis Is Provided For Why A POSA Would Have Been Motivated To Combine Teraoka And Burrows	42
2.	Petitioner’s Boilerplate “Known Technique” Statement Fails To Explain How The Combination Would Be Achieved	45
IX.	CONCLUSION.....	49
	CERTIFICATE OF SERVICE	50

TABLE OF AUTHORITIES

Cases

<i>Crown Packaging Tech., Inc. v. Ball Metal Beverage Container Corp.,</i> 635 F.3d 1373 (Fed. Cir. 2011)	3
<i>Hastings v. United States,</i> 78 Fed. Cl. 729 (2007)	19
<i>Heart Failure Technologies LLC v. Cardiokinetix, Inc.,</i> IPR 2013-00183 (PTAB July 31, 2013)	38, 48
<i>In re Cuozzo Speed Techs., LLC,</i> 793 F.3d 1268 (Fed. Cir. 2015)	18
<i>In re Fritch,</i> 972 F.2d 1260 (Fed. Cir. 1992)	44
<i>In re Ratti,</i> 270 F.2d 810 (CCPA 1959)	47
<i>In re Suitco Surface, Inc.,</i> 603 F.3d 1255 (Fed. Cir. 2010)	18
<i>In re Translogic Tech., Inc.,</i> 504 F.3d 1249 (Fed. Cir. 2007)	18
<i>Kinetic Concepts, Inc. v. Smith & Nephew, Inc.,</i> 688 F.3d 1342 (Fed. Cir. 2012)	3
<i>Kinetic Technologies, Inc. v. Skyworks Solutions, Inc.,</i> IPR2014-00529 (PTAB Sept 24, 2014)	34, 36
<i>KSR Int’l Co v. Teleflex, Inc.,</i> 550 U.S. 398 (2007)	35, 47
<i>Merck & Co., Inc. v. Teva Pharmaceuticals USA, Inc.,</i> 347 F.3d 1367 (Fed. Cir. 2003)	3

<i>Net MoneyIN, Inc. v. Verisign, Inc.</i> , 545 F.2d 1359 (Fed. Cir. 2008)	29
<i>OrthoMcNeil v. Mylan Lab</i> , 520 F.3d 1358 (Fed. Cir. 2008)	35
<i>Unigene Labs., Inc. v. Apotex, Inc.</i> , 655 F.3d 1352 (Fed. Cir. 2011)	35
<i>Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.</i> , 200 F.3d 795 (Fed. Cir. 1999)	19
<i>Xerox Corp. v. 3Com Corp.</i> , 458 F.3d 1310 (Fed. Cir. 2006)	29
<i>Zimmer Holdings, Inc. et al. v. Bonutti Skeletal Innovations LLC</i> , IPR2014-01078 (PTAB Oct. 30, 2014)	39

Statutes

35 U.S.C. § 102	1, 3
35 U.S.C. § 103	1, 3
35 U.S.C. § 314	2
35 U.S.C. § 316	2
37 C.F.R. § 42.100	18
37 C.F.R. § 42.104	1, 35
37 C.F.R. § 42.108	2

Other Authorities

Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756 (Aug. 14, 2012)	2, 3
---	------

Rules

MPEP § 2143.01	47
MPEP § 2144.03	36, 45

LIST OF EXHIBITS

Exhibit No.	Description	Date	Identifier
2001	NHTSA Publication, Summary of Fuel Economy Performance	Dec. 15, 2014	NHTSA Publication
2002	NHTSA Press Release	Aug. 28, 2012	
2003	All-Wheel Drive BorgWarner Book	2009	
2004	Gassman GKN Seamless Drivelines Article	Sept. 2009	
2005	Honda Worldwide Article entitled <i>Honda Develops World's First Super Handling AllWheel Drive</i>	April 1, 2004	Honda Worldwide Article
2006	Institution of Mechanical Engineers Article entitled <i>Four Wheels On Demand</i>	April 2015	Institution of Mechanical Engineers Article
2007	Meritor White Paper entitled <i>Building on Rich Heritage and Designing More Value and Efficiencies</i>	2012	Meritor 2012 White Paper
2008	Elsevier White Paper entitled <i>An experimental investigation of spin power losses of a planetary gear set</i>	2015	Elsevier 2015 White Paper
2009	S. Renjith et al., <i>CFD based Prediction of Spin Power Loss of Automotive Differential System</i> , SAE Technical Paper 2015-01-2783 (2015)	2015	2015 Tata SAE Paper
2010	Andreev et al., <i>Driveline Systems of Ground Vehicles - Theory and Design</i>	2010	Andreev Book
2011	Engineering Dictionary definition of "coupling," http://www.engineering-dictionary.org/coupling , retrieved January 26, 2015	Jan. 2016	

Exhibit No.	Description	Date	Identifier
2012	V. Vantsevich, <i>All-Wheel Driveline Mechatronic Systems: Principles of Wheel Power Management</i> , SAE Technical Paper 2006-01-0580 (2006)	April 2006	2006 SAE Paper
2013	R. Rajamani, <i>Vehicle Dynamics and Control</i> (2012)	2012	Vehicle Dynamics Book
2014	How to Choose the Right ATV, http://www.atv.com/products/how-to-choose-the-right-atv-622.html , retrieved January 28, 2015	Jan. 2016	ATV Article

I. INTRODUCTION

Pursuant to 37 C.F.R. § 42.107, Patent Owner, GKN Automotive Ltd. (“GKN”), submits the following Preliminary Response to the Petition for *Inter Partes* Review (“Petition”) of U.S. Patent No. 8,215,440 (“the ‘440 Patent”) filed by Petitioner, JTEKT Corporation.

GKN is a well-known worldwide manufacturer and innovator in the field of driveline systems and components. The ‘440 Patent is just one of many patents owned by GKN that protect its research and development in driveline systems.

Petitioner filed this *inter partes* review against claims 1-7 of the ‘440 Patent (“the Challenged Claims”). Petitioner asserts the following Grounds under 37 C.F.R. § 42.104(b):

Ground	Claims	Alleged Basis for Rejection By Petitioner
Ground 1	1, 4, and 5	Anticipated under 35 U.S.C. § 102(b) by Teraoka (Ex. 1002)
Ground 2	2 and 3	Obvious under 35 U.S.C. § 103(a) by Teraoka in view of Watanabe (Ex. 1002 and Ex. 1003)
Ground 3	6 and 7	Obvious under 35 U.S.C. § 103(a) by Teraoka in view of Burrows (Ex. 1002 and Ex. 1004)

(Petition at 7.)

As a threshold matter, the Petition fails to make a *prima facie* case for

unpatentability for at least 3 reasons: 1) the underlying rationale for the Grounds is flawed, as Petitioner is asserting or implying claim constructions contrary to the broadest reasonable interpretation standard; 2) claim limitations are missing from the relied-on references; and 3) Petitioner's obviousness grounds rely exclusively on conclusory, boilerplate statements instead of providing the required rationale for combining otherwise incompatible references.

Accordingly, GKN respectfully requests that the Patent Trial and Appeal Board ("the Board") decline to initiate *inter partes* review of the Challenged Claims because Petitioner has failed to show a reasonable likelihood of prevailing on any of the asserted Grounds.

II. STANDARD FOR GRANTING *INTER PARTES* REVIEW

The Board may grant a petition for *inter partes* review only if "the information presented in the petition . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a); 37 C.F.R. § 42.108(c). Petitioner bears the burden of showing this threshold has been met. *See* Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756 (Aug. 14, 2012) [hereinafter "Practice Guide"]. If *inter partes* review is granted, Petitioner then has the burden of proving unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e). As explained below, neither burden is met here.

As to Petitioner’s anticipation ground, under 35 U.S.C. § 102, Petitioner must show where each claim limitation is found in a single reference, and the reference must enable one of skill in the field of the invention to make and use the claimed invention. *Merck & Co., Inc. v. Teva Pharmaceuticals USA, Inc.*, 347 F.3d 1367, 1372 (Fed. Cir. 2003); *Crown Packaging Tech., Inc. v. Ball Metal Beverage Container Corp.*, 635 F.3d 1373, 1383 (Fed. Cir. 2011) (“But disclosure of each element is not quite enough – [the Federal Circuit] has long held that ‘[a]nticipation requires the presence in a single prior art disclosure of a claimed invention *arranged as in the claim.*’” (Citation omitted.))

As to Petitioner’s obviousness grounds, under 35 U.S.C. § 103, Petitioner must show where each claim limitation is found in the prior art. *See, e.g., Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1361 (Fed. Cir. 2012). Failure to do so defeats a claim of obviousness. *Id.* Moreover, “there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR Int’l v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (emphasis added)).

The Practice Guide specifies that the responses a patent owner can submit to defeat a petition include: “The prior art lacks a material limitation in all of the independent claims. . . . The petitioner’s claim interpretation for the challenged claims is unreasonable.” Practice Guide, 77 Fed. Reg. at 48,764. The Petition is

legally flawed for at least these reasons. Additionally, Petitioner's minimal explanation for the alleged rationale to combine lacks the requisite specificity to explain why one of ordinary skill would have been prompted to combine the references as asserted and how such a combination would have been achieved.

III. TECHNICAL BACKGROUND

Since the introduction of environmental emissions regulations in 1963, fuel economy and emissions standards for passenger vehicles and heavy duty trucks have become increasingly stringent. (Ex. 2001, NHTSA Publication, Summary of Fuel Economy Performance at 3.) With every modification of the regulatory framework, the auto industry is challenged to design vehicles and systems that can satisfy the new set of fuel economy and emissions standards. (Ex. 2002, NHTSA Press Release at 1.)

While the environmental regulations have been tightening, consumer demand for vehicles with greater mobility under difficult road conditions – from sports utility vehicles, crossover vehicles and the like – have increased. (Ex. 2003, All-Wheel Drive BorgWarner Book at 18.) The essential change for these “four-wheel drive” (“4WD,” commonly referred to as all-wheel drive “AWD”) vehicles is the ability to direct power to all four-wheels on either a part-time or full-time basis. (*Id.* at 37-41.)

Automotive drivelines are the mechanisms that distribute the engine power to the wheels of the vehicle. Because the driveline interfaces with the vehicle's primary systems (e.g., engine, wheels, suspension, steering and braking systems), it has a major role in determining vehicle performance characteristics including traction, mobility, fuel efficiency, steering effort, turnability, stability, braking, driveability and more. (Ex. 2010, Andreev Book at 9.)

