

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GENERAC POWER SYSTEMS, INC.,
Petitioner,

v.

CHAMPION POWER EQUIPMENT, INC.,
Patent Owner.

IPR2025-01271
Patent 10,697,398

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

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EX2037	July 31, 2020 Generac Response Letter
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EX2080	US2012/0104008 ("DeNardo")
EX2081	Propane 101 Internet Archive
EX2082	File History of U.S. Patent App. No. 14/925,441
EX2083	August 29, 2025 Stipulation from MWE
EX2084	August 29, 2025 Stipulation from Harbor Freight
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EX2086	US10221780 (“the ’780 Patent”)
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EX2135	IPR2025-01457 CV of Mahdi Shahbakhti
EX2136	IPR2025-01457 Deposition Transcript of Mahdi Shahbakhti

GLOSSARY

Abbreviation	Term
'145 Patent	U.S. Patent No. 11,143,145
2015 Family	U.S. Patent Nos.: 10,393,034; 11,143,120; 10,221,780; 11,492,985; 10,697,398; 11,530,654; 11,840,970; 11,905,895; and 11,143,145 (collectively)
'398 Patent	U.S. Patent No. 10,697,398
Board	Patent Trial and Appeal Board
Patent Owner	Champion Power Equipment, Inc.
Petition	Petition for Inter Partes Review of U.S. Patent No. 10,697,398 (Paper 4)
Petitioner	Generac Power Systems, Inc.
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 Response to the Petition filed by Petitioner Generac Power Systems, Inc. challenging Claims 1-17, 19-26, 32-46, 53-54, and 56-58 of U.S. Patent No. 10,697,398.

I. INTRODUCTION

Petitioner's proposed grounds are identified below:

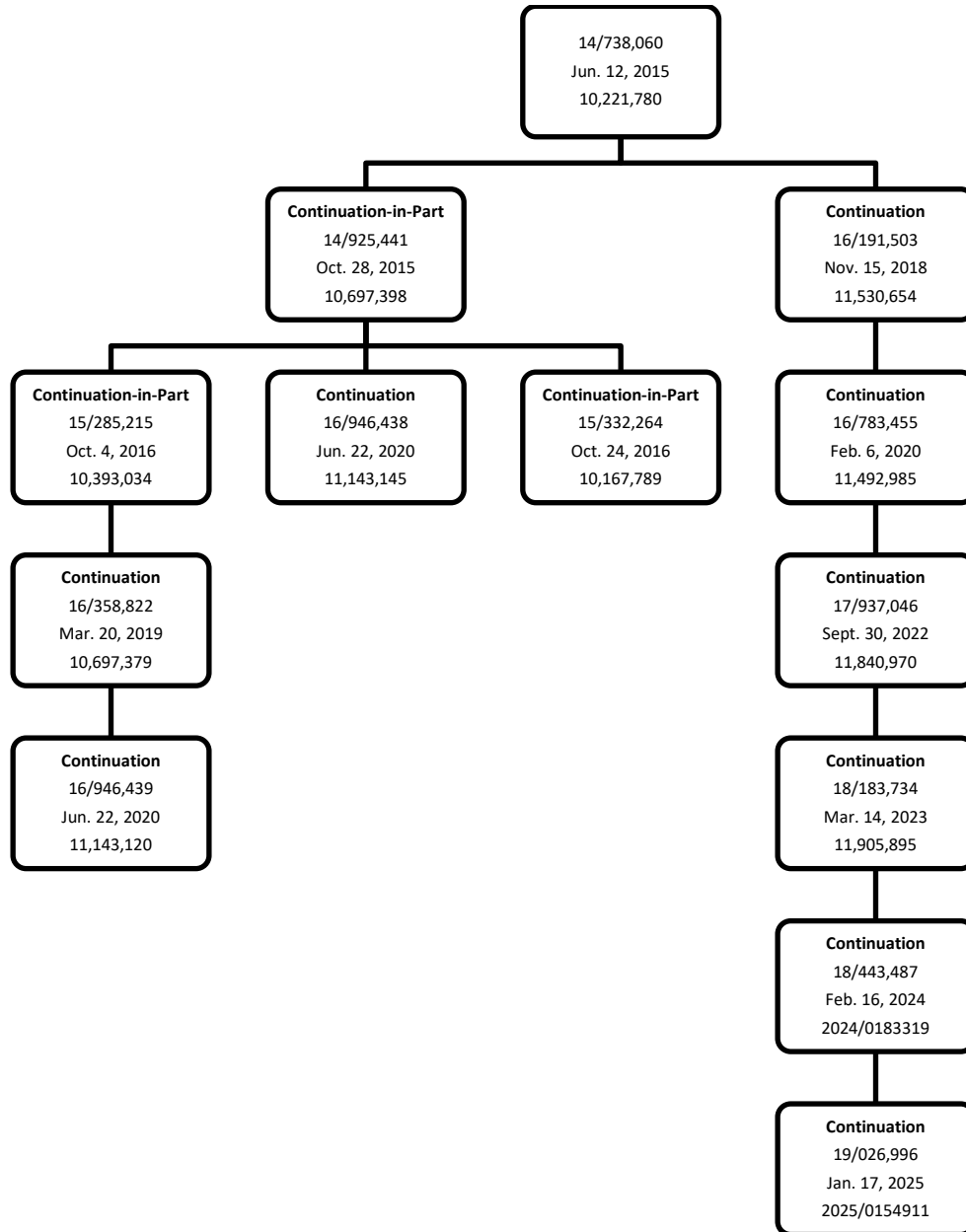
Ground	Claims	Basis	Primary Reference	Secondary Reference(s)
1	1, 3, 22, 57	102	Workshop Manual	-
2	2, 4-14, 19-21, 23, 32-42, 58	103	Workshop Manual	Matsushima, Yamamoto, and Olmr
3	1, 3, 22, 57	102	Nakafushi	-
4	2, 4-14, 19-21, 23, 32-42, 58	103	Nakafushi	Matsushima, Yamamoto, and Olmr
5	1, 15-16, 43-44	102	Holzapfel	-
6	43-46, 56	102	Neal	-
7	43-46, 53-54, 56	102	Winberg	-
8	17, 23-26	103	Holzapfel	Neal, Yamamoto
9	17, 23-26	103	Holzapfel	Winberg, Yamamoto

Petitioner has failed to establish that at least Claims 1-17, 19-22, and 57-58 are anticipated or otherwise rendered obvious by any of the cited prior art.

II. OVERVIEW OF THE '398 PATENT

The '398 Patent was filed as U.S. Patent Application No. 14/925,441 on October 28, 2015. EX1001, (21), (22). The '398 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:



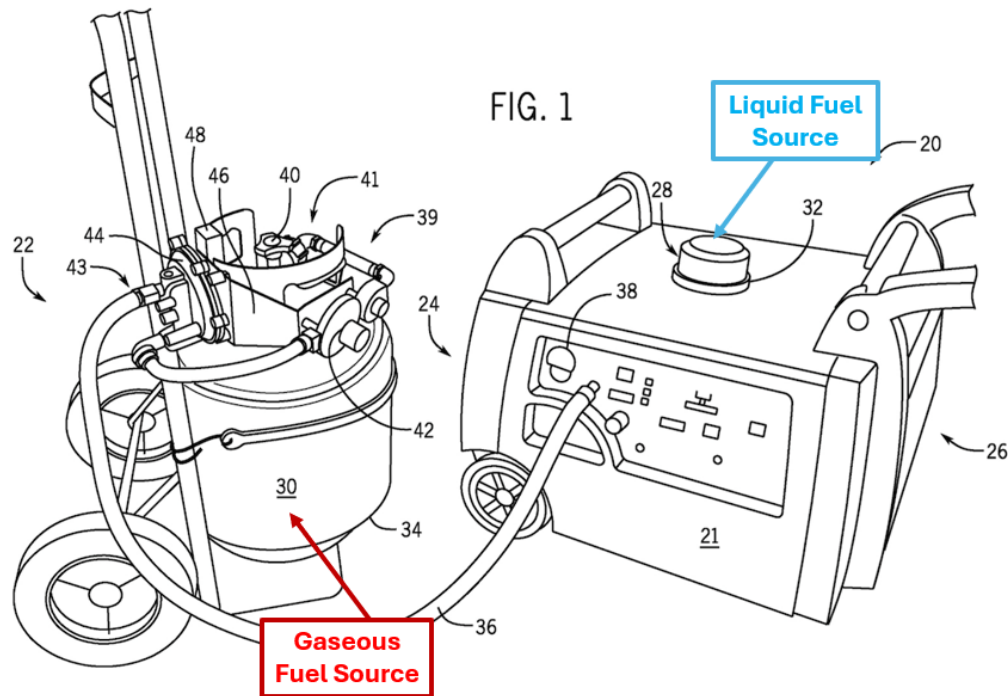
A. The Specification of the '398 Patent

The '398 Patent, titled “Batteryless Dual Fuel Engine with Liquid Fuel Cut-Off,” is directed to a liquid fuel cut-off attached to a carburetor to interrupt liquid

fuel upon actuation of the switch from liquid fuel to gaseous fuel. *Id.*, Abstract. Specifically, the '398 Patent describes “[a] dual fuel engine [that] includes an engine operable on a gaseous fuel and a liquid fuel and a switch to change operation of the engine between gaseous fuel and liquid fuel.” EX1001, Abstract.

