UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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HARBOR FREIGHT TOOLS USA INC.,
GENERAC POWER SYSTEMS, INC., and
MWE INVESTMENTS, LLC,
Petitioner,

v.

CHAMPION POWER EQUIPMENT, INC.,
Patent Owner.

Case No. IPR2025-00805
U.S. Patent No. 10,393,034

PATENT OWNER CHAMPION POWER EQUIPMENT, INC.'S PRELIMINARY RESPONSE

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GLOSSARY

Abbreviation	Term
’034 Patent	U.S. Patent No. 10,393,034
’060 Application	U.S. Patent Application No. 14/738060
’398 Patent	U.S. Patent No. 10,697,398
’441 Application	U.S. Patent Application No. 14/925441
’780 Patent	U.S. Patent No. 10,221,780
Board	Patent Trial and Appeal Board
Challenged Claims	Claims 1-24 of the ’034 Patent
Generac	Generac Power Systems, Inc.
Harbor Freight	Harbor Freight Tools USA, Inc.
MWE	MWE Investments, LLC
Patent Owner	Champion Power Equipment, Inc.
Petition	Petition for Inter Partes Review of U.S. Patent No. 10,393,034 (Paper 4)
Petitioner	Harbor Freight, Generac, and MWE, collectively
POSITA	Person of Ordinary Skill in the Art
USPTO	United States Patent & Trademark Office

Pursuant to 37 C.F.R. § 42.107, Patent Owner Champion Power Equipment, Inc. hereby submits its Preliminary Response to the Petition filed by Harbor Freight Tools USA, Inc., Generac Power Systems, Inc., and MWE Investments, LLC (collectively, "Petitioner"), challenging Claims 1-24 of U.S. Patent No. 10,393,034.

I. INTRODUCTION

Petitioner's proposed grounds are identified below:

Ground	Claims	Basis	Primary Reference	Secondary Reference(s)
1	1-3, 5-9, 18	103	Nakafushi	Olmr
2	*4, 10*	103	Nakafushi	Olmr; Duffy
3	19-23	103	Nakafushi	Olmr; Bernhardsson and/or Duffy
4	11-13, 16-17	103	Nakafushi	Jungmann; Parlatore
5	14-15, 24	103	Nakafushi	Jungmann; Parlatore; Olmr and/or Bernhardsson
6	1-3, 5-9, 11-14, 17-20, 22-23	102	Kubota DF972 Workshop Manual	
7	4	103	Kubota Workshop Manual	Duffy
8	16, 24	103	Kubota Workshop Manual	Parlatore and/or the Tri-Fuel Video

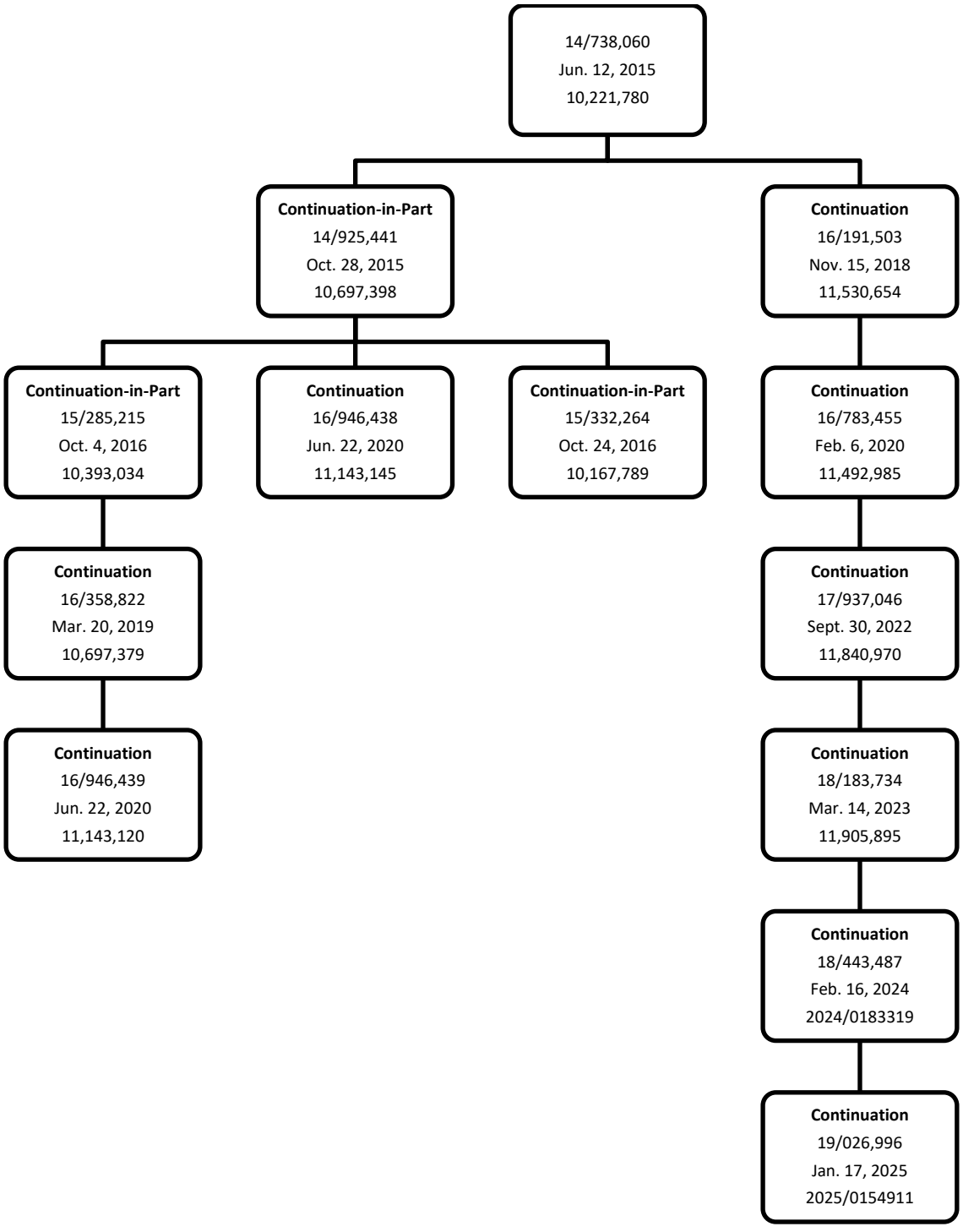
Discretionary denial pursuant to 35 U.S.C. § 314(a), 35 U.S.C. § 325(d), and the *Fintiv* and *Advanced Bionics* factors[1] is warranted for the reasons set forth in Patent Owner's Brief in Support of its Request for Discretionary Denial of Institution (Paper 8). Moreover, denial is appropriate because (1) Petitioner's invalidity arguments are fatally flawed for failing to disclose either "a gaseous fuel source" or "a gaseous fuel supplied from a pressurized fuel source," and (2) both the art and arguments advanced by Petitioner have already been advanced (and discarded) by the USPTO. Each basis for denial is discussed in turn, below.

II. OVERVIEW OF THE '034 PATENT

The '034 Patent claims priority to and is a continuation-in-part of U.S. Patent Application No. 14/925,441, which issued as U.S. Patent No. 10,697,398. EX1001, (63). The '398 Patent in turn claims priority to and is a continuation-in-part of U.S. Patent Application No. 14/738,060, which issued as U.S. Patent No. 10,221,780. EX1001, (63). The '060 Application was originally filed on June 12, 2015. *Id.*

[1] *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential); *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 (PTAB Feb. 13, 2020) (precedential).