The problem of fuel economy and CO₂ emissions is a particular challenge for 4WD systems and, in particular, 4WD systems that remain engaged all the time. Energy/torque losses in these systems are generally greater than their two-wheel drive ("2WD") counterparts. (Ex. 2004, Gassman GKN Seamless Drivelines Article at 73.) Essentially, extra fuel is required to overcome the inertial and frictional losses associated with the additional rotating components in a 4WD driveline. (Ex. 2003, All-Wheel Drive BorgWarner Book at 126; *see also* 170.) To overcome this issue of "driveline drag," selectively connectable 4WD drive systems – in which one of the drivelines is permanently connected to a drive unit and a second driveline is connectable to the drive unit on demand – were introduced in 2004. (Ex. 2005, Honda Worldwide Article at 1.) For such on-demand systems, the optionally connectable driving axle is not permanently driven but rather engaged when traction assistance is needed. By disconnecting the driving axle, a reduction in drag moments and friction forces may be achieved,

reducing power losses. (Ex. 2006, Institution of Mechanical Engineers Article at 2.) In addition to improving fuel efficiency, lower power losses result in less heat generation, improved mechanical fatigue performance and often less complex, more cost-effective systems. (Ex. 2007, Meritor 2012 White Paper at 9.)

The primary sources of drivetrain power loss can be broken down into two categories: 1) load-dependent (mechanical) power losses induced by friction at the lubricated gear and bearing contacts and 2) load-independent (spin) power losses. (Ex. 2008, Elsevier 2015 White Paper at 1.) Prior to the '440 Patent, little attention was given to the latter category of power losses. The '440 Patent provided an elegant solution to minimizing spin-based power losses for selectively connectible all-wheel drive systems while addressing the related considerations of system complexity, cost, fuel economy, weight and the ability to allow for dynamic on-demand switching from two to four-wheel drive mode.

The effort of the '440 Patent – to reduce spin-based driveline power losses while delivering the desired vehicle performance criteria – continues today and has evolved to include elaborate computer modeling of discrete components of the driveline system to identify each potential location of power loss, from the angle of each gear to predicting the spin power loss of various differential systems. (Ex. 2009, 2015 Tata SAE Paper at 1-3.)

IV. OVERVIEW OF THE ‘440 PATENT

A. The Invention

The ‘440 Patent is directed to a selectively connectable 4WD driveline system that enables distribution of “drive power to all drive wheels” without the “series of disadvantages” introduced by prior art systems. These disadvantages, detailed in the “Description of Related Art” section, include problems with longitudinal and transverse equalization, cost, complexity, increased weight, increased fuel consumption and notably, diminished net drive output.¹ For the latter problem, the ‘440 Patent explains that even when the secondary drive axle is disconnected:

¹ On the need for longitudinal and transverse equalization the ‘440 Patent provides:

care should be taken that the drive wheels of the primary axle and the drive wheels of the secondary axle in particular travel different trajectories when driving round curves . . . which without a corresponding speed difference balance would lead to tensions in the drive train. In order to lower tensions caused by different drive wheel speeds on primary axle and secondary axle **longitudinal equalization** or respectively longitudinal differential is to be provided. Tensions caused by different drive wheel speeds of the drive wheels of the secondary axle are offset by a **transverse equalization** usually formed by transverse differential.

Ex. 1101, ‘440 Patent, 1:62-2:6 (emphasis added).

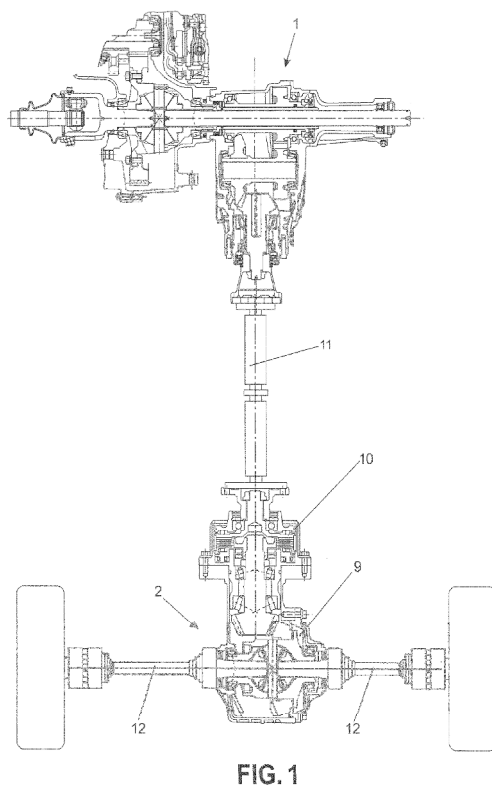
[t]he components of the secondary drive train however are still being driven either by the vehicle drive via the primary axle and/or by the secondary drive wheels or respectively dragged along passively, without transmitting drive power. This gives rise to **friction losses** (bearing friction, churning losses, friction of gear wheel engagement, etc.) and the rotating masses of the secondary driven train components (differential, intermediate shaft, couplings, etc.) are to be accelerated or respectively relented constantly with the vehicle during dynamic driving. This **power loss** contributes significantly to the fact that fuel consumption in a vehicle with connectable secondary axle even with uncoupled secondary axle is noticeably higher than in a vehicle having no drivable secondary axle.

(Ex. 1001, '440 Patent at 2:27-40.)

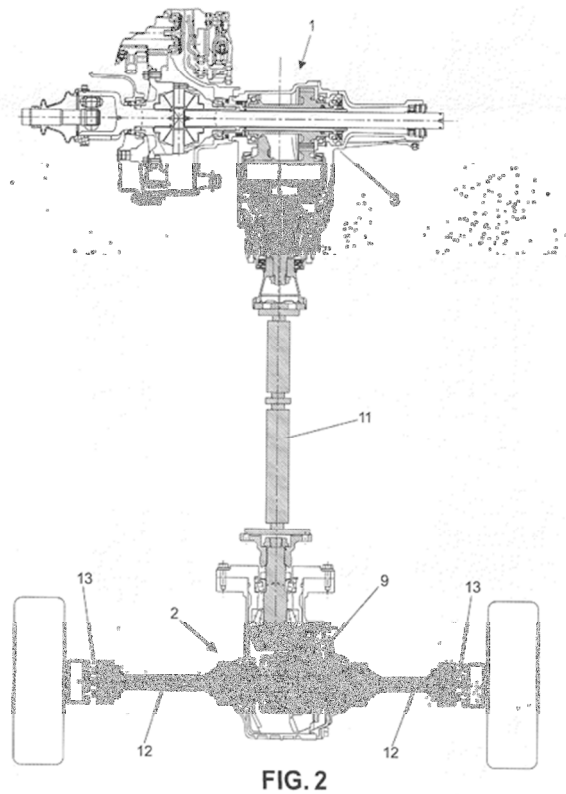
This problem is captured by Figs. 1 and 2 of the '440 Patent, reproduced on page 9, which illustrate two distinct prior art systems. In the Fig. 1 system (on the left), the secondary driveline contains hang-on coupling 10, used to connect the primary driveline 1 with the secondary driveline 2. Coupling 10 is in-line with the propeller shaft 11, and on the engine side of axle drive unit 9, which means the entire secondary driveline from the wheels to propeller shaft 11 rotates or is “dragged along”, even in two-wheel drive mode. (Ex. 1001, '440 Patent at 6:18-25.) More specifically, movement of the rear wheels along the roadway will cause rotation of the secondary driveline.

By contrast, in the Fig. 2 system (on the right), while a wheel hub coupling

13 prevents the parts of the secondary driveline from rotating in two-wheel drive mode, this design creates other constraints. Specifically, there is no ability to differentially spin the front and rear wheels at different speeds, which is needed for cornering. (*Id.* at 1:61-2:10.) In addition, there is no ability to differentially control the torque transmitted to each of the rear wheels through side shafts 12. (*Id.* at 6:42-46.) Finally, dog clutches 13 require that the vehicle be stationary in order to engage the rear wheels. (*Id.* at 6:2-8). Thus, the vehicle must be stopped to engage or disengage the dog clutches 13, even if the road conditions require immediate four wheel drive engagement.



Ex. 1001, '440 Patent, Fig. 1



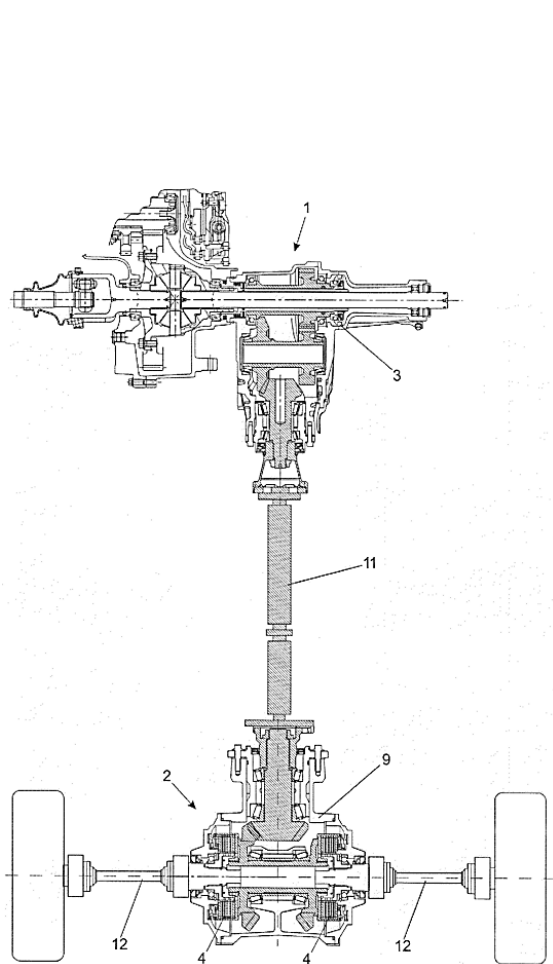
Ex. 1001, '440 Patent, Fig. 2

In the '440 Patent, these disadvantages of the prior art systems are solved by 1) moving the secondary driveline coupling from an in-line position with the propeller shaft to a side shaft location and 2) introducing a switch-on mechanism that works in conjunction with the side shaft coupling to provide a shut-down section “that has no more power loss,” “whereby connecting the secondary drive during travel is possible . . . and losses in comfort and practicability do not have to be tolerated.” (Ex. 1001, '440 Patent, Abstract.) This integrated system also allows for more control of the torque provided to the drive wheels: “[t]he drive torque and slippage to be transferred are freely adjusted by these freely adjustable side shaft couplings 4, such that with this axle drive functions of longitudinal differential and of active-yaw differential can be shown in addition to the functions of transverse differential.” (*Id.* at 6:42-46.)² Representative figures are provided below, with annotations to illustrate the embodiments claimed in the '440 Patent.