The '398 Patent identifies certain advantages to dual-fuel generators, such as continued functionality when, “power outages in the utility grid result from severe weather.” EX1001, 1:31-33. However, the patent also warns that “a common problem with [dual fuel generators] is that the engine can experience overly rich air-fuel ratio when both fuels are simultaneously engaged during cross-over switching between the fuel sources.” EX1001, 1:57-62. An associated problem is that “a float bowl in the carburetor that must first fill or empty prior to changeover causes delay in cross-over switching between the fuel sources.” EX1001, 1:64-67; *see also id.*, 1:53-2:4; EX2133, ¶¶75-76.

Figure 1 of the '398 Patent, reproduced below for convenience, shows an example embodiment of the patented technology, which requires a carburetor that can mix air and fuel and connect to both a gaseous fuel source and a liquid fuel source. The invention is directed at using such dual-fuel engines in portable electric generators. EX2133, ¶73.



EX1001, Fig. 1

The '398 Patent teaches that “mechanical fuel lockout switch 38 provides gasoline flow from gasoline tank 32 to the engine while preventing connection of an LPG supply line to fuel inlet 59 of the second fuel line.” EX1001, 5:40-45. The '398 Patent also distinguishes between liquid and gaseous fuel. For example, when describing “an exemplary embodiment of the invention, first fuel source 28 is a liquid fuel and second fuel source 30 is a gaseous fuel. The liquid fuel may be gasoline and the gaseous fuel may be liquid petroleum gas (LPG).” EX1001, 4:7-10. EX2133, ¶73.

Figure 1 depicts “second fuel source 30” as an LPG tank with the fuel outlet (service valve 40) located at the top of the tank, in order to draw gaseous fuel from

the second fuel source 30. *See* §V, *infra*. Although “second fuel source 30” contains both liquid and gaseous LPG (§V, *infra*), the liquid LPG settles to the bottom of tank and cannot exit from the outlet located at the top of the tank. EX2133, ¶74.

B. The Independent Claims of the '398 Patent

Patent Owner's Response addresses specific limitations of Independent Claims 1 and 57 of the '398 Patent, as well as related dependent claims.

1. Claim 1

Claim 1 of the '398 Patent recites a “dual fuel engine” separately comprising (1) “an engine operable on a gaseous fuel and a liquid fuel,” (2) “a liquid fuel valve positioned along a liquid fuel line coupling the liquid fuel source to the carburetor,” (3) “a gaseous fuel valve positioned along a gaseous fuel line coupling the gaseous fuel source to the carburetor,” and (4) “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.” EX1001, Cl. 1; EX2133, ¶¶115-116. Thus, a POSITA would have understood Claim 1 to distinctly claim the state of the fuel (*i.e.*, gaseous or liquid) at three separate locations: the source of the fuel, the fuel line, and the engine.

Specifically, the claims separately recite a *gaseous* fuel source, a *gaseous* fuel line coupling the gaseous fuel source to the carburetor, and an engine operable on *gaseous* fuel. Figure 4B of the '398 Patent (reproduced below) depicts a gaseous fuel

source (Propane Tank 68), a gaseous fuel line (Second Fuel Line 70) and an engine operable on gaseous fuel (Engine 60). EX2133, ¶117.

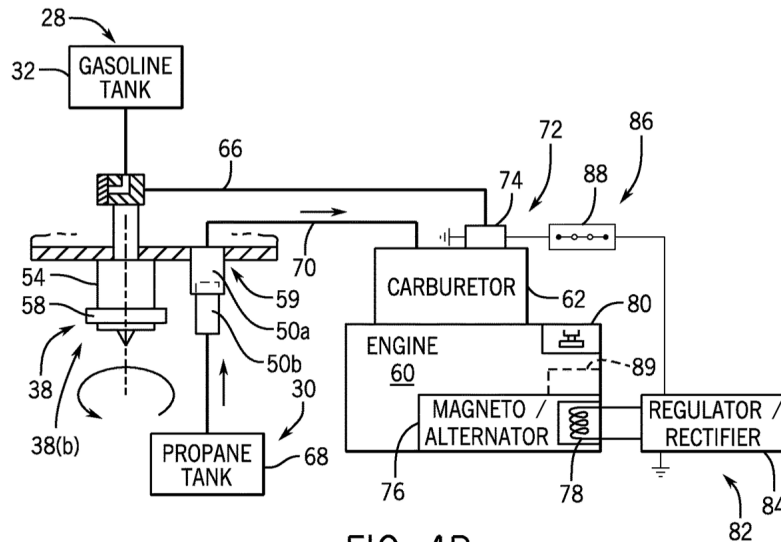


FIG. 4B

EX1001, Fig. 4B

Likewise, the claims separately recite a *liquid* fuel source, a *liquid* fuel line coupling the liquid fuel source to the carburetor, and an engine operable on *liquid* fuel. Figure 4B of the '398 Patent (reproduced below) depicts a liquid fuel source (Gasoline Tank 32), a liquid fuel line (First Fuel Line 66) and an engine operable on liquid fuel (Engine 60). EX2133, ¶118.

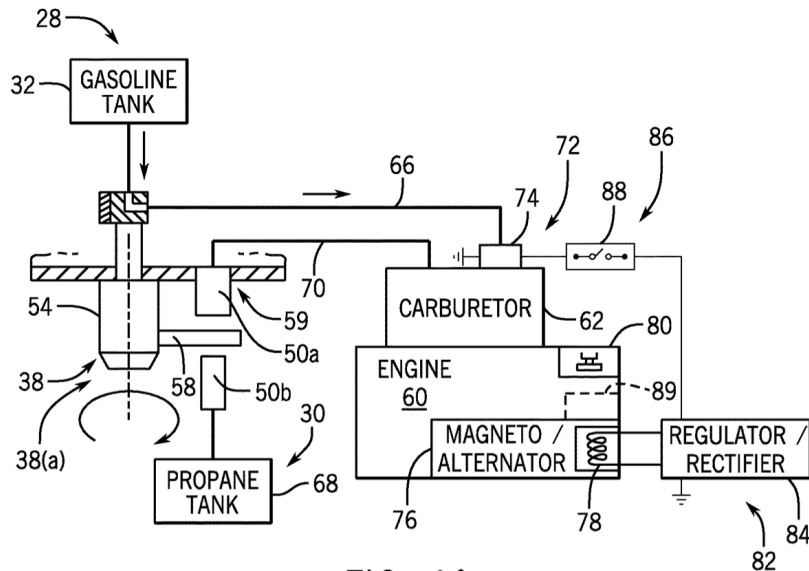


FIG. 4A

EX1001, Fig. 4A

Petitioner acknowledges that one of the functions of a carburetor is the evaporation of liquid gasoline. EX1006, 7; EX2133, ¶119. Specifically, Petitioner's own exhibits teach that:

Liquid gasoline will not support rapid combustion without being changed to a mist or broken down or atomized into tiny drops. When liquid gasoline is introduced to the venturi, it is gasified by its collision with the rapidly moving air mass. The atomized fuel then flows to the intake manifold where the pressure is low, and any remaining liquid gasoline evaporates further. Vaporization is finally completed with the heat generated by the compression of the air-fuel mixture in the cylinder.

EX1006, 7; EX2133, ¶119.

In light of this teaching (*i.e.*, that liquid fuel is atomized and partially vaporized in the carburetor, further vaporized in the intake manifold, and completely vaporized in the cylinder), a POSITA would have understood that the “operable on” requirement of Element [1.1] would have referred to the state of the fuel when it reaches the carburetor/engine. Therefore, a POSITA would have understood that an engine is “operable on” liquid fuel as claimed by the ’398 Patent liquid fuel even if the fuel is partially vaporized in the carburetor, intake manifold, or cylinder. EX2133, ¶120.

This is consistent with the prosecution history of the ’398 Patent. During prosecution of the ’398 Patent, the examiner asserted that U.S. Patent Pub. No. 2007/0137591 (“Sugimoto”) teaches “the engine operable on a gaseous fuel and a liquid fuel (paragraphs 0085 – 0086 describes a first fuel in liquid phase to gas, and a second gas fuel).” EX1002, 180; EX2133, ¶¶121-122.

In response, Patent Owner stated that:

Sugimoto actually discloses “[t]he external fuel bottle 71 supplies the second fuel gas in gas phase to the fuel gas pressure regulator 62” and “[t]he fuel pressure regulator 62 functions as a vaporizer for vaporizing the first fuel gas supplied thereto in liquid phase.” Sugimoto, ¶ [0078]. Since the first fuel gas is vaporized by the fuel pressure regulator 62, the first fuel gas and the second fuel gas are provided in a gaseous form to the carburetor 18b. *See Id.* at ¶ [0071]. As such, the Examiner has

not shown that Sugimoto discloses an engine operable on a gaseous fuel and a liquid fuel.

EX1002, 225; EX2133, ¶123.

2. Claim 57

Claim 57 recites a method of assembling a dual fuel engine comprising (1) providing an engine operable on a gaseous fuel and a liquid fuel, (2) attaching a carburetor to an intake of the engine, (3) coupling a switch to the engine to change operation of the engine between gaseous fuel and liquid fuel; and (4) attaching a liquid fuel cut-off to the carburetor to close the fuel passage upon actuation of the switch from liquid fuel to gaseous fuel. EX2133, ¶80.

III. LEVEL OF ORDINARY SKILL IN THE ART

A POSITA pertinent to the '398 Patent 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. EX2133, ¶105.

A POSITA, as described above, would understand the different mechanical components and functionality of fuel-powered machinery that are required to practice the claims of the '398 Patent. They would have gained this understanding

from either developing the components and control systems for such machines, or from servicing and operating such machinery in the field, which frequently requires knowledge of the machines to perform maintenance and repairs consistent with the requirements of operator manuals. Indeed, service manuals for such machinery assume that the reader is familiar with the mechanical components and control systems and how they work. EX2133, ¶106.