The ’034 Patent is one of thirteen members of a patent family directed to multi-fuel engine technology, which are collectively referred to as the “2015 Family.” The 2015 Family is depicted below:



A. The Specification of the '034 Patent

The '034 Patent, titled "Fuel System for a Multi-Fuel Internal Combustion Engine," is directed to a multi-fuel engine operable on both liquid fuel and gaseous fuel. EX1001, Abstract. The '034 Patent explains that problems with such multi-fuel engines include overly rich air-fuel ratios, difficulties starting the engine, and unstable operating conditions when switching between liquid fuel and gaseous fuel:

> [A] common problem with such configurations that couple two fuel sources to a single fuel inlet, such as a carburetor, of an engine is that during cross-over switching between the fuel sources the engine can experience overly rich air-fuel ratio. This is particularly problematic when switching from a liquid fuel to a gaseous fuel because carburetors have a fuel bowl containing fuel that is drawn into the engine even after the liquid fuel source is cut-off. Therefore, for a period of time, the engine is running on both liquid and gaseous fuels causing an overly rich fuel mixture. Further, such simultaneous delivery of fuel from the first fuel line and the second fuel line, even if for a brief time, may make the engine hard to start and lead to unstable operating conditions.

EX1001, 1:60-2:6; *see also* EX2078 (Singhose Decl.), ¶78.

To address these problems, the multi-fuel engine of the '034 Patent "includes a liquid cutoff solenoid coupled to open and close a liquid fuel path to the engine, and a gaseous cutoff solenoid coupled to open and close a gaseous fuel source to the engine." *Id*. at 2:16-20. Further, "[a] switch couples a power source to the liquid

cutoff solenoid and the gaseous cutoff solenoid to switch between fuel sources on-the-fly during engine operation." *Id*. at 20-23; EX2078 (Singhose Decl.), ¶79.

As the '034 Patent explains, gaseous fuels include, for example, gaseous "liquified petroleum gas, compressed natural gas, hydrogen, or the like." EX1001, 1:45-46. "Liquified petroleum gas (LPG), often referred to as propane, exists in a gaseous state at normal temperature and pressure but can be conveniently stored under pressure in a liquid state." *Id*. at 1:46-49. With respect to the systems disclosed by the '034 Patent, when the valve at the top of the propane cylinder is opened propane vapor is released, which causes the pressure within the cylinder to drop. The drop in pressure then causes additional liquid LPG fuel within the tank to evaporate into a gas. The fuel exits the valve in a gaseous state, *not* as liquid propane. *See* Section V, *infra*; EX2078 (Singhose Decl.), ¶80.

Because the pressurized fuel source described by the '034 Patent supplies gaseous fuel to the system (as opposed to liquid fuel), it does not require a vaporizer, or a heat source necessary for operation of a vaporizer, to change the fuel from a liquid state to a gaseous state. Instead, the '034 Patent discloses two pressure regulators: (1) primary pressure regulator 64 to regulate the pressure of the gaseous fuel when it is drawn from the fuel source and (2) secondary pressure regulator 66 to regulate the pressure of the gaseous fuel received from primary pressure regulator 64. However, the fuel flowing through pressure regulator 64 and secondary pressure

regulator 66 is in a gaseous state, as drawn from the gaseous fuel source. EX2078 (Singhose Decl.), ¶81.

B. The Independent Claims of the '034 Patent

Claims 1, 11, and 18 are reproduced below:

1. A multi-fuel engine comprising: an engine operable on a liquid fuel and a gaseous fuel; a carburetor attached to an intake of the engine to mix air and fuel and connect a liquid fuel source to the intake, the carburetor comprising a float bowl; a liquid cutoff solenoid coupled to the carburetor to open and close a liquid fuel path to the engine downstream from the float bowl; a gaseous cutoff coupled to open and close a gaseous fuel source to the engine; and a switch selectively coupling a power source to the liquid cutoff solenoid to	11. A multi-fuel generator and fuel delivery system comprising: a multi-fuel internal combustion engine configured to operate on a liquid fuel supplied from a liquid fuel source through a liquid fuel line and a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line; an alternator driven by the multi-fuel internal combustion engine; a fuel regulator system comprising: a primary pressure regulator coupled to a service valve of the pressurized fuel source to regulate fuel supplied from the pressurized fuel source to a reduced pressure, and a secondary pressure regulator coupled to the primary pressure regulator to regulate fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the engine; and	18. A multi-fuel internal combustion engine comprising: an engine operable on liquid fuel supplied through a liquid fuel line from a liquid fuel source and gaseous fuel supplied through a gaseous fuel line from a pressurized fuel source; a carburetor coupled to an intake of the engine to mix air and fuel and connect to the liquid fuel line and the gaseous fuel line; a carburetor cutoff solenoid coupled to control fuel flow within the carburetor from the liquid fuel line and selectively engage engine operation on liquid fuel; and a gaseous fuel valve coupled to control

open and close the liquid fuel path.	an electro-mechanical valve system coupled to the engine and operated by an electrical switch powered by one of the alternator, a battery, and a magneto that controls fuel flow to the engine from the liquid fuel source and the pressurized fuel source.	fuel flow through the gaseous fuel line and selectively engage engine operation on gaseous fuel.

C. The Prosecution History of the '034 Patent

1. The Parent '441 Application

U.S. Patent Application No. 14/925,441 (the parent to the '034 Patent), was filed on October 28, 2015. EX1001, (63). On October 11, 2018, the Examiner ("Long T Tran") rejected then-pending claims 1-63 of the '441 Application. EX2053, 1-2. Of particular relevance, the Examiner rejected pending Claim 1 "under 35 U.S.C. 103 as being unpatentable over Poehlman (US 4,489,699) and in view of Tsuda et al. (US 5,809,979)" (assigned to Kubota Corporation and hereinafter referred to as "Kubota Patent"). EX2053, 4. Regarding Claim 1, the Examiner explained that "Poelhman [sic] teaches . . . a carburetor (15) attached to an intake (105) of the engine to mix air and fuel and connect to a gaseous fuel source (27) and a liquid fuel source (21)" and "Tsuda et al. teaches to the liquid fuel cut-off (14) is incorporated into the carburetor." EX2053, 4-5.

After several rounds of back and forth with the Examiner, Patent Owner amended Claim 1 on May 28, 2019 to add additional limitations directed towards liquid and gaseous fuel valves:

1. (Currently Amended) A dual fuel engine comprising:

an engine operable on a gaseous fuel and a liquid fuel;

a switch to change operation of the engine between gaseous fuel and liquid fuel;

a carburetor attached to an intake of the engine to mix air and fuel and connect to a gaseous fuel source and a liquid fuel source;

a liquid fuel valve positioned along a liquid fuel line coupling the liquid fuel source to the carburetor;

a gaseous fuel valve positioned along a gaseous fuel line coupling the gaseous fuel source to the carburetor; and

a liquid fuel cut-off incorporated into the carburetor to interrupt liquid fuel upon actuation of the switch from liquid fuel to gaseous fuel.

EX2082, 119.