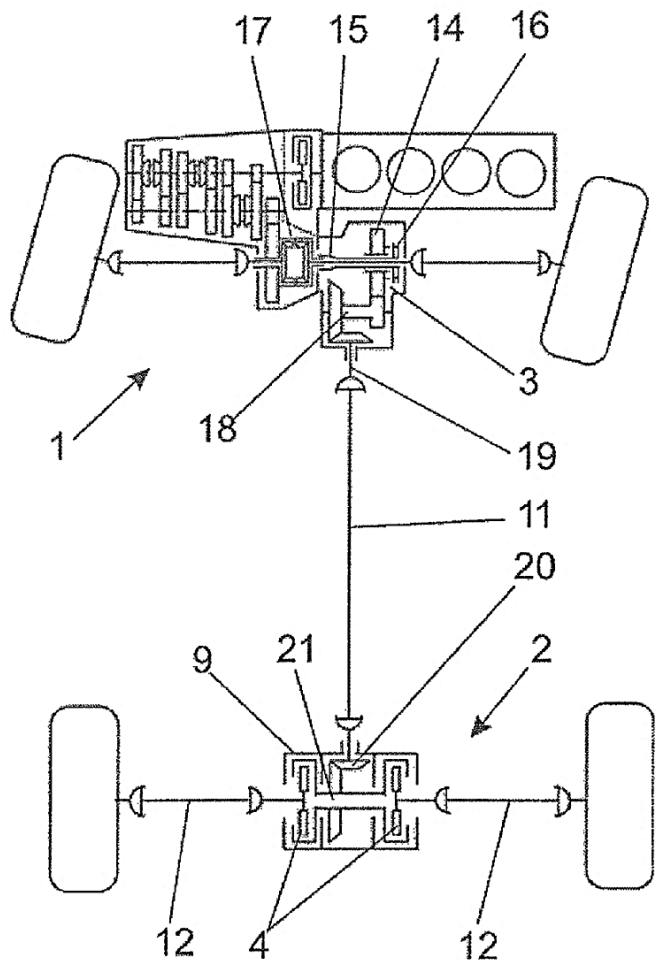
The first set of side-by-side illustrations (Figures 3 and 8 of the '440 Patent) relate to the Figure 3 drive train embodiment which includes a front primary axle 1 that is permanently driven by the engine and a rear secondary axle 2, that is disconnectable in two-wheel drive (2WD) mode – allowing significant portions of the drive train to be inoperative in 2WD. (Ex. 1001, '440 Patent at 5:17-19, 6:34-

² Yaw is an indication of how far the vehicle is angled left or right from its center vertical axis. (Ex. 2013, Vehicle Dynamics Book at 5-6.)

37.) The schematic of Figure 8 corresponds to the drive train shown in detail in Figure 3. (*Id.* at 8:63-64.) A switch on device 3 is located near the front of the vehicle and disengages spur gear step 14 to decouple engine output torque from the rear secondary axle 2. (*Id.* at 7:11-16, 6:49-52.) By decoupling the rear secondary axle 2 from the engine, the “section of the secondary drive train . . . located between side shaft couplings 4 and switch-on device 3 is inoperative.” (*Id.* at 6:35-37.)



Ex. 1001, '440 Patent, Fig. 3



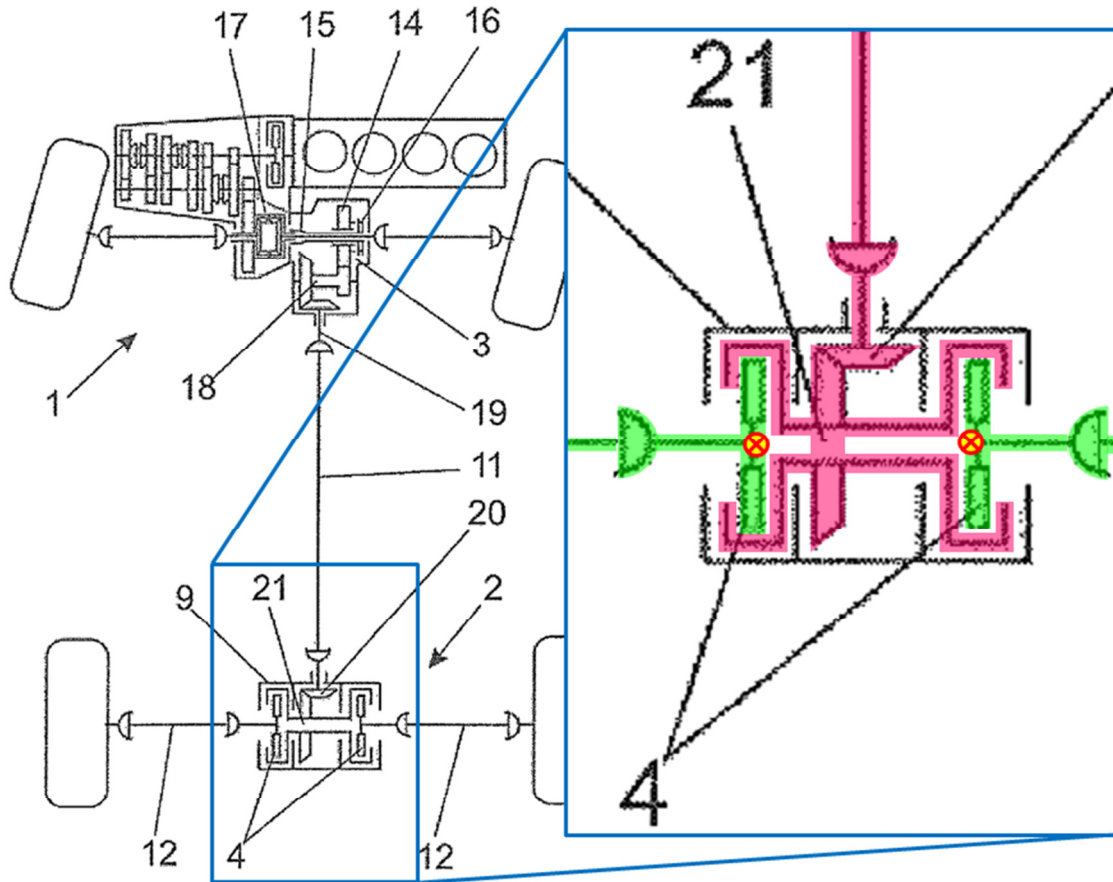
Ex. 1001, '440 Patent, Fig. 8

In contrast to the other embodiments disclosed in the '440 Patent, rear axle

drive unit 9 is provided without a rear differential. (*Id.* at 8:61-64.) Here, an additional decoupling is provided by an opposing pair of frictionally-engaged side shaft couplings 4, “which transmit the secondary drive output to the side shafts 12 of the secondary axle.” (*Id.* at 6:39-42; 8:61-64.) “To shut down the secondary drive train the side shaft couplings 4 are opened and the secondary drive train is uncoupled from the permanently driven part of the drive train via the switch-on device 3.” (*Id.* at 6:49-52.)

The rear axle portion of Figure 8 has been enlarged and annotated below to distinguish between idled components (highlighted in pink) and rotating components (highlighted in green) when the secondary axle is disengaged. The torque decoupling locations are denoted with “” below.

As shown in Figure 8, each opposing side shaft 12 is decoupled from the drive train at side shaft couplings 4 and independently rotated along with the rear wheels. Unlike the prior art systems, the internal components of the rear axle drive unit 9 (highlighted in pink) are disconnected from the rear wheels and idled in 2WD mode. (*Id.* at 6:49-52.)



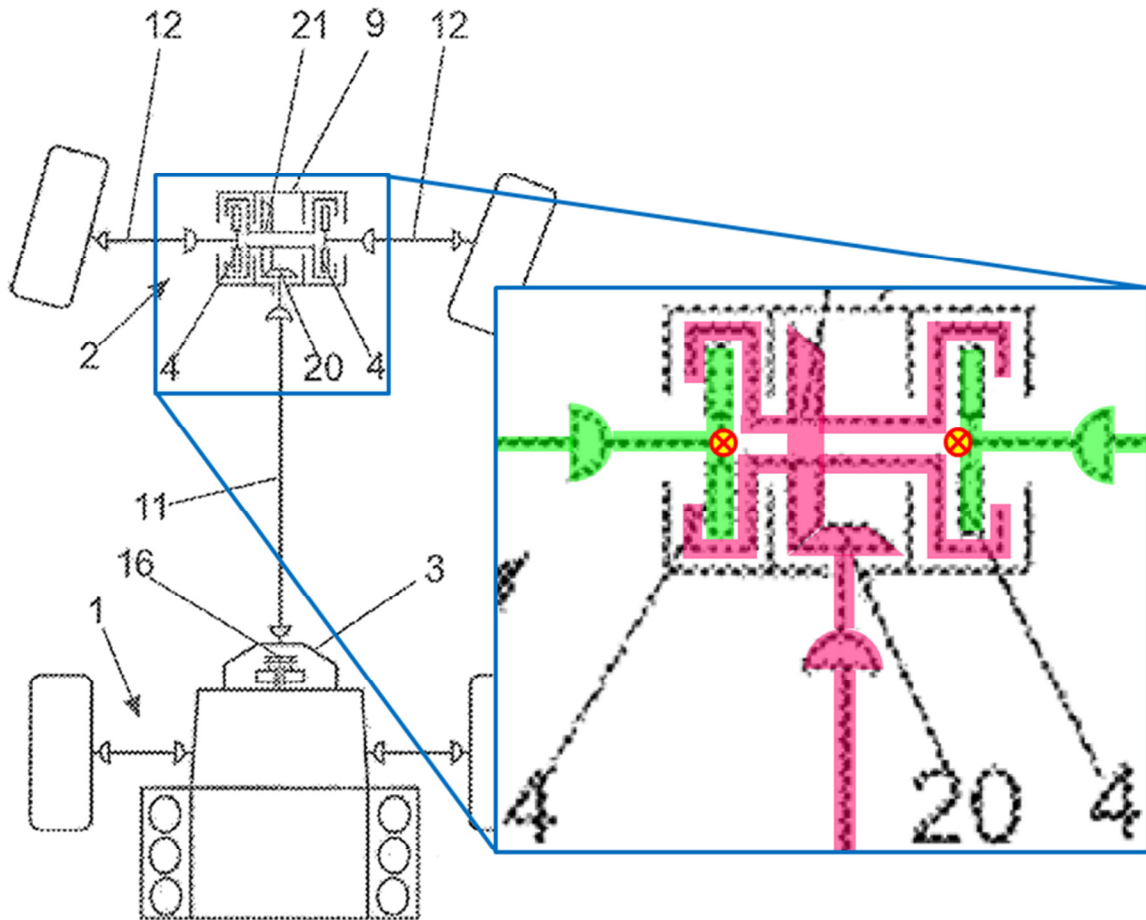
Ex. 1001, '440 Patent, Fig. 8 (annotated)

Providing a torque decoupling on either side of the drive unit 9 allows idling of additional drive train components which would otherwise rotate. “This [Fig. 3] configuration . . . makes it possible to completely shut down a majority of the secondary drive train with the secondary axle uncoupled. The drive train components belonging to the shutdown section of the secondary axle drive train consequently cause no power loss in two-wheel drive mode are therefore significantly reduced.” (*Id.* at 6:57-7:5.)