Patent Owner's proposed requirement of a four-year degree in mechanical engineering or a closely related field is based on the curriculum commonly taught to mechanical engineering, which covers the subject matter of the claims of the '398 Patent. EX2133, ¶107. For example, in the sophomore-level design class at Georgia Tech students learn how to use a processor and sensors to control the actions of an automated machine that includes pneumatic actuators controlled by electro-mechanical valves. The ultimate power source for the pneumatics is a pressured air tank whose fluid output goes through a regulator. The students utilize quick-connect hose couplings to connect the various components of their pneumatic systems. EX2133, ¶107.

During their senior year, mechanical engineering students commonly complete a capstone design project wherein they usually design, construct, and demonstrate a prototype product. Such prototypes often utilize switches, valves, and various mechanical assemblies. Therefore, mechanical engineering students would

be able to practice most of the claimed features, as well as understand how those features would be combined and operate. EX2133, ¶108.

The '398 Patent also includes components involving delivery of liquid and/or gas to the engines. The detailed components of such systems, like carburetors comprising float bowls, are not usually taught at the undergraduate level. Therefore, Patent Owner's proposed definition of a POSITA includes the requirement of one year of experience designing, developing, servicing, or operating fuel-powered machinery, or in the alternative, substantial work experience in the field. EX2133, ¶109.

Petitioner alleged that a POSITA:

[W]ould have a degree in mechanical engineering, physics, materials science, or related fields, and three years of work experience in combustion engines. Additional higher graduate education could substitute for work experience, and additional work experience/training could substitute for formal education.

Pet., 9 (citing EX. 1003, ¶32). Petitioner's proposed definition is unsupported, and relies solely on its expert's summary conclusions. Specifically, Petitioner has failed to support its contention that three years of work experience in combustion engines is necessary. EX2133, ¶¶102-103.

Regardless, the arguments advanced herein are not impacted based on which definition is applied. EX2133, ¶¶6-23, 110.

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 13 at 6 (P.T.A.B. 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 Response, Patent Owner applies the plain and ordinary meaning of each claim limitation that is addressed. EX2133, ¶¶111-112.

V. BACKGROUND

Liquified petroleum gas is commonly referred to as “LPG” or “propane.” EX1001, 1:44-47. 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]; EX2133, ¶47.

Like virtually all forms of matter, LPG can exist in various different states that have very different properties. The terms “liquid propane” or “liquid LPG” are commonly used to describe LPG when present in a liquid state. EX2133, ¶48. Similarly, the terms “propane vapor” and “gaseous LPG” are commonly used to describe LPG in a gaseous state. EX2133, ¶49.

Prior to the priority date of the '398 Patent, the distinctions between gaseous and liquid LPG were well known in the art. EX2133, ¶50; EX2127 (Morse Depo. Tr.) at 43:1-12. Specifically, a propane system designed to use vapor cannot utilize propane in its liquid form and vice-versa. EX2133, ¶51; EX2127 (Morse Depo. Tr.) at 197:9-199:19; EX2081.B. This is also true for component parts of a system that utilizes liquid propane in some parts of the system and propane vapor in other parts. EX2133, ¶52. For example, the 2014 Edition of the NFPA 58 Liquefied Petroleum Gas Code (the operative version as of the filing date of the '398 Patent) explicitly teaches that vaporizers “shall be provided with automatic means to prevent the passage of liquid from the vaporizer to its vapor discharge piping.” EX2132, 32. This regulation exists to prevent the unintentional use of liquid LPG in a gaseous LPG system.

LPG “exists in a gaseous state at normal temperature and pressure but can be conveniently stored under pressure in a liquid state.” EX1001, 1:44-47. A POSITA would have understood that the propane storage disclosed by the '398 Patent can be accomplished in large on-site tanks, or in portable cylinders. EX2133, ¶53; EX2127 (Morse Depo. Tr.) at 36:20-40:21; *see also* EX2081.C; EX2081.D.

Petitioner’s expert, Dr. Morse, stated that “even though LPG is conveniently stored in a liquid state under high pressure, LPG exists as a gas at normal temperatures and pressures.” EX1003, ¶82. According to Dr. Morse, “LPG supplied

in this way will typically leave the storage tank as a liquid and gas mixture in equilibrium until there is a change in temperature and/or pressure. For example, when the LPG exiting the tank travels to a first regulator that reduces the pressure, the LPG will be vaporized to gaseous form as it passes through the regulator. Vaporizers/regulators that have the dual function of vaporizing fuel and regulating its pressure were well known in the art.” *Id.*; EX2133, ¶54.

Confusingly, Dr. Morse’s assertion that LPG “will typically leave the storage tank as a liquid and gas mixture in equilibrium” is not consistent with his earlier declarations regarding related patents. For example, Dr. Morse submitted a declaration in connection with IPR2025-00805, regarding Champion’s U.S. Patent No. 10,393,034, which is a child of the ’398 Patent at issue here. There, Dr. Morse stated that LPG tanks supply “liquid propane to a vaporizer” and the “vaporizer converts the liquid LPG into gaseous fuel and supplies the gaseous fuel to the dual-fuel carburetor.” EX2101, ¶70. Tellingly, Dr. Morse’s analysis in earlier IPRs made no reference LPG tanks simultaneously supplying both liquid and gaseous LPG. EX2133, ¶¶55-58.

Presumably, Dr. Morse’s (and Petitioner’s) changed position is due to the fact that Petitioner intentionally delayed filing its Petition in the instant proceeding until *after* it had a chance to review Patent Owner’s Preliminary Response in IPR2025-

00805. *Compare* Petition (filed September 3, 2025) with IPR2025-00805, Paper 12 (filed August 29, 2025).

A. Gaseous LPG Systems

The fuel source containers of LPG are often called “cylinders.” LPG cylinders have a wide variety of possible configurations. For example, consumer-focused cylinders are designed to supply gaseous LPG and are used to fuel gas grills, fire pits, and generators. EX2133, ¶59; EX2081.D.

As another example, U.S. Patent Pub. No. 2011/0100335A1 (“Parlatore”), (cited by Petitioner in related proceedings) describes a system configured to operate using gaseous LPG. EX2126, ¶[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...”); EX2133, ¶60.

Parlatore explicitly recognizes the benefits of propane 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.” *Id.*, ¶[0025]. 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.” *Id.*, ¶¶0025]; EX2133, ¶61.

B. Liquid LPG Systems

Conversely, commercial or industrial cylinders are optimized to supply liquid LPG to motorized commercial equipment such as forklifts. EX2133, ¶62. EX2081.D-E. 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.” EX2133, ¶63; EX2081.E.

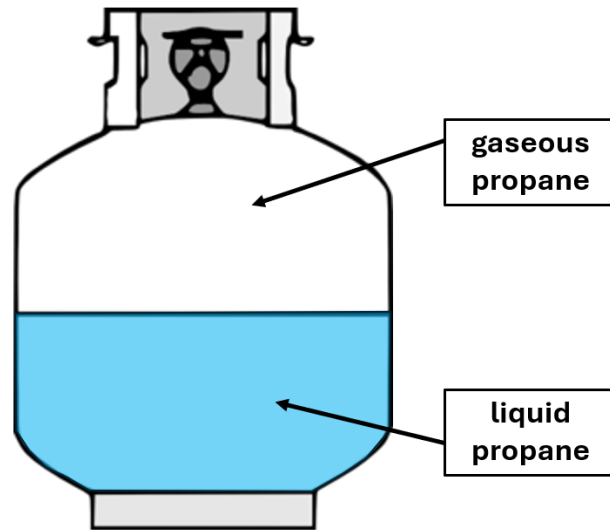
Petitioner’s Bernhardsson reference, which was cited in a related proceeding, provides another example of a system configured to operate using liquid LPG. EX2100, 2:58-68 (“The system 4 for supplying a gaseous fuel, e.g. LPG (Liquefied Petroleum Gas) or natural gas, includes a container 40 in which the 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; EX2133, ¶64.

Other references provide examples of LPG vaporizers for use with liquid LPG. For example, the Kubota Workshop manual describes a vaporizer which includes both primary and secondary chambers. EX1012, 69. The primary and secondary chambers—acting together—vaporize liquid LPG into a gaseous state before the fuel enters the carburetor. EX2133, ¶65; EX1012, 70-71. Perhaps most critically, Petitioner’s Holzapfel reference discloses “an additional fuel supply system employing a normally gaseous fuel” but explicitly teaches that the system should be configured “so as to draw off the liquid *and not gas*.” EX1009, 2:8-15 (emphasis added); EX2133, ¶66.

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.¹ Liquid propane is more dense than gaseous propane, and therefore sinks to the bottom of the tank, as depicted below:

¹ This is also true with respect to gasoline tanks, which contain liquid gasoline and gasoline vapor.



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 causes the pressure within the cylinder to drop, which (1) causes the liquid LPG to boil and evaporate into a gas, and (2) releases the gaseous propane located near the valve. EX2133, ¶¶67-68; EX2127 (Morse Depo. Tr.) at 41:6-42:16.

The different LPG use cases and storage configurations would have been known to a POSITA. For example, such differences are discussed on the Propane 101 Website: “The proper use of a propane cylinder involves 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.” EX2133, ¶69; EX2081.F.