However, the Examiner issued a final rejection on July 22, 2019. EX2082, 81. The Examiner found that "Poelhman [sic] teaches . . . a liquid fuel valve (43) positioned along a liquid fuel line (19) coupling the liquid fuel source to the carburetor; [and] a gaseous fuel valve (45) positioned along a gaseous fuel line (25) coupling the gaseous fuel source to the carburetor." EX2082, 84

In response to the final rejection, Patent Owner filed an appeal brief on January 22, 2020, arguing that the claims were patentable over the *combination* of Poehlman and Tsuda. Specifically, Patent Owner argued that a POSITA "would

recognize that it would not be a mere 'rearrangement of parts' to modify the system of Poehlman to incorporate [features from Tsuda], as alleged by the Examiner." EX2082, 24, 37. A Notice of Allowance issued on March 6, 2020, where the Examiner conceded that "[i]t would not have been obvious to *further modify* the combination of Poehlman and Tsuda et al." EX2082, 13.

2. The '215 Application

Concurrently, prosecution of the '034 Patent was ongoing. The '034 Patent was filed as U.S. Patent Application No. 15/285,215 on Oct. 4, 2016. The Examiner (again, "Long T Tran") issued a non-final rejection on February 2, 2018 alleging that then-pending claims 1-7 and 20-25 were anticipated by Poehlman. Specifically, the Examiner stated:

> Peohlman [sic] teaches a multi-fuel engine comprising: an engine (13) operable on a liquid fuel (21) and a gaseous fuel (27); a liquid cutoff solenoid (43) coupled to open and close a liquid fuel path to the engine; a gaseous cutoff solenoid (45) coupled to open and close a gaseous fuel source to the engine; and a switch (51) coupling a power source (59) to the liquid cutoff solenoid and the gaseous cutoff solenoid to switch between fuel sources on-the-fly during engine operation.

EX1002, 266. The remaining claims were rejected over various combinations of Poehlman, Kern (US2004/0139943), and Graf (US 5,450,832). EX1002, 263-278.

In response, Patent Owner argued, *inter alia*, that "Poehlman fails to disclose a liquid cutoff solenoid coupled to open and close a liquid fuel path to the engine

and a gaseous cutoff solenoid coupled to open and close a gaseous fuel source to the engine" and "cannot be said to anticipate that which is called for in claim 1." EX1002, 231. The Examiner made the rejection final on June 8, 2018. EX1002, 142.

The Examiner issued another non-final rejection on January 25, 2019, stating that Claims 1-7 and 20-25 were "rejected under 35 U.S.C. 103 as being unpatentable over Poehlman (US4,489,699) and in view of Walker (US 3,718,000). EX1002, 47-48. Specifically, the Examiner explicitly found that "Poehlman is silent to the liquid and gaseous cutoff is a cutoff solenoid" but that "Walker teaches a similar multi-fuel engine in which the liquid and gaseous fuel lines comprise a control valve 85 being energized by a solenoid 84 to control the flow of gasoline; and a control valve 99 energized by a solenoid 98 to control the gaseous fuel flow." EX1002, 47-48.

On April 25, 2019, Patent Owner amended Claim 1 to state: "a liquid cutoff solenoid coupled to the carburetor to open and close a liquid fuel path to the engine downstream from the float bowl." EX1002, 28. Patent Owner also argued that "neither Poehlman nor Walker teaches or suggests a carburetor to mix air and fuel and connect to the liquid fuel line and the gaseous fuel line with a carburetor cutoff solenoid coupled to control fuel flow within the carburetor from the liquid fuel line, as called for in claim 20." EX1002, 38. Finally, Patent Owner argued that "neither of Kem or Graf teaches or suggests a fuel regulator system including a primary pressure regulator and a secondary pressure regulator, with the secondary pressure

regulator regulating fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the engine." EX1002, 39. The Examiner issued a Notice of Allowance on June 18, 2019.

III. LEVEL OF ORDINARY SKILL IN THE ART

A POSITA pertinent to the Challenged Claims would have a four-year degree in mechanical engineering or a closely related field and at least one year of experience designing, developing, servicing, or operating fuel-powered machinery. Additional education could substitute for professional experience and significant work experience—such as working with, servicing, or operating such machinery in the field—could substitute for formal education. EX2078 (Singhose Decl.), ¶¶23-28.

Petitioner alleged that a POSITA:

> [W]ould have a college degree in mechanical engineering, physics, or related fields, and three years of work experience in combustion engines operating on various fuel sources. Additional higher graduate education could substitute for work experience, and additional work experience/training could substitute for formal education. For example, a person having significant experience servicing or operating dual-fuel combustion engines, or incorporating such engines into their finished products, would qualify as a [POSITA].

Petition, 11-12 (citing EX. 1003, ¶¶31, 49-50). Petitioner's proposed definition is deficient. Specifically, Petitioner has failed to support its contention that an

undergraduate physics degree is pertinent to the Challenged Claims, or that three years of work experience in combustion engines operating on various fuel sources is necessary. Regardless, the arguments advanced herein are not impacted based on which definition is applied. EX2078 (Singhose Decl.), ¶¶30-34.

IV. CLAIM CONSTRUCTION

Claim terms are to be construed in accordance with the standard set forth in *Phillips v. AWH Corp*., 415 F.3d 1303, 1312 (Fed. Cir. 2005) (*en banc*). But "[o]nly terms which are in controversy need to be construed, and then only to the extent necessary to resolve the controversy and material to the decision." *Facebook, Inc. v. Sound View Innovations, LLC*, IPR2017-01005, Paper No. 13 at 6 (PTAB Sept. 1, 2017) (citing *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc*., 200 F.3d 795, 803 (Fed. Cir. 1999)). For purposes of the arguments set forth in this Preliminary Response, Patent Owner applies the plain and ordinary meaning of each claim limitation which is addressed.

Petitioner alleges it has "not identified any claim terms that need construction in order to address the issues raised by this Petition." Pet., 12. Harbor Freight,

however, previously argued that the terms "gaseous cutoff" and "coupled to [verb]" were indefinite in the co-pending parallel litigation.[2]

Although Patent Owner disputes that the identified terms are indefinite, Petitioner did not address this discrepancy in the Petition. Pet., 12. Specifically, Petitioner failed to explain how the terms "gaseous cutoff" and "coupled to [verb]" when "read in light of the specification delineating the patent, and the prosecution history" are both (1) sufficiently definite so as to inform Petitioner's invalidity challenges raised in the Petition, and (2) "fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901, 134 S. Ct. 2120, 2124 (2014).

The Petition should be denied on this basis alone. *See, e.g., Cambridge Mobile Telematics, Inc. v. Sfara, Inc.,* IPR2024-00952, Paper 12 (PTAB Dec. 13, 2024) (informative) (declining to institute where Petitioner (1) alleged certain terms were

[2] On October 9, 2024, Harbor Freight filed a declaratory judgment action against Champion in the Central District of California. EX2017. On February 27, 2025, Champion filed its Answer and infringement Counterclaims. EX2018. Harbor Freight answered on March 20, 2025, and raised various affirmative defenses, including several invalidity defenses against the '034 Patent and the other twelve asserted patents. EX2019.

indefinite in parallel district court litigation, and (2) failed to "explain[] why the plain and ordinary meaning of the [challenged] terms should apply in this proceeding (why the inconsistent positions are warranted) or set forth an alternative claim construction") (citing Consolidated Trial Practice Guide at 45).

V. LIQUIFIED PETROLEUM GAS

Liquified petroleum gas is commonly referred to as "LPG" or "propane." EX1001, 1:46-49. Propane "is derived from the refining of oil and gas and is compressible to a liquid form for storage." *Id.*, *see also* EX2080 (U.S. Patent Pub. No. 2012/0104008), ¶[0003]. The terms "liquid propane" and "liquid LPG" are commonly used to describe LPG when present in a liquid state. EX2078 (Singhose Decl.), ¶¶55-56. Conversely, the terms "propane vapor" and "gaseous LPG" are commonly used to describe LPG in a gaseous state. EX2078 (Singhose Decl.), ¶57.