As compared to the axle drive units 9 in prior art Figures 1 and 2 above, “[t]he added advantage here is that not only transverse equalization but at the same

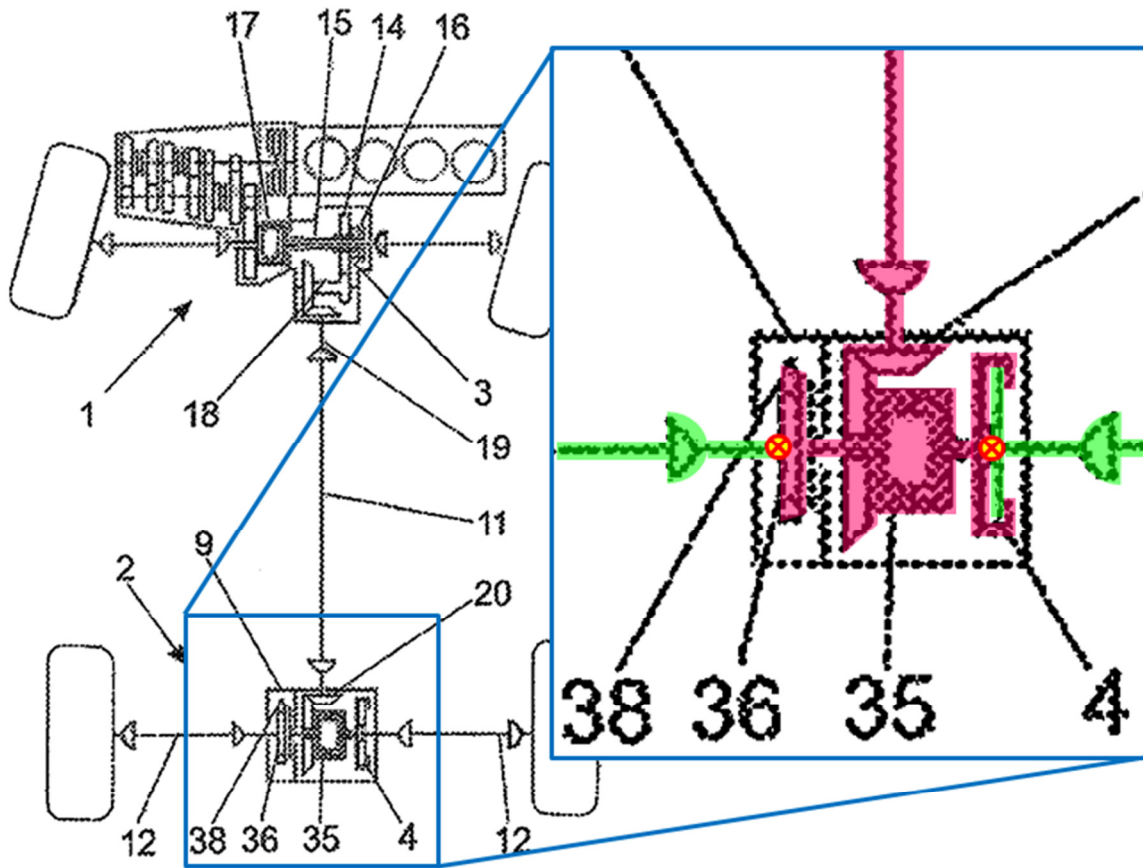
time also longitudinal equalization can be guaranteed via the side shaft couplings.” (*Id.* at 3:45-48.) In addition, with this type of axle drive unit “other functions are also conceivable, such as that of an active yaw differential, in which a yawing moment can be produced specifically by the individual actuation of the couplings. . . Omitting a plurality of otherwise necessary drive train components (wheel hub switching, transverse and longitudinal differential) makes a cost-optimized and weight-optimized configuration of the drive train possible.” (Ex. 1001, ‘440 Patent at 3:55-65.)

Figure 10 is a schematic of a drive train embodiment having a rear-mounted engine and a permanently-driven rear primary axle 1. (*Id.* at 9:23, 5:26-28.) Like the embodiment of Figures 3 and 8, even when the engine is shifted from the front axle to the rear axle in the Fig. 10 embodiment, the internal components of the front drive axle unit 9 (highlighted in pink) are idled when the secondary front axle 2 is switched off to reduce power loss. (*Id.* at 9:23-35.)



Ex. 1001, '440 Patent, Fig. 10 (annotated)

Figure 12 annotated below depicts a schematic of a further “configuration adapted for high torque vehicles” having a differential 35 located at the secondary rear axle 2 – in combination with a side shaft coupling 4. (*Id.* at 10:22-28.) As the ‘440 Patent explains, while a differential is “best suited” for high torque off-road vehicles, the Fig. 12 configuration still provides a shutdown section which prevents the differential from rotating in 2WD mode, see the section highlighted in pink. (Ex. 1001, ‘440 Patent at 10:11-30.)



Ex. 1001, '440 Patent, Fig. 12 (annotated)

The synchronizing 38 and coupling 36 provide an alternate disconnection of the side shaft on the opposing side from the side shaft coupling 4. “In the deactivated four-wheel drive train, therefore in the secondary axle 2 not integrated in the drive power transmission, the left synchronizing 38 is opened so that both side shafts 12 and therefore also the wheels have no connection to the rear axle components.” (*Id.* at 10:62-66.) Again, much like previously-described embodiments of the '440 Patent, the internal components of the secondary axle drive unit 9 (highlighted in pink) are deactivated to reduce power loss. The synchronizing 38 provides smoother engagement of the rear secondary axle by

sequentially engaging prior to the side shaft coupling 4 to gradually bring the internal components up to speed. (*Id.* at 11:26-49.) “The drive torque can be delivered incrementally to the rear wheels with subsequent connection of the frictionally engaged side shaft coupling 4.” (*Id.* at 11:45-47.)

B. Independent Claim 1

Claim 1 (annotations and emphasis added) is directed to:³

[1.a.] *A drive train of a vehicle, comprising a primary drive train and a secondary drive train, further comprising:*

[1.b.] *a primary axle which is permanently driven via the primary drive train; and*

[1.c.] *a secondary axle as part of the secondary drive train;*

[1.d.] *wherein the secondary axle is connectable to the primary axle via a switch-on mechanism of a switch-on device in order to allow the integration of the secondary drive train into the drive train so that the overall drive train power is transferred over both the primary axle and the secondary axle, and*

[1.e.1] *wherein when the secondary axle is connected to the primary axle, the secondary drive train power is conveyed via at least one side shaft couplings into side shafts of the secondary axle and is transmitted to wheels of the secondary axle* [1.e.2.] *the secondary drive train having a shutdown section located between the switch-on device and the at least one side shaft coupling, whereby:*

³ For ease of reference, quoted claim language has been italicized throughout.

[1.f.] *the switch-on mechanism and/or the side shaft couplings comprise at least one frictionally engaged coupling and [1.g.] when the secondary axle is disconnected from the primary axle in order to transfer the overall drive train power via the primary axle only, the shutdown section of the secondary drive train is decoupled from both the primary axle of the primary drive train and the wheels of the secondary axle.*

V. CLAIM CONSTRUCTION

“A claim in an unexpired patent shall be given its broadest reasonable construction in light of the specification of the patent in which it appears.” 37 C.F.R. § 42.100(b); *see also In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1278 (Fed. Cir. 2015) (“We conclude that Congress implicitly approved the broadest reasonable interpretation standard in enacting the AIA.”). When applying that standard, we interpret the claim language as it would be understood by one of ordinary skill in the art in light of the specification. *In re Suitco Surface, Inc.*, 603 F.3d 1255, 1260 (Fed. Cir. 2010). Thus, we give claim terms their ordinary and customary meaning. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007) (“The ordinary and customary meaning ‘is the meaning that the term would have to a person of ordinary skill in the art in question.’”). Only terms which are in controversy need to be construed and then only to the extent necessary to resolve the controversy. *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*,

200 F.3d 795, 803 (Fed. Cir. 1999).

A. “Switch-on device”/”Switch-on mechanism”

Independent claim 1 recites, in relevant part:

[1.d.] *wherein the secondary axle is connectable to the primary axle via a **switch-on mechanism** of a **switch-on device** in order to allow the integration of the secondary drive train into the drive train so that the overall drive train power is transferred over both the primary axle and the secondary axle, and*

(Ex. 1001, ‘440 Patent, Claim 1 (boldface added).)

Petitioner asserts that “switch-on device” should be construed as “a structure assigned to couple/decouple the shutdown section.” (Petition at 12.) Likewise, Petitioner asserts that “switch-on mechanism” should be construed as “a point (e.g., a clutch) of the switch-on device between the primary drive train and the secondary drive train which can couple/decouple the shutdown section.” (*Id.*)

Because the claim terms at issue are clear, no further construction is necessary. *See Hastings v. United States*, 78 Fed. Cl. 729, 934 (2007). (Holding that the proposed construction “easier to pass into or through,” for the claim phrase “more easily penetrated,” “adds nothing to the understanding of the patent [and that] the best course is to view the words actually used by the patent as reflecting most accurately how one skilled in the art would view that language”) (citations omitted). Indeed, assigning additional language to words that are plain on their

face risks changing their meaning.

B. “A Shutdown Section”

Independent Claim 1 recites, in relevant part:

[1.e.2.] *the secondary drive train having **a shutdown section located between the switch-on device and the at least one side shaft coupling**, whereby . . . [1.g.] when the secondary axle is disconnected from the primary axle in order to transfer the overall drive train power via the primary axle only, **the shutdown section of the secondary drive train is decoupled from both the primary axle of the primary drive train and the wheels of the secondary axle.***

(Ex. 1001, ‘440 Patent, Claim 1 (boldface added).)

Petitioner asserts that “*shutdown section*” should be construed as “**any portion** of a secondary drive train which can be decoupled from both the primary axle and the wheels of the secondary axle.” (Petition, p. 15 (emphasis added).) Petitioner arbitrarily parses the claim language and construes “*shutdown section*” in a manner that contradicts 1) the limitation when read as a whole; 2) the plain meaning; and 3) how the term is used throughout the ‘440 Patent.

Petitioner attempts to construe “*shutdown section*” as an isolated term, disconnected from the broader limitation that defines the term. When read as whole, it is clear that the “*shutdown section*” limitation requires no construction. Claim 1 defines the location of the “*shutdown section*” – “*the secondary drive train having a shutdown section located between the switch-on device and the at least*

one side shaft coupling” – and then defines the purpose of the shutdown section – “*when the secondary axle is disconnected from the primary axle in order to transfer the overall power via the primary axle only, the shutdown section of the secondary drive train is decoupled from both the primary axle of the primary drive train and the wheels of the secondary axle.*” (Ex. 1001, ‘440 Patent, Claim 1 (emphasis added).)