Of key importance to the understanding of the ’398 Patent’s claims, is the idea that propane vapor service and propane liquid service are completely different from one another. EX2133, ¶70; EX2081.B. 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. EX2133, ¶70; EX2081.B. 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 with their valves at the top of the storage vessels. EX2133, ¶70; EX2127 (Morse Depo. Tr.) at 197:9-199:19; EX2132, 32 (teaching that vaporizers “shall be provided with automatic means to prevent the passage of liquid from the vaporizer to its vapor discharge piping” in order to prevent the unintentional use of liquid LPG in a gaseous LPG system).

VI. OVERVIEW OF THE PRIOR ART

A. Kubota DF972-E2 Workshop Manual (“Workshop Manual”)

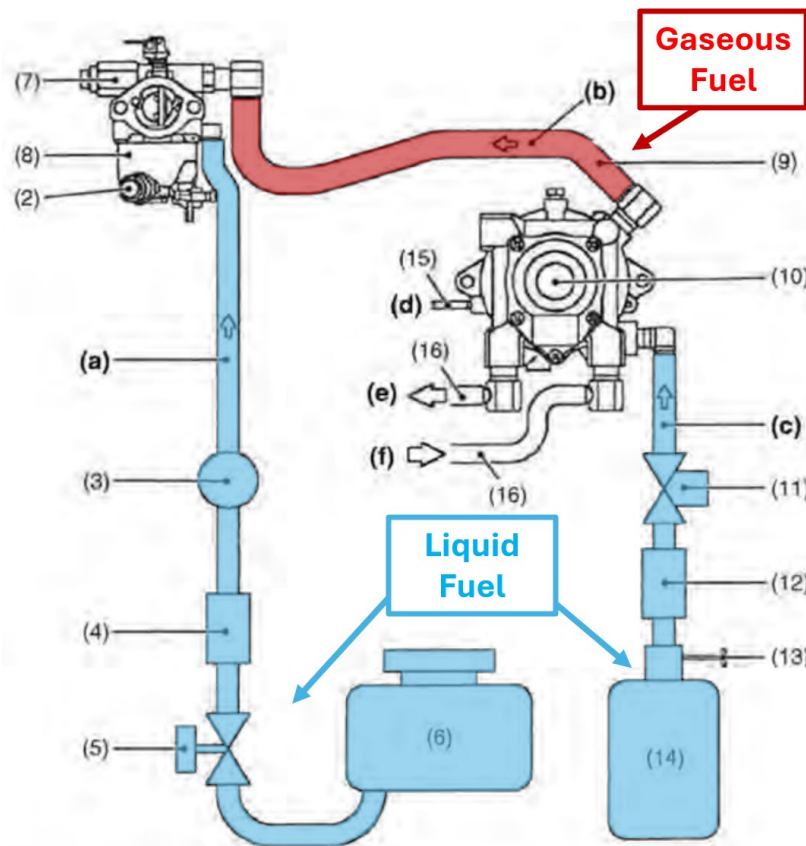
The Workshop Manual describes the Kubota DF972-E2 engine, which can run on two different types of fuel. EX1012. More specifically, the DF972-E2 engine

is a “Vertical, water cooled, 4-cycle Dual Fuel (Gasoline/LPG) engine. EX1012, 8; EX2133, ¶83.

The Workshop Manual explains that the engine is supplied by two different liquid fuel sources: gasoline and liquid LPG. The Workshop Manual teaches, “[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 [the] vaporizer.” EX1012, 65. 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; EX2133, ¶84.

As described in detail below, liquid propane is transported to the vaporizer (10) via a liquid propane line (c). *Id.*, 65. The Workshop Manual summarizes the purpose of the vaporizer on page 64: “This vaporizer installs the water jacket, throws the coolant of engine, heats primary chamber, promotes evaporation, and prevents valves being frozen.” From these teachings, a POSITA would have understood that the Workshop Manual discloses that LPG tank (14) supplies liquid LPG, which is converted to a gaseous state only after passing through the vaporizer. EX2133, ¶85.

The Workshop Manual’s fuel system is illustrated with the following annotated diagram, which depicts the state of the fuel at various points in the system:



- | | | | |
|-------------------------------|-----------------------------------|--------------------------|---------------------------|
| (1) WG Carburetor | (9) Vapor Hose* | (a) Gasoline Line | [A] WG972-E2 |
| (2) Gasoline Cut Off Solenoid | (10) Vaporizer | (b) Gaseous Propane Line | [B] DF972-E2 |
| (3) Fuel Feed Pump | (11) LPG Shut Off Solenoid Valve* | (c) Liquid Propane Line | |
| (4) Fuel Filter | (12) LPG Filter* | (d) Vacuum Line | |
| (5) Gasoline Cock* | (13) LPG Manual Valve* | (e) Hot Coolant Out Line | Component Marked * Is Not |
| (6) Gasoline Tank* | (14) LPG Tank* | (f) Hot Coolant In Line | Provided by KUBOTA |
| (7) LPG Cut Off Solenoid | (15) Vacuum Hose* | | |
| (8) DF Carburetor | (16) Coolant Hose* | | |

EX1012, 65

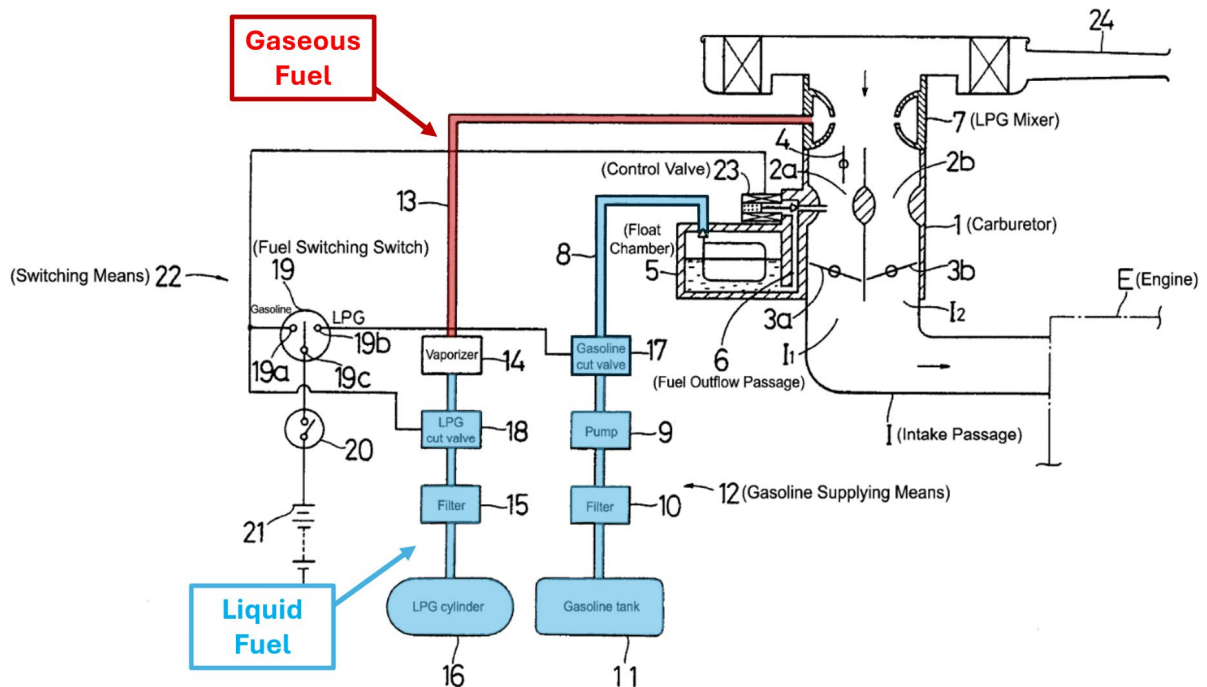
As shown above, the Workshop Manual discloses gasoline and LPG that are supplied from liquid fuel sources, travel through several components of the fuel system in liquid form, and are ultimately converted to a gaseous state for combustion. EX2133, ¶¶86-88.

B. JPS61283734A (“Nakafushi”)

The Petition states that “Nakafushi discloses an engine configured to selectively use gasoline or LPG.” Pet., 10 (citing EX1005, Fig. 1). Nakafushi discloses “LPG bomb 16” which a POSITA would have understood comprises an on-site LPG tank. EX1005, ¶[0012].² Much like the Workshop Manual, Nakafushi’s LPG cylinder 16 is a source of liquid fuel that is subsequently vaporized by a vaporizer. Thus, at various points in the Nakafushi system, the LPG is either liquid (blue) or gaseous (red), as depicted in annotated Figure 1, below. EX2133, ¶¶92-93.

² 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].

FIG. 1



EX1005, Fig. 1

A POSITA would have understood that LPG bomb 16 supplies *liquid* LPG to filter 15, through LPG cut valve 18, and into vaporizer 14, which then converts the LPG into gaseous form. Ex. 1005, ¶[0012] (“LPG bomb 16 as an LPG supplying means by an LPG supplying passage 13 via a vaporizer 14 for vaporizing LPG”). 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 heat the liquid to its boiling point. EX2133, ¶96.