Prior to the earliest priority date of the '034 Patent, the distinctions between gaseous and liquid LPG were well known in the art. For example, the "Propane 101" website pre-dates the '034 Patent. EX2081.A ("Designed by propane dealers so that current and potential users of propane gas may better understand[] what propane is and what it does. Through our experience and knowledge, we aspire to improve the relationship between LP Gas marketers and consumers by expanding awareness of not only propane as a fuel but also the activities of gas marketers in the propane gas industry."); *see also* EX2078 (Singhose Decl.), ¶¶58-89.

"Both liquid propane and vapor are usable but cannot be used interchangeably. *In other words, a propane system designed to use vapor can't utilize propane in its liquid form and vice-versa.* Additionally, the characteristics of propane liquid and propane vapor are so different that the primary properties [a POSITA is] concerned with are as different as night and day." EX2081.B (emphasis added); *see also* EX2078 (Singhose Decl.), ¶60.

LPG "exists in a gaseous state at normal temperature and pressure but can be conveniently stored under pressure in a liquid state." EX1001, 1:46-49. The propane storage disclosed by the '034 Patent can be accomplished in large on-site tanks, or in portable cylinders. EX2081.C-D; *see also* EX2078 (Singhose Decl.), ¶61.

Petitioner's expert categorically states that "A POSA would understand that . . . LPG is a gaseous fuel (LPG is most typically stored in a tank under pressure as a liquid, but is decompressed/vaporized and sent into the engine as a gas)." EX1003, ¶90; *see also id.*, ¶66 (referring to "LPG" and "propane" as "a hydrocarbon fuel that is stored under pressure as a liquid, but ultimately fed to the generator engine as a gas comprising mostly propane"). While Dr. Morse correctly states that LPG is typically stored as a liquid and enters the engine as a gas, his categorical assertion that a POSITA would have understood any reference to LPG refers to a gaseous fuel is incorrect, as indicated by the very same references that Petitioner cites in its

grounds. *See*, *e.g.*, Ex. 1012, 65 (separately identifying both a "Liquid Propane Line" and a "Gaseous Propane Line"); EX2078 (Singhose Decl.), ¶¶62-63.

First, Dr. Morse's assertion that LPG is "sent into the engine as a gas" or "fed to the generator engine as a gas" is irrelevant. The vast majority of fuel sources (including liquid gasoline, which both Petitioner and Patent Owner agree is a *liquid* fuel) are sent into the engine in a gaseous state. EX2078 (Singhose Decl.), ¶64. Thus, the phase of matter at the time the fuel enters the engine does not indicate "a gaseous fuel source" or "a gaseous fuel supplied from a pressurized fuel source." EX2078 (Singhose Decl.), ¶64.

Second, as explained herein, numerous LPG applications are optimized to separately run on either liquid or gaseous LPG. As such, categorically referring to LPG as a gaseous fuel source completely discounts numerous liquid LPG applications, and incorrectly characterizes the knowledge of a POSITA. EX2078 (Singhose Decl.), ¶65.

A. Gaseous LPG Systems

LPG cylinders have a wide variety of possible configurations. For example, consumer-focused cylinders are designed to supply propane vapor (gaseous LPG) and are used to fuel consumer products such as gas grills, fire pits, and generators. EX2081.D; *see also* EX2078 (Singhose Decl.), ¶66.

Petitioner's Parlatore reference provides an example of a system configured to operate using gaseous LPG. EX1010, ¶[0014] ("In one exemplary embodiment and as shown in the exemplary diagram in FIG. 1, a gas, such [as] liquefied petroleum gas or propane, may be supplied to an engine as fuel. The gas may be stored in a bottle or tank, such as LPG tank 102. . . . An exemplary fuel system may use liquefied petroleum gas (LPG or propane) which may be stored in a vapor gaseous state in LPG tank 102. . . ."). EX2078 (Singhose Decl.), ¶67.

Parlatore explicitly recognizes the benefits of propane (as a gaseous vapor), stating that the LPG applications described therein "may be accomplished through the use of *vapor fuel delivery rather than the delivery of liquid propane gas*." EX1010, ¶[0025] (emphasis added). Moreover, using propane vapor supplied directly from the source, rather than converting liquid propane to propane vapor, allows the system to avoid "issues pertaining to cooling and freezing, such as those known to affect the conversion of propane from liquid to gas." EX1010, ¶[0025]; EX2078 (Singhose Decl.), ¶68.

B. <u>Liquid LPG Systems</u>

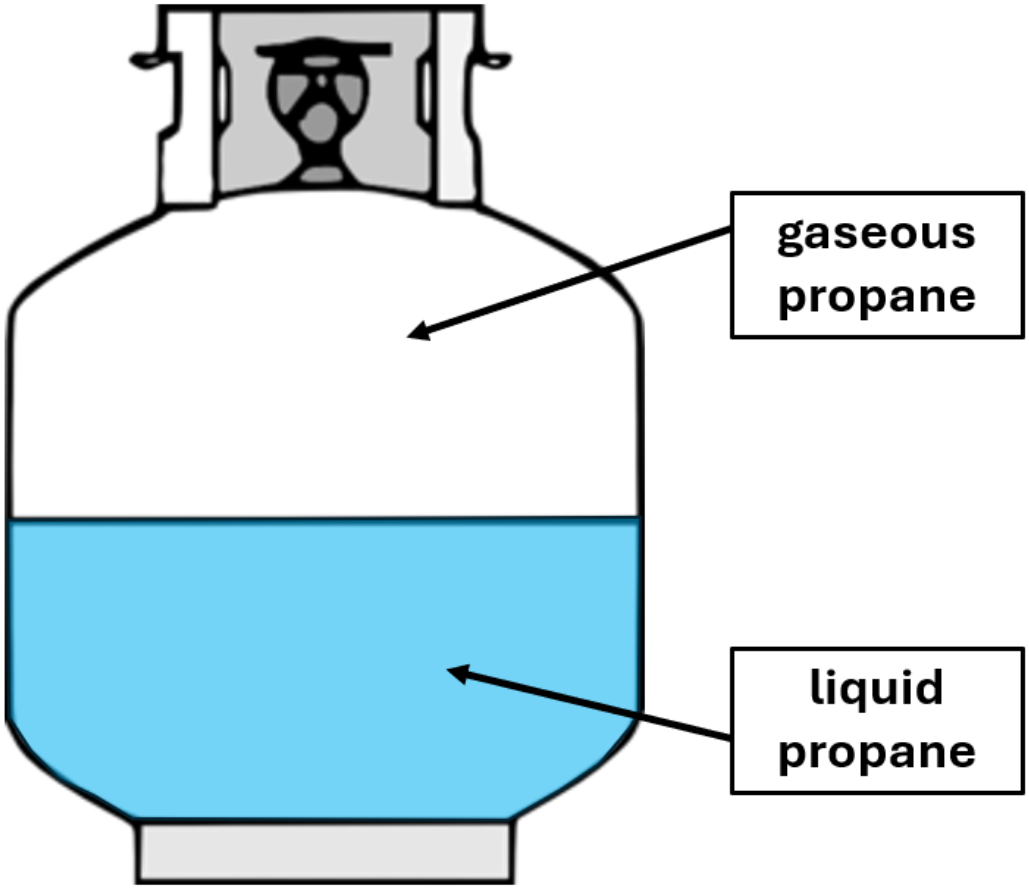
Conversely, commercial or industrial cylinders are optimized to supply liquid LPG to motorized commercial equipment such as forklifts. EX2081.D; *see also* EX2078 (Singhose Decl.), ¶69. For example, "[p]ropane powered forklifts primarily use 33 pound [sic] cylinders as their fuel source and are equipped for liquid service.