Contrary to the claimed *shutdown section located between the switch-on device and the at least one side shaft coupling*, Petitioner’s construction improperly rewrites the claim such that “any portion” which can be decoupled constitutes a *shutdown section*. The plain meaning of the term is, however, evident from the claim as written and the consistent use of the term throughout the ‘440 Patent. “Because the switch-on mechanism and/or the side shaft couplings have frictionally engaged couplings, it can be that when the secondary axle is uncoupled, the shutdown section of the secondary drive train located between the switch-on device and the side shaft couplings is uncoupled both from the primary axle and from the secondary drive wheels, such that there is no more power loss in this shutdown section.” (Ex. 1001, ‘440 Patent, Abstract (emphasis added).) The Brief Summary of the Invention section reiterates the Abstract language, adding that “[t]his configuration of the drive train makes it possible to completely shut down a majority of the secondary drive train with the secondary axle uncoupled.”

(Ex. 1001, ‘440 Patent at 3:10-24.) There is no support in the ‘440 Patent for Petitioner’s proposed construction that any arbitrary location be considered a *shutdown section*. In sum, the plain meaning of *shutdown section* is evident from Claim 1. No construction is required.

C. “Side shaft coupling”

Independent claim 1 recites, in relevant part:

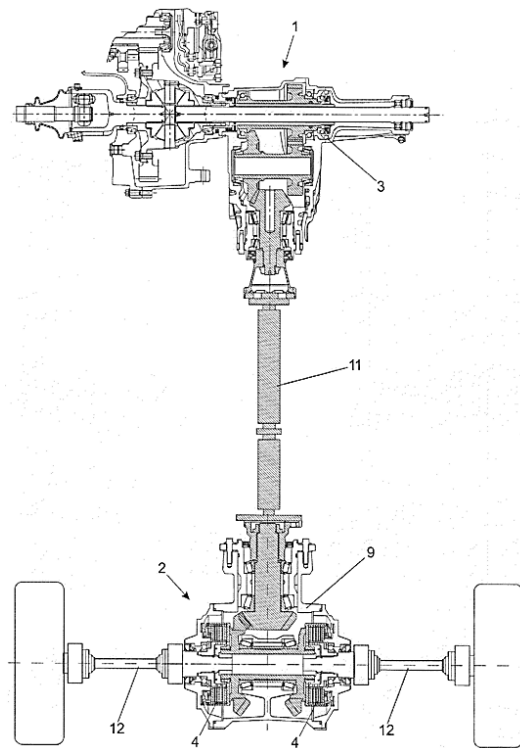
[1.e.1] *wherein when the secondary axle is connected to the primary axle, the secondary drive train power is conveyed via at least one side shaft couplings into side shafts of the secondary axle and is transmitted to wheels of the secondary axle* [1.e.2.] *the secondary drive train having a shutdown section located between the switch-on device and the at least one side shaft coupling, whereby:*

(Ex. 1001, ‘440 Patent, Claim 1 (emphasis added).)

While Petitioner does not explicitly construe the term *side shaft coupling* it applies it in a manner that impermissibly rewrites the limitation – eliminating “side shaft” and leaving just the word “coupling.” Petitioner’s application of “*side shaft coupling*” is improper because it contradicts the broadest reasonable interpretation of the term.

Although the term “*side shaft coupling*” requires no special construction, the plain meaning of the term must be determined in the context of the broader claim. A coupling is “a connecting device used between two objects so motion of one will be imparted to the other.” (Ex. 2011, Engineering Dictionary at 1.) It thus follows

that in the context of claim 1, the plain meaning of *side shaft coupling* is: “the connecting device that conveys power from the secondary drive train into **side shafts of the secondary axle.**” This meaning is also consistent with how the term is used throughout the ‘440 Patent. In every embodiment of the ‘440 Patent, the *side shaft coupling* is the component that connects the side shaft to the secondary drive train, allowing power to transmit from the secondary drive train into the side shaft. See, Figs. 3, 8 and 12 embodiments, reproduced on pages 11, 13 and 16 above. Given this relationship between the side shaft couplings and the side shafts/wheels, in the Fig. 3 embodiment below, the side shaft couplings provide transverse equalization between the wheels. (Ex. 1001, ‘440 Patent at 3:31-41.)



Ex. 1001, ‘440 Patent, Fig. 3

VI. GROUND 1, BASED ON THE ALLEGED ANTICIPATION BY TERAOKA OF CLAIMS 1, 4 AND 5, IS DEFICIENT

A. Overview Of Teraoka

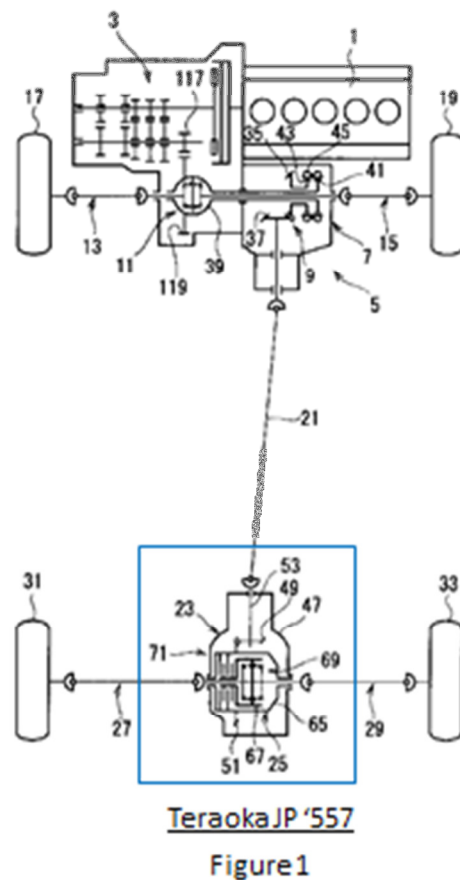
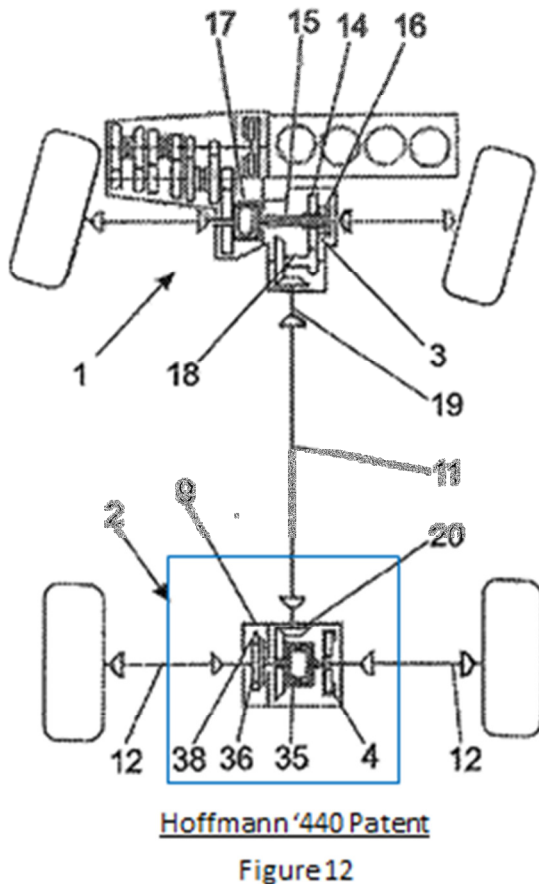
Teraoka is directed to a four-wheel drive system in which either set of wheels can be disengaged when in two-wheel drive. (Ex. 1002, Teraoka at 3.) The problem “to be solved” in Teraoka involves simplifying the configuration while reducing the drag torque created by the coupling during two-wheel drive travel. More specifically, “since a wet multi-plate clutch is used for the coupling 521, even when it is uncoupled by the controller, if rotation is inputted into one side, the viscosity of the oil will generate drag torque between the clutch plates.” (Ex. 1002, Teraoka, Abstract, [112-3].)

This problem is solved by providing a four-wheel drive system where the “coupling is arranged between the final speed reduction mechanism and the wheels . . . drag rotation of the wheels is inputted into the coupling without undergoing speed increase by the final speed reduction mechanism.” (Ex. 1002, Teraoka at [0028].) This arrangement will also reduce the drag torque of oil arising in the coupling. (*Id.*) As illustrated in Figure 1, reproduced below,

when the two-four switching mechanism [7] and the coupling [clutch mechanism 71] are coupled, the driving force of the prime mover [engine 1] is transmitted from the transfer case [5] and two-four switching mechanism [7] to the final speed reduction mechanism [23] and subjected to speed reduction, after which it is distributed from the

coupling [clutch mechanism 71] via the differential device [51] to the left and right wheel sides [27,29], and the vehicle enters a four-wheel drive state.

(Ex. 1002, Teraoka at 4.)



B. Ground 1 Is Deficient Against Claims 1, 4 and 5 Because Clutch Mechanism 71 in Teraoka Does Not Constitute A Side Shaft Coupling

For its anticipation argument, Petitioner argues that clutch mechanism 71 constitutes a *side shaft coupling* under claim 1 of the '440 Patent. (Petition at 16.) Petitioner's argument is deficient for two reasons: 1) clutch mechanism 71 is not a *side shaft coupling* under the proper construction of that term and 2) clutch

mechanism 71 and differential 51 of the secondary axle are not arranged as required by the claims – see Section XI(D) below.

As detailed in the “Claim Construction” Section V above, the plain meaning of *side shaft coupling* is “the connecting device that conveys power from the secondary drive train into **side shafts of the secondary axle.**” It thus follows that in Figure 1 of Teraoka above, it is the differential 51 and not clutch mechanism 71 that serves to connect and convey power from the secondary drive train into side shafts 27, 29 in 4WD mode. Teraoka makes this clear – in 4WD mode, power is “distributed from the coupling [clutch mechanism 71] via the differential device [51] to the left and right wheel sides [27, 29]. (Ex. 1002, Teraoka at [0024].) Accordingly, while the clutch mechanism 71 in Teraoka serves to couple/decouple the primary and secondary drive trains, it is not “*a side shaft coupling*,” per Claim 1 of the ‘440 Patent. For at least this reason, there is no reasonable likelihood that Claim 1 is anticipated by Teraoka.