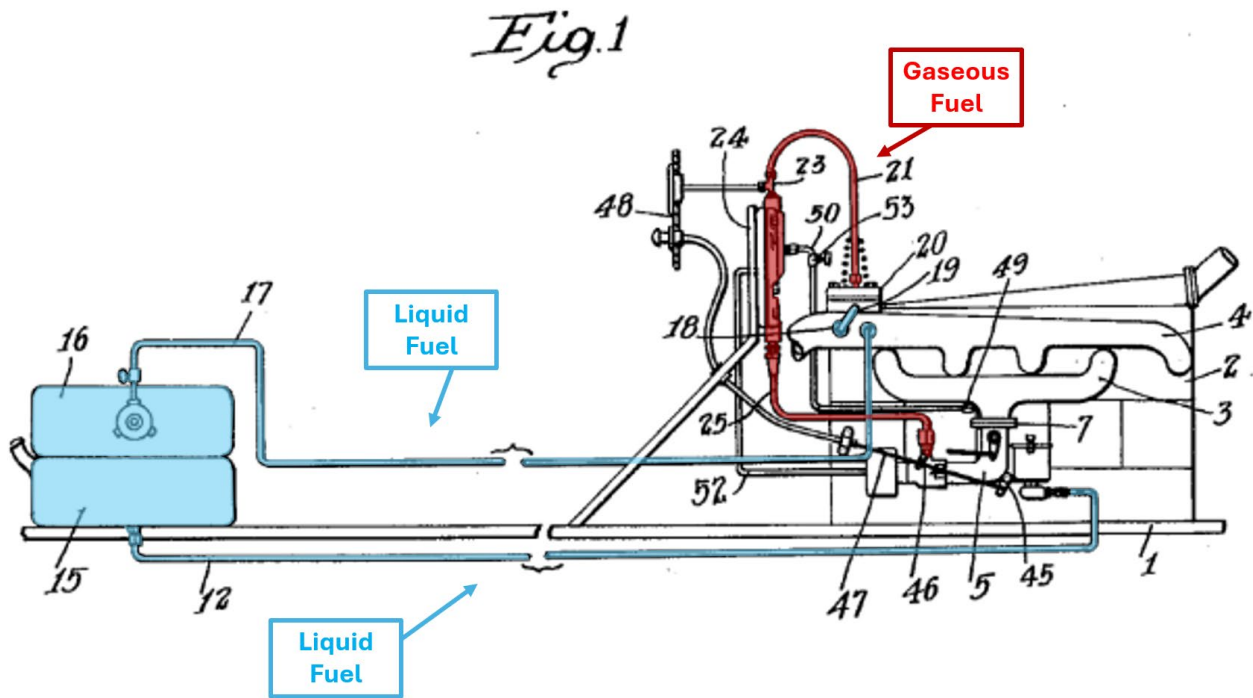
C. **U.S. Patent No 1,931,698 (“Holzapfel”)**

Holzapfel was filed March 30, 1931 and discloses a fuel system for internal combustion engines. EX1009. Specifically, Holzapfel “relates to fuel systems for internal combustion engines, and has particular reference to a fuel system embodying the supplying of liquid fuel and gaseous fuel to an engine in alternation at will.” EX1009, 1:1-5; EX2133, ¶99. With respect to the gaseous fuel system, Holzapfel explains:

I propose to add an additional fuel supply system employing a normally gaseous fuel, this system comprising a fuel supply tank 16 in which normally gaseous fuel is compressed and thereby maintained in liquified condition. From tank 16 there extends a suitable gaseous fuel supply tube 17 extending to the bottom of the tank 16, *so as to draw off the liquid and not gas.*

EX1009, 2:8-15 (emphasis added); EX2133, ¶¶100-101.

Holzapfel’s fuel paths are depicted in their liquid (blue) and gaseous (red) states, in the annotated Figure 1, below:



EX1009, Fig. 1 (annotated)

VII. ARGUMENT

The Petition alleges nine separate invalidity grounds. Patent Owner's Response addresses Grounds 1-5, regarding Claims 1-17, 19-22, and 57-58 of the '398 Patent. Petitioner has failed to establish that at least Claims 1-17, 19-22, and 57-58 are anticipated or otherwise rendered obvious by any of the cited prior art. EX2133, ¶113.

A. Ground 1: The '398 Patent is Not Anticipated by the Workshop Manual

The Petition alleges that Claims 1, 3, 22, and 57 of the '398 Patent are anticipated by the Workshop Manual. Petitioner's allegations are deficient at least because the Workshop Manual does not disclose (1) a *gaseous* fuel source, (2) a

gaseous fuel valve *positioned along* a gaseous fuel line, and (3) *attaching* a liquid fuel cut-off to the carburetor. Each argument is addressed in turn, below. EX2133, ¶114.

1. Claim 1

As discussed above, a POSITA would have understood Claim 1 distinctly claimed the state of the fuel (i.e., gaseous or liquid) at three separate locations: the source of the fuel, the fuel line, and the engine. *See* §II.B, *supra*; EX2133, ¶¶115-123. “[W]here a claim lists elements separately, the clear implication of the claim language is that those elements are distinct components of the patented invention.” *Regeneron Pharm., Inc. v. Mylan Pharm. Inc.*, 130 F.4th 1372, 1379 (Fed. Cir. 2025) (citing *Becton, Dickinson & Co. v. Tyco Healthcare Grp., LP*, 616 F.3d 1249, 1254 (Fed. Cir. 2010)); *see also Kyocera Senco Indus. Tools Inc. v. Int’l Trade Comm’n*, 22 F.4th 1369, 1382 (Fed. Cir. 2022) (“The asserted claims list those elements separately” and “there is, therefore, a presumption that those components are distinct.”); *Schindler Elevator Corp. v. Otis Elevator Co.*, 593 F.3d 1275, 1282 (Fed. Cir. 2010) (explaining that “the term ‘information transmitter’ itself suggests that the transmitter is a thing, separate and apart from an ‘elevator user’”).

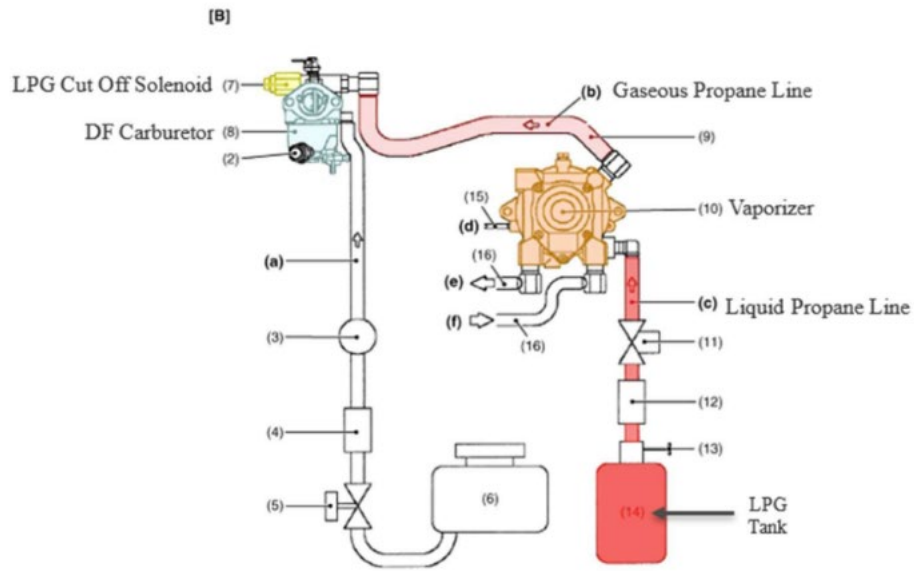
The Workshop Manual does not disclose at least (1) a *gaseous* fuel source, and (2) a gaseous fuel valve *positioned along* a gaseous fuel line. EX2133, ¶124.

- a. **Element [1.3]: “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”**

The Workshop Manual does not disclose “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.” Specifically, the Workshop Manual does not disclose a “gaseous fuel source.” EX2133, ¶¶125-126.

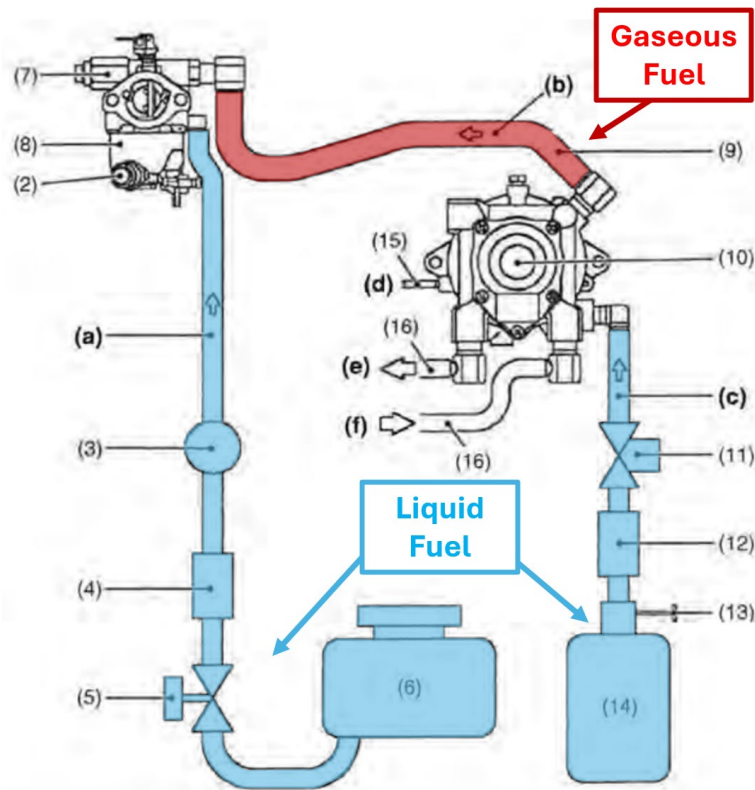
As discussed above, the Workshop Manual describes a dual fuel engine that draws fuel from two different liquid sources: Gasoline Tank (6) and LPG Tank (14). *See* §VI.A, above; EX2133, ¶127.