Because the cylinders are designed for liquid service, they have to be placed properly on the lift truck to operate correctly. Improper cylinder installation can result in loss of power and eventually complete loss of engine functionality." EX2081.E; *see also* EX2078 (Singhose Decl.), ¶70.

Petitioner's Bernhardsson reference provides an example of a system configured to operate using liquid LPG. EX1008, 2:58-68 ("The system 4 for supplying a gaseous fuel, e.g. LPG (Liquefied Petroleum Gas) or natural gas, includes a container 40 in which the gas assumes liquid form under pressure. . . . The container 40 is connected to a vaporizer 43 via a solenoid valve 42 and a pipe 41 . . . and *gas supplied in liquid form to the vaporizer 43 is successively transformed into gas*.") (emphasis added). Notably, Bernhardsson *does not* teach that its system is operable on gaseous LPG, and using gaseous LPG in the system disclosed by Bernhardsson would render Bernhardsson's vaporizer 43 superfluous. EX2078 (Singhose Decl.), ¶71.

C. LPG Storage and Distribution

Regardless of whether a LPG tank or cylinder is designed to supply liquid or gaseous LPG, the storage device contains LPG in both a liquid and gaseous state. EX2078 (Singhose Decl.), ¶72. Liquid propane is more dense than gaseous propane, and therefore sinks to the bottom of the tank, as depicted below:



Schematic Representation of an LPG Tank with Both Gaseous and Liquid Propane.

When the valve at the top of the LPG cylinder is opened, it releases the gaseous propane located near the valve, which (1) causes the pressure within the cylinder to drop, and (2) causes the liquid LPG to boil and evaporate into a gas. EX2078 (Singhose Decl.), ¶73.

"The proper use of a propane cylinder [depends on] the appliance(s) being serviced. Propane appliances and equipment that utilize cylinders . . . are not to be used as a replacement for an empty bulk propane tank. . . . Also, bottles that are used

in vapor service such as a barbeque grill or fish fryer cannot be replaced by a forklift propane cylinder, as LP Gas forklift cylinders use liquid propane for their specific engine fuel applications. . . LP Gas cylinders are not interchangeable with ASME bulk propane tanks or with other types of cylinders that are approved for specific LP Gas applications." EX2081.F; *see also* EX2078 (Singhose Decl.), ¶74.

Ultimately, [p]ropane vapor service and propane liquid service are completely different from one another." EX2081.B; *see also* EX2078 (Singhose Decl.), ¶75. The vast majority of propane applications—such as water heaters, furnaces, gas grills, and the generators at issue in the co-pending disputes between Patent Owner and Petitioner—utilize propane vapor as a gaseous fuel source. EX2081.B; *see also* EX2078 (Singhose Decl.), ¶75. These applications are not configured to operate on liquid LPG. If liquid propane were injected into these systems it could result in fire or similar danger, which is why consumer propane cylinders should always be positioned upright. EX2081.B; *see also* EX2078 (Singhose Decl.), ¶75.

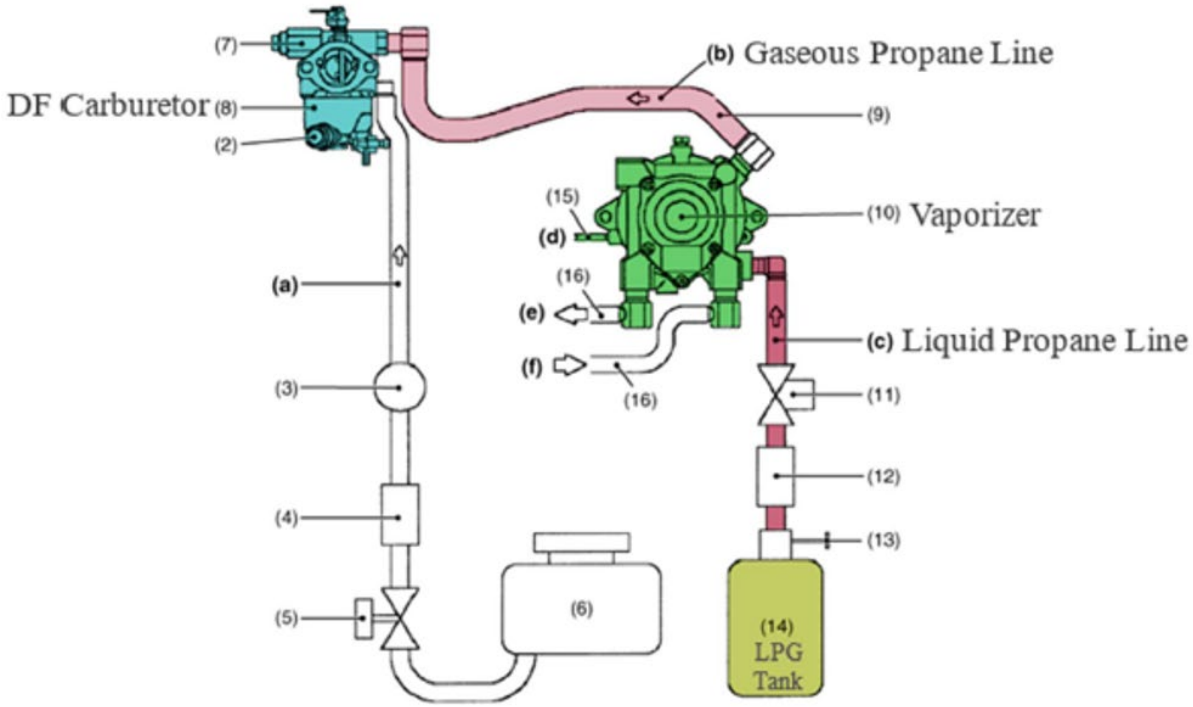
VI. THE PRIOR ART

The Petition asserts invalidity over *eight* different grounds which include *fourteen* combinations of *eight* different prior art references. Each ground relies on one of two primary references. However, as explained in Section VII, the Petition can be summarily denied in light of deficiencies in Petitioner's two primary

references: Nakafushi and Kubota DF972 Workshop Manual. Each reference is discussed in turn, below:

A. Kubota DF972-E2 Workshop Manual ("Workshop Manual")

According to Petitioner, "[t]he Workshop Manual describes the Kubota DF972-E2 engine—a dual-fuel engine with an alternator to function as a generator that runs alternatively off of gasoline or LPG." Pet., 20 (citing Ex. 1012, 65). Without conceding their accuracy, Petitioner's annotations to the Workshop Manual's "Fuel System" diagram are reproduced in part below:



Pet., 21 (citing EX1012, 65); EX2078 (Singhose Decl.), ¶92.