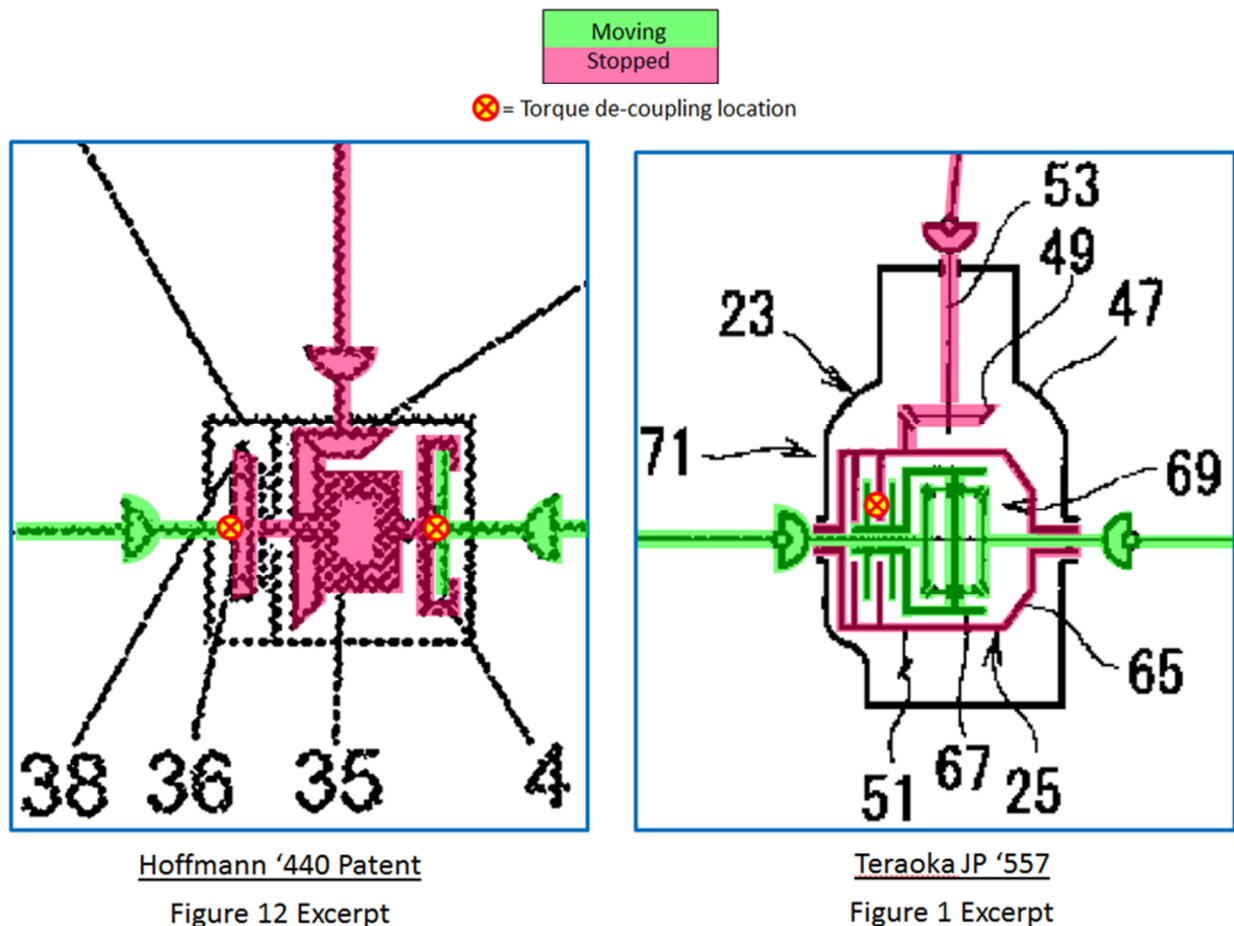
C. Ground 1 Is Deficient Against Claims 1, 4 and 5 Because Teraoka Does Not Disclose A *Shutdown Section*

For the *shutdown section* limitation [1.e.2.], Petitioner argues that “Fig. 1 of Teraoka (Ex. 1002) illustrates that intermediary propeller shaft 21 and final gear 23 (*i.e.*, a shutdown section) are between clutch mechanism 71 (*i.e.*, the at least one side shaft coupling) and the transfer case 5 (*i.e.*, the switch-on device).” (Petition at 17.) However, as illustrated by the green portion of the Teraoka’s Figure 1 excerpt

below on page 28, when clutch mechanism 71 is open in 2WD mode and the secondary drive train is uncoupled from the primary drive train, the differential 51 (*i.e., side shaft coupling*) would still be rotating along with the wheels 31, 33. As such, Teraoka fails to teach both prongs of the *shutdown section* limitation, namely: 1) a *secondary drive train having a shutdown section located between the switch-on device and the at least one side shaft coupling*; and 2) *when the secondary axle is disconnected from the primary axle in order to transfer the overall power via the primary axle only, the shutdown section of the secondary drive train is decoupled from both the primary axle of the primary drive train and the wheels of the secondary axle.*

In the context of the '440 Patent and the problem being solved – minimizing rotational and frictional losses during 2WD mode – the impact of this design difference is significant. This is clear from the side-by-side illustrations on page 28 of the '440 Patent Figure 12 embodiment and the Figure 1 Teraoka embodiment which have been annotated and expanded to show the torque de-coupling locations in the secondary axle and the sections of each system which are rotating (in green) versus stopped (in pink). For reference purposes, the original drawings of each system are provided on page 25. Because the torque decoupling location (clutch mechanism 71 in Teraoka) is upstream of the side-shaft coupling (differential 51 in Teraoka), in 2WD mode when the secondary drive is uncoupled, a large portion of

the secondary axle (shown in green) is still rotating – causing significant frictional losses. In comparison, because side shaft coupling 4 of the ‘440 Patent (as shown in the Figure 1 excerpt below) is the torque decoupling location, as required by the *shutdown section* limitation in claim 1, the *shutdown section* is maximized and thus the rotational losses in 2WD are minimized.



It is well-known that “the major part of the AWD related losses is caused by the drag and churning losses of the spinning parts,” e.g. the differential. (Ex. 2004, Gassman GKN Seamless Drivelines Article at 73; Ex. 1001, ‘440 Patent, 2:21-36.) This is why the ‘440 Patent claims require that the clutch or coupling location is

moved from an in-line position (*see* Fig. 1 prior art embodiment) to a side shaft location per claim 1, to balance the tradeoffs between minimizing power losses and driveability concerns.

Notwithstanding Petitioner's assertions, as properly construed, the *shutdown section* limitation is not met simply because "a portion" of the secondary drive is decoupled from both the primary axle and the wheels of the secondary axle. (Petitioner at 12.) Rather, Claim 1 requires that the shutdown section is *located between the switch-on device and the side shaft coupling*. As Teraoka does not "shut down" the components of the differential (much like the Fig. 2 prior art system of the '440 Patent), Teraoka fails to teach the *shutdown section* limitation.

D. Ground 1 Is Deficient Against Claims 1, 4 and 5 Because Teraoka Does Not Disclose "A Side Shaft Coupling" Or "A Shutdown Section" That Is Arranged Per Claim 1

Because Teraoka lacks a *side shaft coupling* and *shutdown section*, arranged as in claim 1, it does not anticipate claim 1. The prior art reference must not only disclose all claim elements within the document's "four corners," *Xerox Corp. v. 3Com Corp.*, 458 F.3d 1310, 1321 (Fed. Cir. 2006), it also must disclose those elements "arranged as in the claim." *Net MoneyIN, Inc. v. Verisign, Inc.*, 545 F.2d 1359, 1369 (Fed. Cir. 2008). That is, the elements must be "arranged or combined in the same way as in the claim." *Id.* at 1370. Even slight differences between the prior art reference and the claim in question preclude a finding of anticipation. *Id.*

at 1371. Here, the Teraoka configuration results in destroying the claimed improvement provided by the ‘440 Patent – shutting down the rotating components between the switch-on device and the side shaft coupling. As shown above, while Teraoka includes a partial shutdown section it does not include “*a shutdown section located between the switch-on device and the at least one side shaft coupling*” which “*is decoupled from both the primary axle of the primary drive train and the wheels of the secondary axle*” “*when the secondary axle is disconnected from the primary axle,*” as required by claim 1. (Ex. 1001, ‘440 Patent, Claim 1 (emphasis added).) Instead, differential 51 continues to rotate when the secondary axle is disconnected from the primary axle. (See annotated Fig. 1 excerpt of Teraoka on page 28.) As Teraoka deviates from the claimed arrangement, Petitioner has failed to make a *prima facie* case of anticipation for Ground 1.

VII. GROUND 2 BASED ON AN OBVIOUSNESS COMBINATION OF TERAOKA AND WATANABE AGAINST CLAIMS 2 AND 3 IS DEFICIENT

A. Overview of Watanabe

The objective of the Watanabe patent, entitled “Power Transmission Device,” is to improve the durability of clutches in a power transmission device. (Ex. 1003, Watanabe at 2.) The concern is that with a lot of use (slipping), the friction plates in the clutch are susceptible to insufficient lubrication and thus

overheating. (*Id.*) Watanabe identifies a single aim of the invention: the “present invention has an object to provide a power transmission device in which friction plates do not suffer from lack of lubrication, seizing or the like.” (*Id.*)

While the Watanabe patent describes a two-clutch system for use in a 4WD, differential-free secondary axle system, it is not directed to the issue of power loss or decoupling the secondary driveline from the primary driveline.

B. Dependent Claims 2 And 3

Claims 2 and 3 depend from independent claim 1 and add the following limitations:

2. The drive train as claimed in claim 1, having **a side shaft coupling for each side shaft of the secondary axle** and wherein when the secondary axle is connected to the primary axle, the side shaft couplings allow a driving power distribution **without a differential gearing** between the drive wheels of the secondary axle to ensure transverse compensation.

3. The drive train as claimed in claim 1, having **a side shaft coupling for each side shaft of the secondary axle** and wherein when the secondary axle is connected to the primary axle, the side shaft couplings allow a drive power distribution **without differential gearing** between the primary axle and the secondary axle, to ensure longitudinal compensation.

(Ex. 1001, ‘440 Patent, Claims 2 and 3) (emphasis added.)

C. Ground 2 Is Deficient Against Claims 2 and 3 For the Same Reason that Teraoka Does Not Anticipate Claim 1, From Which Claims 2 and 3 Depend

As to dependent claims 2 and 3 of the '440 Patent, Petitioner's only obviousness assertion is that Watanabe discloses the additional limitation of claims 2 and 3, not disclosed by Teraoka, namely "side shaft couplings for each side shaft of the secondary axle" which *allow a drive power distribution without differential gearing*. (Petition at 19.)

However, this does not change the fact that, as discussed in the immediately preceding sections of this response, Teraoka does not disclose a number of limitations, such as the claimed *shutdown section*, required by independent claim 1 from which claims 2 and 3 depend. Petitioner makes no showing that Watanabe cures the deficiencies of Teraoka relative to independent claim 1. The Petition relies exclusively on the Ground 1 anticipation argument to attack claim 1. As detailed in Section VI, because the Petition fails to establish how material limitations in independent claim 1 are met, institution of dependent claims 2 and 3 should also be denied.