Petitioner explicitly maps the claimed liquid and gaseous fuels sources to Gasoline Tank (6) and LPG Tank (14). Pet., 28 (“The Workshop manual discloses that the carburetor connects to a LPG tank (gaseous fuel source) and a gasoline tank (liquid fuel source).”). Petitioner’s annotations depicting the alleged gaseous fuel source are reproduced below. EX2133, ¶128.



Pet., 31 (annotations in original)

Contrary to Petitioner's representations (but consistent with Petitioner's annotations), LPG is liquid fuel when leaving the fuel source, and only becomes gaseous fuel after reaching the vaporizer, as depicted by the below annotated figure:



EX1012, 65 (annotated)

Specifically, the Workshop Manual explicitly teaches that LPG Tank (14) is a source of *liquid* fuel, not *gaseous* fuel. EX1012, 65 (“For LPG fuel, *the liquid fuel stored in the LPG tank (14) is sent to vaporizer (10)*”) (emphasis added); *see also id.* at 69 (“Vaporizer is a device which converts the liquid fuel into the gaseous fuel”); 64 (“When evaporating by primary chamber of vaporizer[,], liquid LPG needs the evaporation heat.”). EX2133, ¶¶129-130.

As explained in the prosecution history, the fact that the liquid fuel in the LPG tank is converted to its gaseous state prior to reaching the carburetor is pertinent for addressing Element [1.1] (“an engine operable on a gaseous fuel and a liquid fuel”).

§II.B, *supra*; EX2133, ¶132. However, a POSITA would not have understood that the LPG tank was a gaseous fuel source. Rather, a POSITA would have viewed both the Gasoline Tank (6) and LPG Tank (14) as liquid fuel sources, which supply liquid fuels that are subsequently vaporized. EX2133, ¶132.

As further evidence that the Workshop Manual does not disclose a gaseous fuel source, the presence of the vaporizer actually precludes LPG Tank (14) from being considered a “gaseous fuel source.” For example, if an LPG tank was used improperly such that LPG vapor exited the LPG tank and was sent to the vaporizer, then the vaporizer would not function properly to generate an appropriately-rich fluid flow into the carburetor. In such a case, the engine would die. In fact, this is exactly what happens when the LPG tank runs out of liquid LPG. EX2133, ¶133.

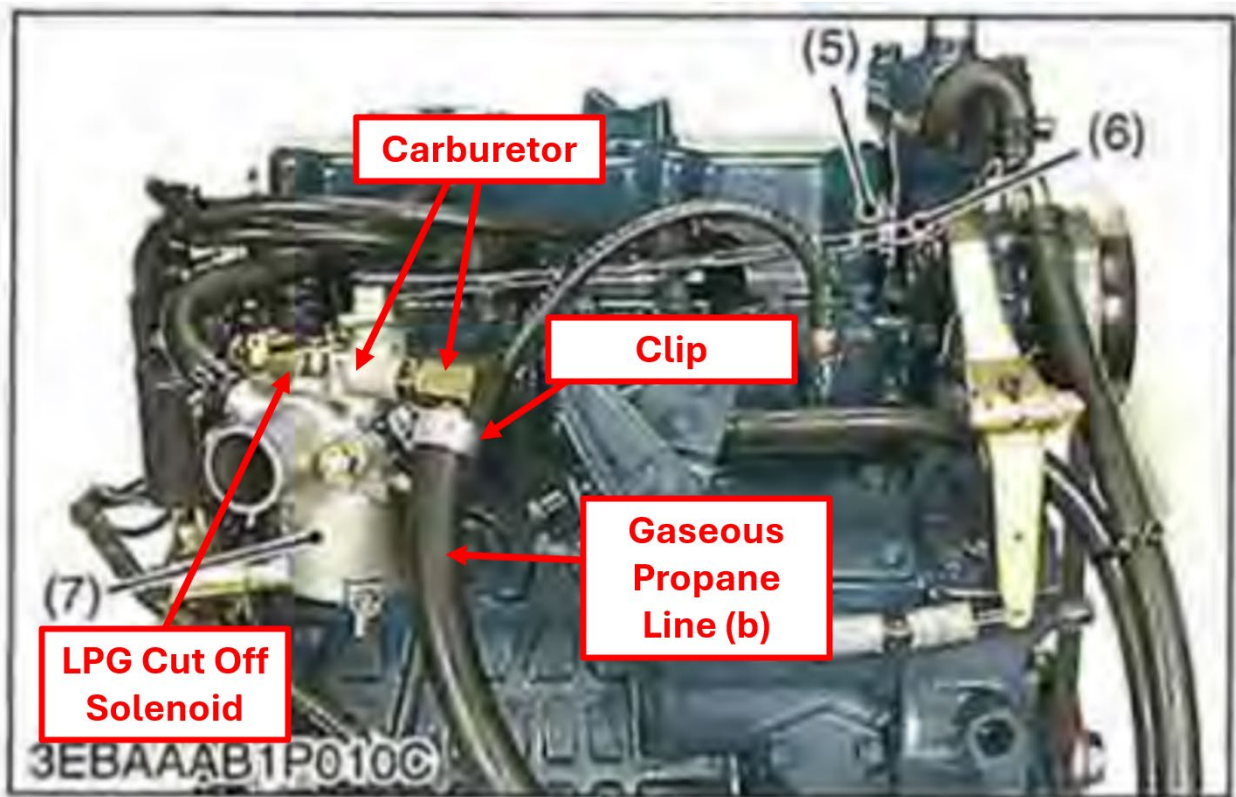
A POSITA would have considered a fuel source to be a gaseous fuel source only if it was the *source* of *gaseous* fuel. Conversely, LPG Tank (14) is a source of *liquid* fuel, and is therefore not a gaseous fuel source. EX2133, ¶¶134-136.

b. Element [1.5]: “a gaseous fuel valve positioned along a gaseous fuel line coupling the gaseous fuel source to the carburetor”

The Workshop Manual does not disclose “a gaseous fuel valve positioned along a gaseous fuel line coupling the gaseous fuel source to the carburetor.” EX2133, ¶137.

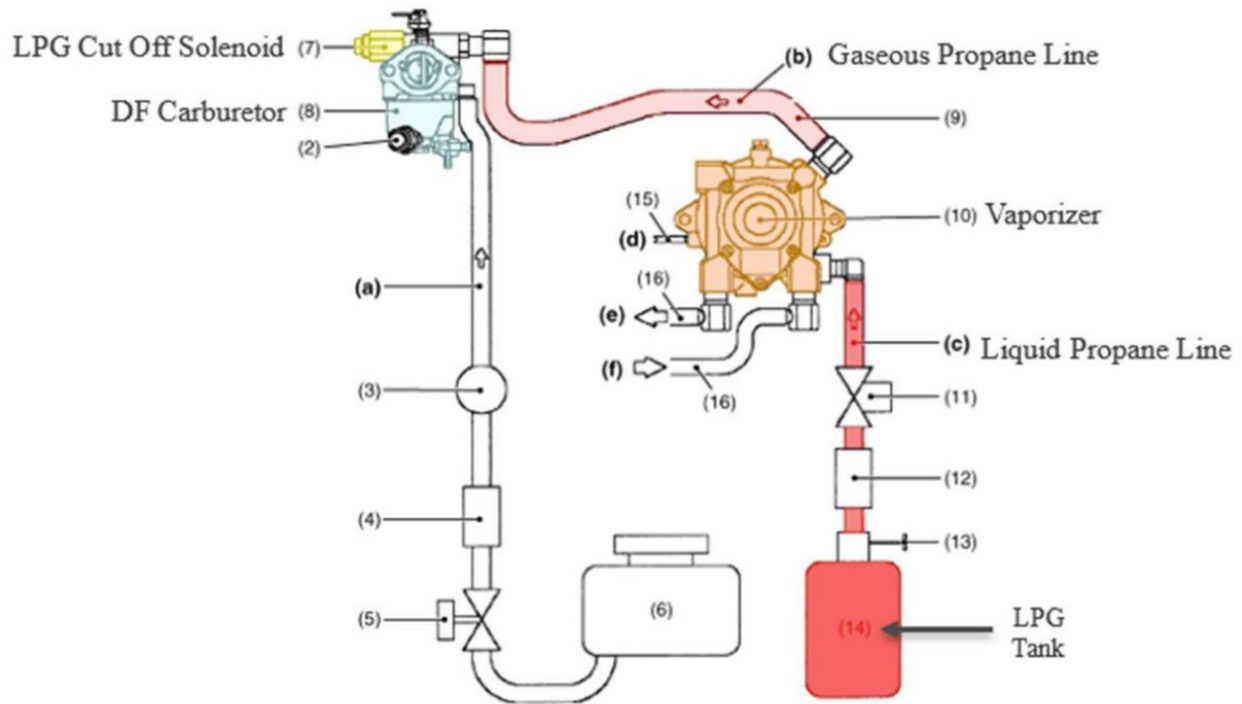
Petitioner identifies “Gaseous Propane Line (b)” as the alleged “gaseous fuel line.” Pet., 30-31. Petitioner likewise identifies the Workshop Manual’s “LPG Cut Off Solenoid” (alternatively identified by numeral “(7)” on p. 65 and “(3)” on p. 68) as the alleged “gaseous fuel valve positioned along a gaseous fuel line.” Pet., 30-31. EX2133, ¶¶138-139.

Gaseous Propane Line (b) consists of a black fuel line, and is depicted attaching to the carburetor (metallic) upstream of the LPG Cut Off Solenoid in the annotated figure, below. EX1012, 115; EX2133, ¶140.