Petitioner identifies the Workshop Manual's "LPG Tank (14)" as both the claimed "gaseous fuel source" and "pressurized fuel source." Petition, 78 ("the

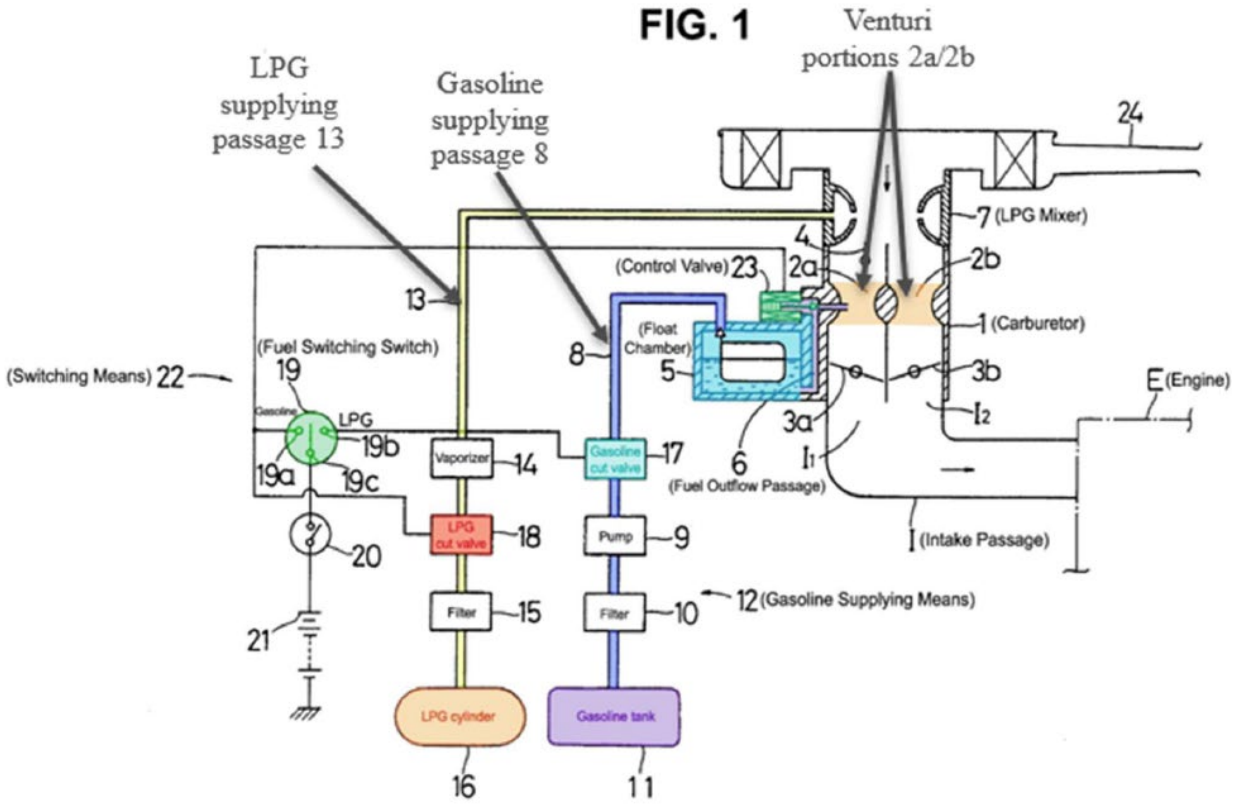
Workshop Manual discloses a gaseous cutoff (i.e. a 'LPG Cut Off Solenoid') that opens and closes a gaseous fuel source (i.e. the 'LPG Tank (14)')") (citing EX1012, 65, 68); *id.*, 94, 103.

However, the Workshop Manual teaches that "[f]or LPG fuel, the liquid fuel stored in the LPG tank (14) is sent to vaporizer (10) by pressure in the gaseous phase in the tank" and "[t]he liquid fuel is evaporated in vaporizer." EX1012, 65. Specifically, the Workshop Manual explains that a "[v]aporizer is a device which converts the liquid fuel into the gaseous fuel" (*id.*, 69) and that, "[w]hen evaporating by primary chamber of vaporizer[,] liquid LPG needs the evaporation heat." *Id.*, 64. "The coolant of the engine is made to circulate as a heat source to evaporate the LPG." *Id.*, 69. The above-referenced figure shows that liquid propane is transported to the vaporizer (10) via a liquid propane line (c), and also shows that coolant flows to and from the vaporizer (10) via a "Hot Coolant In Line" (f) and a "Hot Coolant Out Line" (e). *Id.*, 65. The Workshop Manual summarizes the purpose of the vaporizer: "This vaporizer installs the water jacket, throws the coolant of engine, heats primary chamber, promotes evaporation, and prevents valves being frozen." EX1012, 64. A POSITA would have understood that the Workshop Manual describes liquid LPG being supplied by LPG tank (14). EX2078 (Singhose Decl.), ¶93.

B. JPS61283734A ("Nakafushi") (Ex. 1004/1005)

Nakafushi operates on the same principle as the Workshop Manual. Petitioner asserts that "Nakafushi is directed to an engine configured to selectively use gasoline or liquid petroleum gas ("LPG") as fuel." Pet., 12 (citing Ex. 1005, ¶[0001]). The system disclosed by Nakafushi implements an "LPG bomb 16" which would have been understood by a POSITA to comprise an on-site LPG tank, rather than a portable LPG cylinder. Ex. 1005, ¶[0012]; *see also* EX2078 (Singhose Decl.), ¶94.[3] Without conceding their accuracy, Patent Owner reproduces Petitioner's annotations to Nakafushi's Figure 1, below:

[3] Nakafushi refers to numeral 16 as both an "LPG cylinder" and an "LPG bomb." Ex. 1005, ¶[0012] ("LPG bomb 16 as an LPG supplying means by an LPG supplying passage 13 via a vaporizer 14 for vaporizing LPG"); ¶[0013] ("LPG supplying means (LPG bomb) 16 is operated to switch so as to supply LPG"); *see also* ¶¶[0016], [0021].



Pet., 13 (citing Ex. 1005, Fig. 1).

Of particular relevance, Petitioner identifies Nakafushi's LPG bomb 16 (or LPG cylinder 16) as the claimed "pressurized fuel source" and "gaseous fuel source." Pet., 45 ("Nakafushi's 'pressurized fuel source' is LPG cylinder 16, which supplies gaseous fuel") (citing Ex. 1005, ¶[0012], Fig. 1; Ex. 1003, ¶178); *see also* Pet., 34-35, 55.

However, a POSITA would have understood that LPG bomb 16 supplies *liquid* LPG to vaporizer 14, which then converts the LPG into a gaseous state. Ex. 1005, ¶[0012] ("LPG bomb 16 as an LPG supplying means by an LPG supplying

passage 13 via a vaporizer 14 for vaporizing LPG"); *see also* EX2078 (Singhose Decl.), ¶95. The function of the vaporizer is to convert the liquid LPG into a gaseous state so it may be properly combusted by the engine. The vaporizer 14 is designed to receive the liquid LPG and raise its temperature (heat the liquid) to the boiling point at the delivery pressure. EX2078 (Singhose Decl.), ¶95.

VII. ARGUMENT

Denial is proper because (1) Petitioner's invalidity arguments are fatally flawed for failing to disclose either "a gaseous fuel source" or "a gaseous fuel supplied from a pressurized fuel source," and (2) both the art and arguments advanced by Petitioner have already been advanced (and discarded) by the USPTO. Each argument is discussed in turn, below.

A. The Petition does not demonstrate a reasonable likelihood that at least one challenged claim is unpatentable.

Of relevance to Patent Owner's Preliminary Response, the Petition alleges the following grounds of invalidity:

- Ground 1 alleges that Independent Claims 1 and 18 are obvious, applying Nakafushi as a base reference;
- Ground 4 alleges that Independent Claim 11 is obvious, applying Nakafushi as a base reference; and

- Ground 6 alleges that Independent Claims 1, 11, and 18 are anticipated by the Kubota DF972 Workshop Manual.