**D. Ground 2 Is Deficient Against Claims 2 and 3 Because
Petitioner's Rationale To Combine Teraoka and Watanabe
Lacks Rational Underpinning**

1. Petitioner's Conclusory Arguments Are Insufficient

Petitioner distorts the claimed invention in an attempt to paint a picture of simplicity to the Board. Per the Petition, “[c]laim 1 of the ‘440 patent merely requires a four wheel drive system that includes at least one side shaft coupling.” (Petition at 19.) This simplified description notably eliminates the claimed relationship between the switch-on device and the side shaft couplings which “cooperate synergistically” to shut down the secondary drive train in 2WD mode. (Ex. 1001, ‘440 Patent at 6:53-56.) Having recast claim 1, Petitioner then asserts that “[i]t would have been a matter of simple substitution to replace the rear, secondary drive train [of Teraoka] with the rear, secondary drive train of Watanabe to yield the predictable result of reducing mass and rotating losses.” (*Id.*) Nothing more is provided in terms of how the combination would be achieved or what tradeoffs would have to be considered. Petitioner would have the Board believe that all components in a driveline system are readily interchangeable.

On the issue of motivation to combine, the Petition simply states: “it would have been obvious to replace the clutch 71 and differential 25 of Teraoka with side shaft couplings on each side of the secondary axle without differential gearing in between, as doing so would achieve the well-known goals of eliminating the heavy

bevel gear differential, therefore reducing the weight and fuel consumption of the vehicle.” (Petition at 19.) Except for the declaration—which provides an almost verbatim, conclusory explanation—no other support is offered. “Merely repeating an argument from the Petition in the declaration of a proposed expert does not give that argument enhanced probative value.” *Kinetic Technologies, Inc. v. Skyworks Solutions, Inc.*, IPR2014-00529, Paper 8 at 15 (PTAB Sept 24, 2014).

The Board routinely denies obviousness grounds, when as here, a Petitioner relies on conclusory, boilerplate language without much in the way of details. *See, Kinetic Technologies, Inc. v. Skyworks Solutions, Inc.*, where the Board found Petitioner’s motivation to combine arguments inadequate, as the Petition and expert declaration failed to “explain the ‘how,’ ‘what,’ and ‘why’ of the proposed combination of references.” (*Id.*) More specifically, the Board faulted Petitioner’s assertions as they did not explain how the references could be combined, or how such a combination would yield a predictable result and further failed to explain why the ordinary artisan would have combined elements from the two references in the specific way the claimed invention does. *Id.* “[S]tatements of general principles from the case law . . . are not a substitute for a fact-based analysis of the proposed combination of references necessary to support those conclusions.” *Id.* Petitioner’s obviousness Ground 2 suffers from the same deficiencies. The Board should therefore deny Ground 2 of the petition for failing to meet the specificity

requirements of at least 37 C.F.R. § 42.104(4)-(5).

2. No Reasonable Basis Is Provided For Why A Person Of Ordinary Skill In The Art Would Have Been Motivated To Combine Teraoka And Watanabe

Obviousness requires more than a mere showing that the prior art includes separate references covering each separate limitation in a claim under examination. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). Rather, “obviousness requires the additional showing that a person of ordinary skill at the time of the invention would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention.” *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011). This requirement “remains the primary guarantor against a non-statutory hindsight analysis.” *OrthoMcNeil v. Mylan Lab*, 520 F.3d 1358, 1364-65 (Fed. Cir. 2008).

Petitioner fails to advance any reasonable basis for why a person of ordinary skill in the art (“POSA”) would have looked to Watanabe to solve the problems identified in the ‘440 Patent, namely power loss, fuel economy and system complexity/cost for selectively connectable 4WD systems. Watanabe is not directed to the issue of drag torque or power loss in selectively connectable 4WD systems. On the contrary, the sole aim for the Watanabe design is “to provide a power transmission device in which friction plates do not suffer from lack of lubrication, seizing, or the like.” (Ex. 1003, Watanabe at 2.)

Regarding motivation to combine, Petitioner merely points to “the well-known goals of eliminating the relatively heavy bevel gear differential, therefore reducing the weight and fuel consumption of the vehicle” as a basis. (Petition at 19.) This argument is however flawed for two reasons. First, Petitioner offers no support for its unsubstantiated assertion that eliminating the “relatively heavy bevel gear differential” to reduce weight and fuel consumption was a “well-known goal.”⁴ It is not appropriate to make an assertion “where the facts asserted to be well-known are not capable of instant and unquestionable demonstration as being well-known.” MPEP § 2144.03(A). Indeed, Petitioner’s assertion is simply incorrect – prior to the filing of the ‘440 Patent and even today, driveline systems routinely utilize a differential on the rear axle to help distribute drive power between the rear wheels. (Ex. 2009, 2015 Tata SAE at 1; Ex. 2012, 2006 SAE Paper at 3, 6.) Second, it is unclear whether eliminating “the heavy bevel gear differential” of Teraoka and replacing it with two multiple plate clutches 89, 91, two hub members 45, 47 and two actuators 133, 135 per Fig. 1 of Watanabe helps reduce the weight of the vehicle, as Petitioner asserts. (Ex. 1003, Watanabe at 3-4;

⁴ While the Becker declaration repeats the argument in the Petition, it provides no underlying facts or data to support the assertion and thus is entitled to little or no weight. *See, Kinetic Technologies, Inc. v. Skyworks Solutions, Inc.*, IPR2014-00529, Paper 8 at 15 (PTAB Sept 24, 2014).

Fig. 1.) Thus, there is no legitimate, factual reasoning offered by Petitioner as to why an inventor would look to Watanabe to solve the problems identified in the '440 Patent.

3. Petitioner's Boilerplate "Simple Substitution" Statement Fails To Explain How The Combination Would Be Achieved

For its explanation of "how" the combination would be achieved, the Petition simply states: "[i]t would have been a matter of simple substitution to replace the rear, secondary drive train with the rear, secondary drive train of Watanabe to yield the predictable result of reducing mass and rotating losses." (Petition at 23.) There is no explanation of which components of the "rear, secondary drive train" would be replaced (making it impossible to assess mechanical compatibility of the proposed combination), how this would be accomplished, and what steps would be necessary to modify a differential-based rear-axle system with one that employs two clutches let alone evidence that the steps would be well-known to one-skilled in the art. At a minimum, mechanical modifications would be required as well as modifications to the brake and steering systems to factor in power inputs from both clutches.

Further, as is typical in the field of driveline design, because the driveline interfaces with all of the major vehicle systems, (*i.e.*, suspension, wheels, braking, etc.) each design modification can impact some or all of the following vehicle

performance characteristics: energy/fuel efficiency, mobility, turnability, stability of motion, handling, braking and smoothness of ride.” (Ex. 2010, Andreev Book at 9.) Thus, a POSA would have to evaluate how the proposed modification, here a two-clutch versus rear differential system, would impact each of the above vehicle performance characteristics to determine whether the combination would be feasible in view of the system tradeoffs. (*Id.*) The proposed substitution is thus anything but “simple.” The fact that the relied-on references concern 4WD driveline systems “is not in itself sufficient rationale” for making the asserted combination. *Heart Failure Technologies LLC v. Cardiokinetix, Inc.*, IPR2013-00183, Paper 12 at 9 (PTAB July 31, 2013).

4. Petitioner Glosses Over The Structure And Function Of Watanabe

Because the clutches in Watanabe have a substantially different structure and function than the clutches in Teraoka, the two cannot be “simply substituted.” In Teraoka, a single wet multi-plate clutch is arranged in a differential carrier on the rear axle so that “lubrication of the wet multi-plate clutch is easy and durability of the clutch plates can be improved.” (Ex. 1002, Teraoka at 5.) By contrast, in Watanabe, the pair of multiple plate clutches 89, 91 are configured to separately engage a cylindrical case 29 and a hub member 45, 47, such that if the tightening force of the multiple plate clutch is adjusted, differential rotation between the case and the hub member is controlled. (Ex. 1003, Watanabe at 3-4.)

As a result of this difference in structure, Watanabe's two clutch mechanism can be used to adjust "the distribution ratio of the drive power between the rear wheels" and more specifically to selectively apply a yawing moment to either of the rear wheels or adjust the size of the yawing moment during cornering to improve steering characteristics. (Ex. 1003, Watanabe at 4-5.) On the other hand, Teraoka's clutches fail to provide any drive power control between the rear wheels. (Ex. 1002, Teraoka at 6, 9.) Petitioner's "simple substitution" boilerplate fails to provide the necessary rational underpinning given the disparate structure and function of the components to be modified. *See, Zimmer Holdings, Inc. et al. v. Bonutti Skeletal Innovations LLC*, IPR2014-01078, Paper 17 at 20 (PTAB Oct. 30, 2014).

VIII. GROUND 3 BASED ON AN OBVIOUSNESS COMBINATION OF TERAOKA AND BURROWS AGAINST CLAIMS 6 AND 7 IS DEFICIENT

A. Overview of Burrows

The Burrows patent provides at least three multi-step control strategies to transition from 2WD to 4WD. (Ex. 1004, Burrows at 9-10.) The first of these strategies is a two-step embodiment for use with friction clutches, where the non-rotating parts of the secondary drive system are engaged and the system waits for them to be brought up to speed. (*Id.*) Once the correct speed is reached a second step is employed to engage the primary drive train with the secondary drive while

the vehicle is moving. (*Id.*) This promotes smooth engagement as perceived by the driver:

Changing from two wheel to four wheel drive is controlled so that [1] the auxiliary drive line 21 is reconnected to either the engine 11 or the second pair of wheels, typically the rear wheels 14, 15, to rotate at least part of the auxiliary drive line 21 for a sufficient time period prior to [2] fully reconnecting it to provide drive torque to the rear wheels 14, 15. Thus transition to engagement of four wheel drive occurs in two stages, reducing any acceleration jerk perceived by the driver.

(Ex. 1004, Burrows, Abstract.)

A second multi-step control strategy is employed for embodiments with a dog clutch:

A control strategy for operation of a dog clutch for a dynamic change in two wheel drive mode causes [1] the clutch 22 to spin-up the auxiliary driveline 21 to the best estimated synchronization speed for connection to the rear wheels 14, 15. The clutch 22 would then [2] disengage quickly whilst simultaneously the synchronizer device would [3] smoothly engage the dog clutch. The clutch 22 then [4] re-engages quickly.

(*Id.* at 12.)

Finally, a third control strategy is taught for “off road” embodiments monitoring an array of vehicle operating conditions and wanting to enter 4WD

more rapidly and automatically. In this “off-road” mode, one clutch is engaged to keep driveline 21 spun up continually and a second clutch is engaged when needed. The controller in Burrows can “predict when four wheel drive should be engaged and . . . automatically spin-up the auxiliary driveline 21 ready for automatic connection into four wheel drive mode.” (*Id.* at 10.)

While the Burrows patent teaches several synchronization mechanisms for 4WD engagement, it is not directed to the issue of power loss or decoupling the secondary driveline from the primary driveline.

B. Dependent Claims 6 And 7

Claims 6 and 7 depend from independent claim 1 and add the following limitations:

6. The drive train as claimed in claim 5, wherein **a speed synchronization** in the switch-on mechanism of the power transmission gearbox for the establishment of **a positive lock** is supported by the at least one side shaft couplings.