[EX1012 (Workshop Manual) at p. 115 (annotated).]

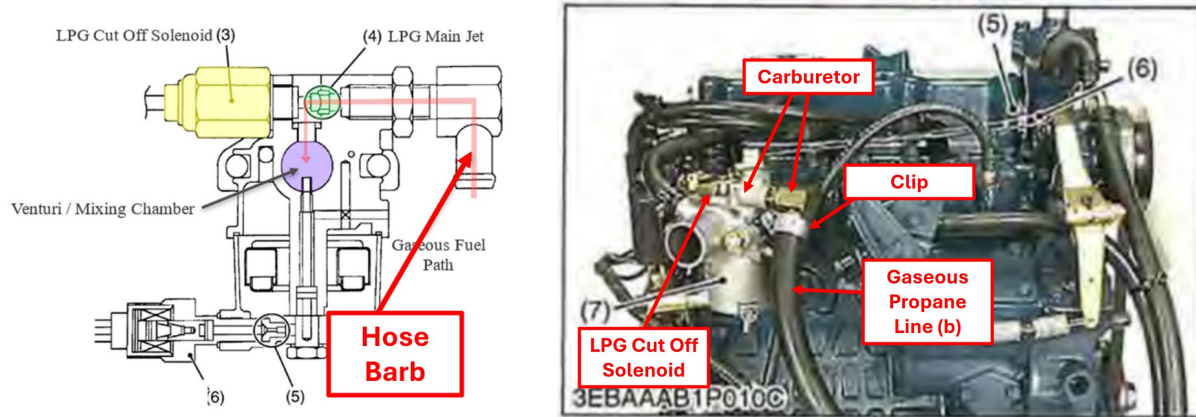
Petitioner's annotations identifying the alleged "gaseous fuel line" and "gaseous fuel valve" provide further clarity regarding the relationship between Gaseous Propane Line (b) and the LPG Cut Off Solenoid, and are reproduced below:



Pet., 31 (annotations in original)

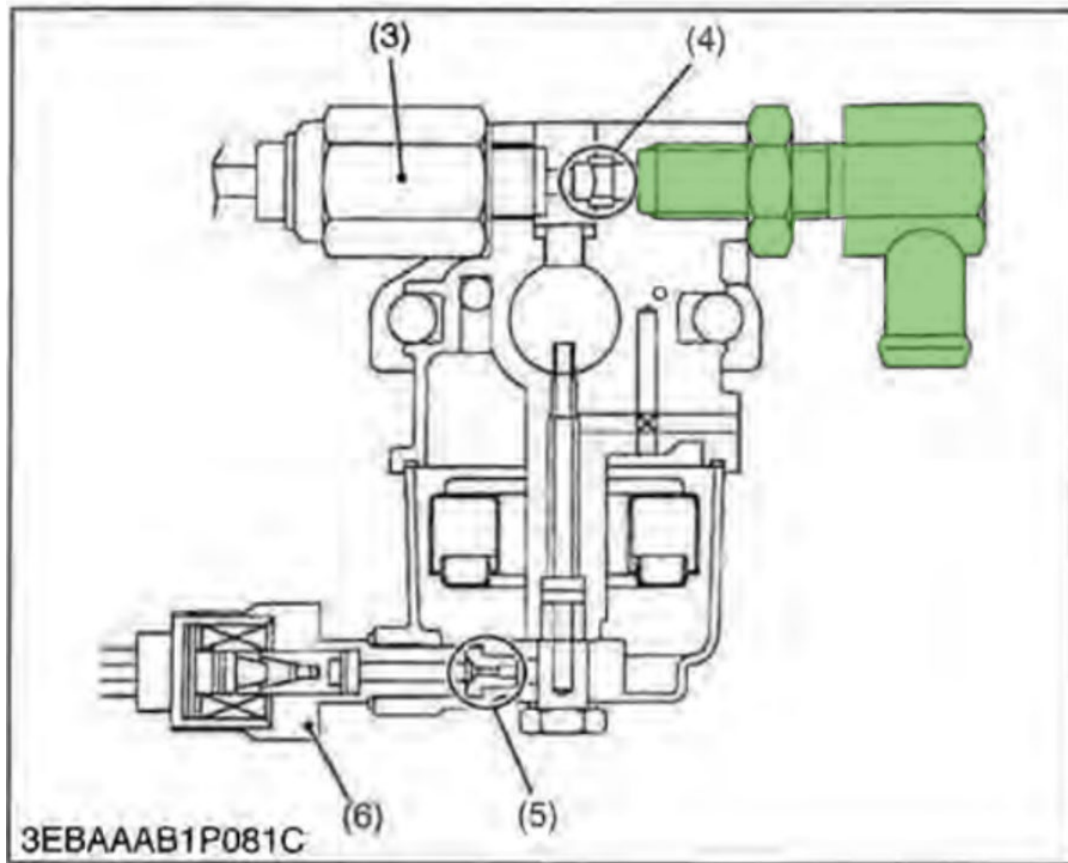
Petitioner's annotations make clear that LPG Cut Off Solenoid (7) is not located *along* Gaseous Propane Line (b). Specifically, Gaseous Propane Line (b) is attached to the hose barb depicted at the top right of the below diagram (below, left), and secured with a clip (below, right). Petitioner's expert (Dr. Morse) testified that this was a common way to secure a fuel line. EX2127 (Morse Depo. Tr.) at 109:11-110:8 ("It's common to have a hose barb on the tank and then an elastomeric fuel line that attaches to the barb, and typically with a clip to secure it."). A "clip" is

depicted in silver below, and is immediately adjacent Gaseous Propane Line (b) (black). EX2133, ¶¶141-142.



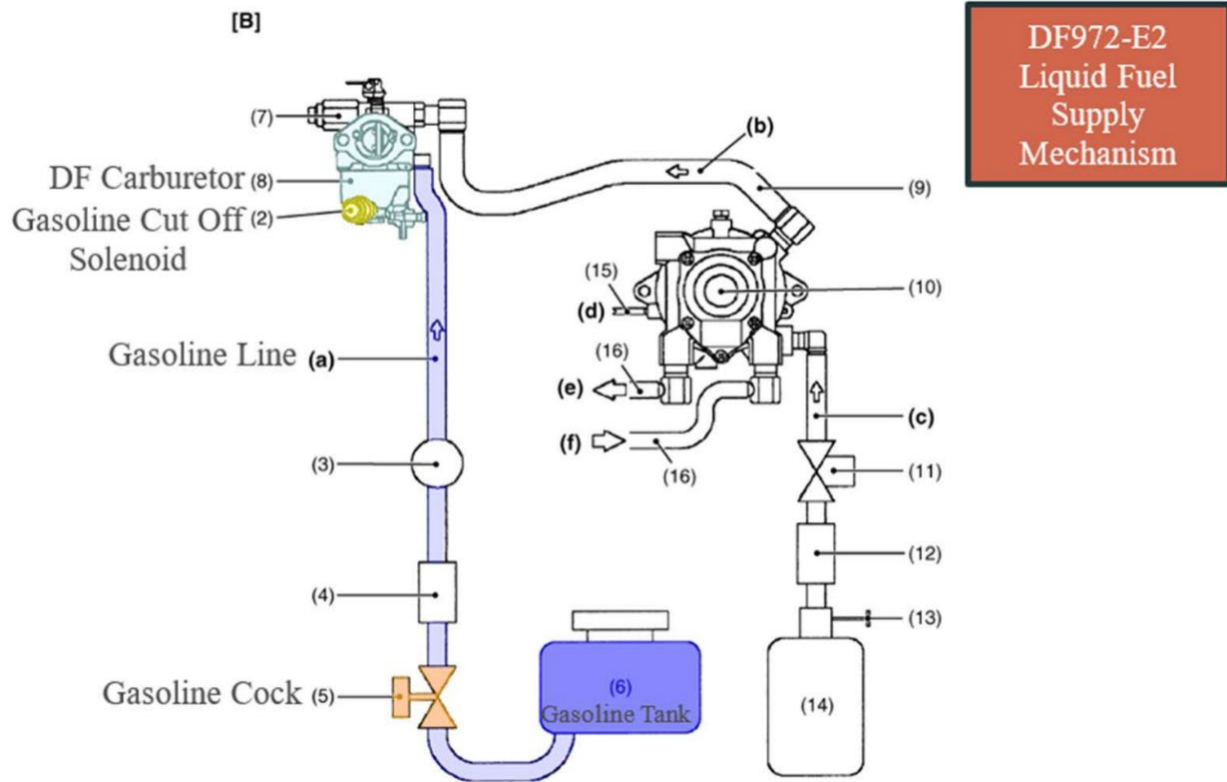
[Pet., 31 (annotated) (left); EX1012 (Workshop Manual) at p. 115 (annotated) (right).]

As shown, Petitioner identifies the LPG Cut Off Solenoid as being located on the “gaseous fuel path,” which (while true) is irrelevant when analyzing specific claim limitations requiring the valve be located along the gaseous fuel *line*. Based on Petitioner’s annotated figure, LPG Cut Off Solenoid (3) is located *after* Gaseous Propane Line (b), with several intervening components that gaseous fuel passes through located between LPG Cut Off Solenoid (3) and Gaseous Propane Line (b). Those intervening components are highlighted in green, in the annotated figure below. EX2133, ¶143.