Collectively, Grounds 1, 4, and 6 are the *only* Grounds which address the independent claims of the '034 Patent. As such, if Petitioner is unable to show that one or more of Grounds 1, 4, and 6 present a reasonable likelihood that Petitioner would prevail with respect to Claims 1, 11, or 18, institution should be denied. *See, e.g., Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1576 (Fed. Cir. 1987) ("Because [independent] claim 1 is not invalid, the presence of all its limitations in [dependent] claim 6 preserves the latter's validity.").

1. The Workshop Manual-based grounds do not demonstrate a reasonable likelihood that any claims are unpatentable.

Petitioner's Ground 6 alleges the Workshop Manual teaches each and every element of the independent claims. Grounds 7 and 8 further allege certain dependent claims are obvious over the Workshop Manual, in view of one or more additional references. However, even a cursory review of the claims shows that, at the very least, the following limitations are wholly absent:

- Claim 1: "a gaseous fuel source"
- Claim 11: "a gaseous fuel supplied from a pressurized fuel source"
- Claim 18: "gaseous fuel supplied through a gaseous fuel line from a pressurized fuel source"

Importantly, Grounds 7 and 8 *do not* raise obviousness challenges with respect to any independent claim. For the reasons set forth below, the Petition does not present a reasonable likelihood that the petitioner would prevail with respect to *any* of these grounds. As such, the Petition should be denied. EX2078 (Singhose Decl.), ¶¶98-99.

a) The Workshop Manual's LPG Tank (14) is not a "gaseous fuel source" as alleged by the Petition.

Claim 1 of the '034 Patent recites: "a gaseous cutoff coupled to open and close *a gaseous fuel source to the engine*." The Petition identifies LPG Tank (14) as the alleged gaseous fuel source. Pet., 78-79 ("the Workshop Manual discloses a gaseous cutoff (i.e. a 'LPG Cut Off Solenoid') that opens and closes a gaseous fuel source (i.e. the 'LPG Tank (14)')") (citing EX1012, 65, 68). EX2078 (Singhose Decl.), ¶¶100-101.

However, LPG Tank (14) is a liquid fuel source that supplies liquid LPG, not gaseous LPG. Ex. 1012, 64-65, 69 ("[f]or LPG fuel, ***the liquid fuel stored in the LPG tank (14) is sent to vaporizer (10)*** by pressure in the gaseous phase in the tank" and "[t]he liquid fuel is evaporated in vaporizer") (emphasis added); *see also* Section V, *supra*. As such, the Workshop Manual does not disclose a gaseous cutoff coupled to open and close *a gaseous fuel source* to the engine because—simply put—LPG

Tank (14) is a *liquid fuel source,* not a *gaseous fuel source*. EX2078 (Singhose Decl.), ¶102.

b) The Workshop Manual does not disclose "a gaseous fuel supplied from" LPG Tank (14) as alleged by the Petition.

Claim 11 of the '034 Patent recites: "a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line." Similarly, Claim 18 recites "gaseous fuel supplied through a gaseous fuel line from a pressurized fuel source." Importantly, both claims require gaseous fuel supplied from a pressurized fuel source. The Petition identifies the Workshop Manual's LPG Tank (14) as the alleged "pressurized fuel source." Pet., 78, 94, 103. EX2078 (Singhose Decl.), ¶¶103-104.

However, it is indisputable that LPG Tank (14) supplies *liquid* LPG, not gaseous LPG. Ex. 1012, 64-65, 69 ("[f]or LPG fuel, ***the liquid fuel stored in the LPG tank (14) is sent to vaporizer (10)*** by pressure in the gaseous phase in the tank" and "[t]he liquid fuel is evaporated in vaporizer"); *see also* Section V, *supra*. As such, the Workshop Manual does not disclose a gaseous fuel *supplied from* a pressurized fuel source because LPG Tank (14) supplies liquid fuel, *not* gaseous fuel. EX2078 (Singhose Decl.), ¶105.

2. The Nakafushi-based grounds do not demonstrate a reasonable likelihood that any claims are unpatentable.

Petitioner's Grounds 1 and 4 rely on Nakafushi in the same erroneous manner as the Workshop Manual. Specifically, Petitioner alleges Nakafushi discloses the following limitations:

- Claim 1: "a gaseous fuel source"
- Claim 11: "a gaseous fuel supplied from a pressurized fuel source"
- Claim 18: "gaseous fuel supplied through a gaseous fuel line from a pressurized fuel source"

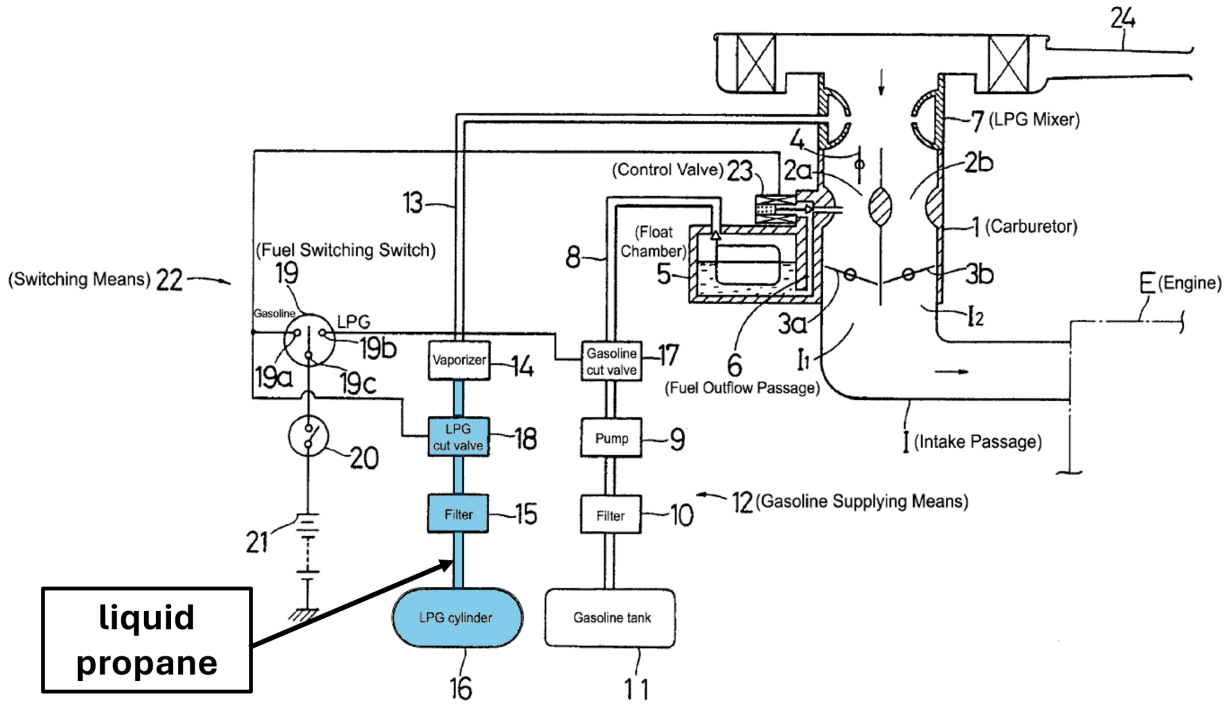
Grounds 2-3 and 5 further allege certain dependent claims are obvious over Nakafushi, in view of one or more additional references. Importantly, these grounds *do not* raise obviousness challenges with respect to any independent claim. For the reasons set forth below, the Petition does not present a reasonable likelihood that the petitioner would prevail with respect to any of these grounds. As such, the Petition should be denied. EX2078 (Singhose Decl.), ¶¶106-107.

a) Nakafushi's LPG bomb 16 is not a "gaseous fuel source" as alleged by the Petition.