7. The drive train as claimed in claim 6, wherein **the at least one side shaft couplings is formed by a frictionally engaged multiple disc clutch**, whereby the friction plates connected in a torque-proof way to the secondary drive wheels cooperate as inner plates with an inner plate carrier and whereby the friction plates located on the drive train-side of the vehicle cooperate with an outer plate carrier as outer plates.

(Ex. 1001, ‘440 Patent, Claims 6 and 7) (emphasis added.)

C. Ground 3 Is Deficient Against Claims 6 and 7 For the Same Reason that Teraoka Does Not Anticipate Claim 1, From Which Claims 6 and 7 Depend

As to dependent claims 6 and 7 of the '440 Patent, Petitioner's only obviousness assertion is that Burrows discloses certain limitations not disclosed by Teraoka, namely the additional "speed synchronization" limitation, required by dependent claims 6 and 7. (Petition at 22.)

However, this does not change the fact that, as detailed in Section VI above, Teraoka fails to disclose a number of limitations required by independent claim 1. The Petition makes no showing that Burrows cures the deficiencies of Teraoka vis-à-vis Claim 1 and instead relies exclusively on the anticipation arguments in Ground 1. Because the Petition fails to establish how material limitations in independent claim 1 are met, namely a *shutdown section* or a *side shaft coupling*, review of dependent claims 6 and 7 should also be denied.

D. Ground 3 Is Deficient Against Claims 6 and 7 Because Petitioner's Rationale To Combine Teraoka and Burrows is Conclusory and Lacks Sufficient Rationale

1. No Reasonable Basis Is Provided For Why A POSA Would Have Been Motivated To Combine Teraoka And Burrows

Petitioner's conclusory arguments are insufficient to establish a rationale to combine Teraoka and Burrows. Indeed, Petitioner fails to advance any reasonable basis for why a POSA would have looked to Burrows to solve the problems

identified in the '440 Patent, namely power and fuel economy losses and the reduction of system complexity/cost when a selectively connectable 4WD system operates in 2WD mode. The Burrows invention relates to drivelines “in particular for motor vehicles such as all-terrain vehicles.” (Ex. 1004, Burrows at 5, emphasis added.) More specifically, Burrows is directed to a multi-stage control strategy that reduces “acceleration jerk perceived by the driver” during the transition to four wheel drive. (Ex. 1004, Burrows, Abstract.) In relation to conventional 4WD vehicles, the terrain demands encountered by all-wheel terrain vehicles (“ATVs”)—and the myriad issues common to ATVs such as “acceleration jerks”—fundamentally alter the driveline design criteria and acceptable tradeoffs, *i.e.* weight and fuel economy considerations. (Ex. 2012, 2006 SAE paper at 4; Ex. 2014, ATV Article at 14-15.) Petitioner offers no explanation for why a person skilled in the art would look to a speed synchronizing mechanism designed to solve acceleration jerks in ATVs if the problem to be solved involves maximizing energy and cost considerations for conventional 4WD applications.

Because the system considerations of an ATV versus a conventional 4WD vehicle are so different, the teachings of one are of little value to the other. As explained in *All-Wheel Driveline Mechatronic Systems: Principles of Wheel Power Management*, a methodology for designing driveline systems should “[p]rovide a way to optimally manage power distributions to the drive wheels and to determine

optimum characteristics of driveline systems based on the criteria of the operational properties.” Such criteria include “energy/fuel efficiency, cross-country mobility, tractive and velocity properties, vehicle turnability and stability of motion and handling.” (Ex. 2012, 2006 SAE Paper at 4.) Because both the operational properties and acceptable system tradeoffs vary so greatly, an engineer designing a driveline to minimize power and fuel economy losses for conventional 4WD applications would not look to a reference directed to minimizing acceleration jerks for an ATV.

Petitioner impermissibly uses the claimed invention “as an instruction manual or ‘template’ to piece together teachings of the prior art so that the claimed invention is rendered obvious . . . One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.” *In re Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992).

As its sole basis for the proposed combination, Petitioner relies on yet another unsubstantiated assertion that “it was well known in the art that positively connected gearing (e.g. a dog clutch) requires speed synchronization of the input and output sides to reduce wear and prevent failure.” (Petition at 22-23.) Neither the Petition nor the Becker declaration offer any underlying facts or data to substantiate the allegedly “well-known” goal. “[W]here the facts asserted to be well-known are not capable of instant and unquestionable demonstration as being

well-known” they are entitled to no weight. MPEP § 2144.03(A).

**2. Petitioner’s Boilerplate “Known Technique”
Statement Fails To Explain How The Combination
Would Be Achieved**

Petitioner offers no specifics as to which of the at least three speed synchronizer mechanisms taught in Burrows would be incorporated, let alone how the mechanism would be combined with the Teraoka configuration. The petition simply states that a known technique to improve similar devices in the same way supports obviousness: “it would have been obvious to one of ordinary skill in the art to synchronize the switching mechanism 7 of Teraoka using the clutch mechanism 71 connected by propeller shaft 21, as taught by Burrows, to perform synchronization without the use of additional equipment.” (Petition at 23.)

Notably, Burrows teaches three distinct synchronizer mechanisms. In the basic 2-stage synchronization method, the transition from 4WD to 2WD

is controlled so that the auxiliary drive line 21 is reconnected to either the engine 11 or the second pair of wheels, typically the rear wheels 14, 15, to rotate at least part of the auxiliary drive line 21 for a sufficient time period prior to fully reconnecting it to provide drive torque to the rear wheels 14, 15. Thus transition to engagement of four wheel drive occurs in two stages, reducing any acceleration jerk perceived by the driver.

(Ex. 1004, Burrows, Abstract (emphasis added).)

According to Burrows, in order to “spin-up the auxiliary driveline 21 to the correct

rotation speed . . . the first clutch connection should be engaged with the driveline for a minimum time period before the second clutch connection is completed. This time period is related to the speed of the vehicle.” (Ex. 1004, Burrows at 11.) When the driveline structure includes a dog clutch, Burrows recommends a separate four-stage synchronization method. (*Id.* at 10.)

By contrast, in Teraoka “[t]he controller simultaneously couples the two-four switching mechanism 7 and clutch mechanism 71 when switching from two-wheel drive state to four-wheel drive state and simultaneously uncouples them when switching from four-wheel drive state to two-wheel drive state.” (Ex. 1002, Teraoka at [0072] (emphasis added).)

The Petition, however, never identifies which of the three multi-stage synchronizer mechanisms taught in Burrows would be suitable for combination with Teraoka. Given the lack of specificity, the Patent Owner must make assumptions to understand and respond to the Petition. Further, Petitioner never explains how any of the multi-stage synchronization processes taught in Burrows could be integrated with Teraoka’s existing driveline – which is not directed to ATV applications—and what other modifications would need to be made thereafter. Teraoka’s simultaneous coupling of the two-four mechanism and clutch mechanism is not readily substitutable with Burrows’ teaching of a multi-stage coupling process without significant system and controller modifications. The

Petition, however, is silent as to what modifications would be needed and whether such modifications were within the knowledge of one skilled in the art during the relevant time frame. Petitioner's cursory discussion of Burrows and limited citations fail to provide the requisite rational underpinning needed to "support the legal conclusion of obviousness." *KSR Int'l Co v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007) citing *In re Kahn*, 440 F.3d at 988.

Moreover, where the suggested combination would require "a change in the basic principle under which the primary reference was designed to operate" then the teachings of the references are not sufficient to render the claims *prima facie* obvious. MPEP § 2143.01(V); *In re Ratti*, 270 F.2d 810 (CCPA 1959). Here, as the suggested combination would require the simultaneous coupling system in Teraoka to be modified to a multi-stage speed synchronization mechanism – the suggested obviousness combination is impermissible.

Finally, Petitioner oversimplifies the driveline area, suggesting that all systems are interchangeable, regardless of their intended function. That is not the case. In an SAE article published in 2006, a noted driveline expert states unequivocally that "the designing of the driveline system is to be based on criteria of the vehicle operational properties." (Ex. 2012, 2006 SAE Paper at 2.) The article goes on to provide that "[d]ynamics and performance of vehicles with four or more drive wheels result from vehicle operational properties such as energy/fuel

efficiency, cross-country mobility, tractive and velocity properties, vehicle turnability, and stability of motion and handling.” (*Id.*) “No doubt, these vehicle operational properties considerably depend on total power applied to all the drive wheels . . . **vehicle dynamics and vehicle performance are not equivalent to each other.**” (*Id.*) Per the article, a POSA would analyze this array of operational properties to determine the optimum characteristics that would lead to the desired vehicle performance and technical efficiency. (*Id.*) As the driveline is combined with various other vehicle systems, such as braking systems, engine transmission, suspension, steering, etc. – the overall set of interrelated operational properties should be considered. *See*, Figure 3. (*Id.*)

In distorting the invention, Petitioner fails to articulate the process a POSA would undertake to design a driveline system focused primarily on energy/fuel efficiency – such as Teraoka – while integrating control strategies for a driveline designed primarily for all terrain mobility – such as Burrows. Petitioner seems to be arguing that because the teachings exist in analogous references, the teachings must necessarily be compatible. This line of reasoning has repeatedly been rejected. *See Heart Failure Technologies LLC v. Cardiokinetix, Inc.*, IPR2013-00183, Paper 12 at 9 (PTAB July 31, 2013).

For these reasons, Petitioner’s Ground 3 obviousness assertion is deficient.

IX. CONCLUSION

In light of the remarks herein, Patent Owner respectfully requests that the Board deny the Petition for *inter partes* review of the '440 Patent.

Respectfully submitted,

Dated: January 28, 2016

/Sangeeta G. Shah/
Sangeeta G. Shah (Reg. No. 38,614)
Kristin L. Murphy (Reg. No. 41,212)
Brooks Kushman P.C.
1000 Town Center, 22nd Floor
Southfield, MI 48075
(248) 358-4400

Attorneys for Patent Owner

CERTIFICATE OF SERVICE

The undersigned hereby certifies that on January 28, 2016 the foregoing **PATENT OWNER'S PRELIMINARY RESPONSE TO PETITION FOR *INTER PARTES* REVIEW UNDER 37 C.F.R. § 42.107**, including any attachments and exhibits, was served in its entirety on the following parties by electronic mail at cpdocketBaker@oblon.com:

Lead Counsel

W. Todd Baker (Reg. No. 45,265)
Oblon, McClelland, Maier & Neustadt, LLP
1940 Duke Street
Alexandria, VA 22314

Back up Counsel

Ryan Smith (Reg. No. 62,257)
Lisa Mandrusiak (Reg. No. 72,653)

Respectfully submitted,

/Sangeeta G. Shah/
Sangeeta G. Shah (Reg. No. 38,614)
Kristin L. Murphy (Reg. No. 41,212)
Brooks Kushman P.C.
1000 Town Center, 22nd Floor
Southfield, MI 48075
(248) 358-4400

Attorneys for Patent Owner