Claim 1 of the '034 Patent recites: "a gaseous cutoff coupled to open and close *a gaseous fuel source to the engine*." Petitioner identifies Nakafushi's LPG bomb 16 (or LPG cylinder 16) as the claimed "gaseous fuel source." Pet., 34-35. EX2078 (Singhose Decl.), ¶108-109.

However, just like the Workshop Manual, the system disclosed by Nakafushi supplies *liquid* LPG from LPG cylinder 16 to vaporizer 14. Ex. 1005, ¶[0012] ("LPG bomb 16 as an LPG supplying means by an LPG supplying passage 13 via a vaporizer 14 for vaporizing LPG"); *see also* Section V, *supra*. The function of the vaporizer is to convert the liquid LPG into a gaseous state so it may be properly combusted by the engine. As is depicted below, vaporizer 14 receives liquid LPG and boils it to create gaseous LPG. EX2078 (Singhose Decl.), ¶110.

FIG. 1



As such, Nakafushi does not disclose a gaseous cutoff coupled to open and close *a gaseous fuel source* to the engine because—simply put—LPG cylinder 16 is a *liquid fuel source,* not a *gaseous fuel source*. EX2078 (Singhose Decl.), ¶111.

b) Nakafushi does not disclose "a gaseous fuel supplied from" LPG bomb 16 as alleged by the Petition.

Claim 11 of the '034 Patent recites: "a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line." Similarly, Claim 18 recites "gaseous fuel supplied through a gaseous fuel line from a pressurized fuel source." Importantly, both claims require gaseous fuel *supplied from* a pressurized fuel source. The Petition identifies Nakafushi's LPG bomb 16 (or LPG cylinder 16) as the claimed "pressurized fuel source." Pet., 45 ("Nakafushi's 'pressurized fuel source' is LPG cylinder 16, which supplies gaseous fuel") (citing Ex. 1005, ¶[0012], Fig. 1; Ex. 1003, ¶178); *see also* Pet., 55; EX2078 (Singhose Decl.), ¶112-113.

However, it is indisputable that LPG bomb 16 supplies *liquid* LPG to vaporizer 14, which then converts the LPG into a gaseous state. Ex. 1005, ¶[0012] ("LPG bomb 16 as an LPG supplying means by an LPG supplying passage 13 via a vaporizer 14 for vaporizing LPG"); *see also* Section V, *supra*. As such, Nakafushi does not disclose a gaseous fuel *supplied from* a pressurized fuel source because LPG cylinder 16 supplies liquid fuel*, not* gaseous fuel. EX2078 (Singhose Decl.), ¶114.

B. <u>Petitioner's arguments were previously considered by the Board.</u>

As explained in Patent Owner's Brief in Support of its Request for Discretionary Denial of Institution (Paper 8), the Workshop Manual describes the

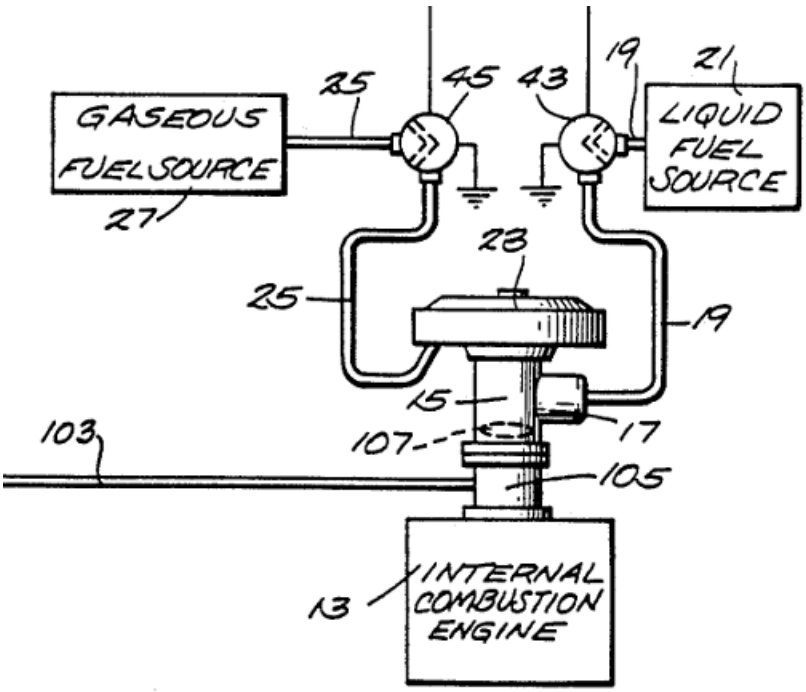
same dual-fuel engine taught by the Kubota Patent (*see* Section II.C.1, *supra*), and Nakafushi is simply cumulative of the Kubota Patent. *See* Paper 8 at § III.A.[4]

Specifically, during prosecution of the '398 Patent (the parent of the '034 Patent at issue in this proceeding), the Examiner rejected Claims 1, 3-4, 12-13, and 35-36 of the pending application as being obvious over the combination of Poehlman (U.S. Patent No. 4,489,699) and the Kubota Patent. EX2053, 4. Notably, the claims at issue explicitly included limitations related to a "gaseous fuel source." *Id.* at 4-5. However, it is apparent that the Examiner realized the fundamental differences in these technologies and did not assert that the Kubota Patent was an anticipatory reference, as Petitioner attempts to do, or even as a primary reference for any

[4] The Kubota Patent teaches the same system as the Kubota Workshop Manual—the manual simply describes the commercial embodiment of the Kubota Patent (Kubota engine model DF972). Both include an LPG source, an LPG solenoid, an LPG vaporizer, a gasoline source, a gasoline solenoid in the carburetor, and a switching device to choose which fuel source is active. *Compare* EX1012, p. 65 *with* EX1018, 2:39-3:40. Indeed, that the Kubota Patent and Kubota Workshop Manual describe the same dual-fuel engine is further proven by Kubota's patent marking. Kubota has marked literature for the Kubota engine model DF972 with that very same Kubota Patent number. EX2044, p. 2.

rejection. Instead, the Examiner cited Poehlman as allegedly disclosing the claimed gaseous fuel source and referred to the Kubota Patent merely as a secondary reference. *Id.* Importantly, the Examiner apparently recognized the Kubota Patent did not have a gaseous fuel source.

Unlike the Kubota Patent, the Workshop Manual, and Nakafushi, Poehlman explicitly discloses a gaseous fuel source. *See, e.g.,* Poehlman at Fig. 1 (reproduced below).



The Examiner's decision to rely on Poehlman for the claimed "gaseous fuel source" constitutes an implicit admission that the Kubota Patent (and therefore the Workshop Manual), does not disclose a gaseous fuel source. For this reason, institution should be denied.

VIII. CONCLUSION

For at least the reasons discussed above, the Petition fails to establish that the Challenged Claims are invalid.

Dated: August 29, 2025

Respectfully submitted,

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CERTIFICATE OF SERVICE

In accordance with 37 C.F.R. § 42.6(e), the undersigned certifies that on August 29, 2025, a complete and entire copy of the foregoing Patent Owner's Preliminary Response, including the exhibits relied upon, was served on counsel of record for Petitioner, as follows:

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CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that the foregoing Patent Owner's Preliminary Response, excluding the portions exempted under 37 C.F.R. § 42.24(b), contains 6,571 words according to Microsoft Word's word count feature.

Dated: August 29, 2025

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