EX1012, 68 (annotated)

As further evidence, Petitioner’s analysis of Element [1.4] (requiring “a liquid fuel valve positioned along a liquid fuel line”) is instructive. There, Petitioner identified the Workshop Manual’s “Gasoline Cock (5)” as the claimed “liquid fuel valve” and “Gasoline Line (a)” as the claimed “liquid fuel line.” Pet., 29; EX2133, ¶¶144-145. Petitioner’s annotations are reproduced below:



Pet., 30 (annotations in original)

Unlike LPG Cut Off Solenoid (7) (identified with respect to Element [1.5]), Gasoline Cock (5) is clearly positioned *along* the alleged liquid fuel line. For example, the alleged fuel line continues both upstream and downstream of the alleged fuel valve. A similar configuration is also found with respect to the Workshop Manual's "LPG Shut Off Solenoid Valve (11)" which is positioned *along* "Liquid Propane Line (c)." EX1012, 65. There, the liquid propane line again continues both upstream and downstream of the alleged fuel valve. EX2133, ¶¶146-147.

Conversely, LPG Cut Off Solenoid (7) is located entirely downstream of Gaseous Propane Line (b), with other intervening components positioned between Gaseous Propane Line (b) and LPG Cut Off Solenoid (7). For at least the reasons set forth above, the Workshop Manual does not disclose Element 1.5 (“a gaseous fuel valve positioned along a gaseous fuel line coupling the gaseous fuel source to the carburetor.”). EX2133, ¶¶148-149.

2. Claims 3, 22

Claims 3 and 22 depend from Claim 1, and are therefore not invalid for the same reasons. EX2133, ¶150.

3. Claim 57

a. Element [57.7]: “attaching a liquid fuel cut-off to the carburetor to close the fuel passage upon actuation of the switch from liquid fuel to gaseous fuel”

The Workshop Manual does not disclose “attaching a liquid fuel cut-off to the carburetor to close the fuel passage upon actuation of the switch from liquid fuel to gaseous fuel.” EX2133, ¶151.

The Petition’s purported analysis with respect to Element [57.7] merely incorporates by reference §VII.A.1.g (referring to Element [1.6] (“a liquid fuel cut-off incorporated into the carburetor to interrupt liquid fuel upon actuation of the switch from liquid fuel to gaseous fuel”))). Pet., 41. Elsewhere, Petitioner argues that “[i]t is inherent that the components of the DF972 engine were assembled to form

the engine, as their integration into a functional system necessitates assembly steps.” Pet., 35. EX2133, ¶¶152-153.

Inherency “is a ‘high standard,’ that is ‘carefully circumscribed in the context of obviousness.’ Inherency ‘may not be established by probabilities or possibilities,’ and ‘[t]he mere fact that a certain thing may result from a given set of circumstances is not sufficient.’ Rather, inherency renders a claimed limitation obvious *only* if the limitation is ‘*necessarily present*,’ or is ‘the natural result of the combination of elements explicitly disclosed by the prior art.’” *Persion Pharm. LLC v. Alvogen Malta Operations LTD.*, 945 F.3d 1184, 1191 (Fed. Cir. 2019) (internal citations omitted) (emphasis added).

However, Petitioner explicitly argues that the Workshop Manual’s “Gasoline Cut Off Solenoid is incorporated into the carburetor.” Pet., 33. Neither the Petition, nor Dr. Morse’s declaration include any explicit disclosure that “attaching” the Gasoline Cut Off Solenoid to the carburetor is “necessarily present” in the Workshop Manual. EX2133, ¶154.

B. Ground 2: The ’398 Patent is Not Obvious Over the Workshop Manual in View of Matsushima, Yamamoto, and Olmr

Claims 2, 4-14, and 19-21 depend from Claim 1. Ground 2 does not provide any additional analysis with respect to Claim 1. As such, these claims are not invalid for the same reasons as Claim 1. Likewise, Claim 58 depends from Claim 57. Ground

2 does not provide any additional analysis with respect to Claim 57. As such, Claim 58 is not invalid for the same reasons as Claim 57. Additional analysis with respect to specific dependent claims is addressed below. EX2133, ¶¶155-157.

1. Claim 2: “The dual fuel engine of claim 1, wherein the engine is a pull start, batteryless engine.”

The Workshop Manual (alone or in view of Matsushima) does not disclose or otherwise render obvious “The dual fuel engine of claim 1, wherein the engine is a pull start, batteryless engine.” EX2133, ¶158.

Petitioner concedes that the Workshop Manual’s DF972 engine has a battery start (as opposed to a pull start) and argues that a POSITA “would have found it obvious to incorporate Matsushima’s recoil-starter 40 with the DF972 engine.” Pet., 41. Specifically, Petitioner argues for replacing the battery start with a pull start. Pet., 41 (arguing that a POSITA would have found it obvious to “incorporate a pull-start to start the DF972 engine *in place of* the battery.”). However, the Petition lacks sufficient motivation to replace the battery start with a pull start, and has not established that a POSITA would have had a reasonable expectation of success in the proposed combination. EX2133, ¶¶159-160.

Petitioner makes two statements regarding the alleged motivation for replacing the Workshop Manual’s pull start with Matsushima’s recoil starter. First, Petitioner argues that “[i]ncorporating a pull-start into the Workshop Manual’s dual-

fuel engine would improve reliability in cold or remote applications and reduce costs.” Pet., 41; EX2133, ¶161.

However, Petitioner’s arguments are conclusory, and there is no evidentiary support in either the Petition or Dr. Morse’s declaration that replacing the Workshop Manual’s battery start system with a pull start would improve its reliability in cold or remote applications, or otherwise reduce costs. Moreover, given that the Workshop Manual relies on powered solenoid valves for many applications, it is unclear how removing the battery (which is used to power those valves) would reduce costs, much less result in a functional device. EX2133, ¶162. Simply put, Petitioner’s argument is “generic and bears no relation to any specific combination of prior art elements.” *ActiveVideo Networks, Inc. v. Verizon Comm’ns., Inc.*, 694 F.3d 1312, 1328 (Fed. Cir. 2012); *see also In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016) (“[P]etitioner cannot employ mere conclusory statements. [It] must instead articulate specific reasoning, based on evidence of record.”).

Second, Petitioner argues that “Matsushima provides a blueprint for implementing a recoil starter on an engine of similar displacement and layout.” Pet., 41. However, Petitioner does not provide any support for its implication that Matsushima and the Workshop Manual disclose “engine[s] of similar displacement and layout.” Pet., 41. EX2133, ¶¶163-164.

Matsushima teaches that its “invention relates to a fuel injection system for an internal combustion engine for supplying fuel to an intake system thereof, and more particularly to an electronically-controlled fuel injection system of this kind which is adapted for use in *small-sized engines equipped with no battery*.” EX1029, 1:6-11 (emphasis added). EX2133, ¶164. In a related proceeding (regarding Champion’s U.S. Patent No. 11,143,145),³ Petitioner’s expert Dr. Mahdi Shahbakhti explicitly defined small engines as engines having a displacement of less than 0.5 liters (500 cc). EX2134 (Shahbakhti Decl.) at ¶[0006]; *see also* EX2135 (Shahbakhti CV) at 1; EX2136 (Shahbakhti Depo. Tr.) at 20:11-21:15.

U.S. Patent No. 3,465,740 (cited by Matsushima as an appropriate “known type” of recoil starter) provides further guidance, referring “particularly to rewind type pull-rope starters for small internal combustions engines such as those commonly employed to power lawn mowers, garden tractors, snow blowers and the like.” EX1029, 4:63-68; EX2128 (U.S. Patent No. 3,465,740), 1:36-40; *see also* EX2129 (U.S. Patent No. 5,197,910) at 1:8-17 (referring to engines with “a relatively small displacement and low power” that “can have a displacement of about ten cubic centimeters”); EX2130 (U.S. Patent No. 4,707,017) at 5:7-18 (referring to motorcycle engines over 170 cubic centimeters as “relatively large”). EX2133,

³ The ’145 Patent is a continuation of the instant ’398 Patent.

¶¶164, 166. These exemplary engines fall squarely into Dr. Shahbakhti’s definition of a “small” engine (*i.e.*, less than 500 cc).

Conversely, the Workshop Manual discloses a 962cc engine. EX1012, 8. Petitioner’s expert (Dr. Morse) testified that a 962cc engine such as the engine disclosed by the Workshop Manual “would be a large engine” “[i]f you use it on a lawn mower.” EX2127 (Morse Depo. Tr.) at 130:9-131:15. EX2133, ¶165. The Workshop Manual also discloses a water-cooled engine. EX1012, 8.

A POSITA would have understood that the typical engine contemplated by Matsushima would have been smaller than the Workshop Manual by at least an order of magnitude. Likewise, because the Workshop Manual discloses a water-cooled engine, Petitioner’s proposed pull start would have needed to turn the water pump in addition to the engine itself, significantly increasing the difficulty of pull-starting the DF972 engine. As such, a POSITA would have understood that the Workshop Manual’s 962cc engine would have been substantially more difficult to start with a pull-starter than the smaller engines contemplated by Matsushima. EX2133, ¶¶166-167; *see also Innogenetics, N.V. v. Abbott Labs.*, 512 F.3d 1363, 1373 (Fed. Cir. 2008) (“[K]nowledge of a problem and motivation to solve it are entirely different from motivation to combine *particular references...*”).

Petitioner’s conclusory analysis of the purported motivation to combine the Workshop Manual and Matsushima is particularly deficient in light of Dr. Morse’s

deposition testimony. There, Dr. Morse repeatedly emphasized that the particular characteristics of an engine are incredibly relevant when analyzing the operation of said engine. EX2127 (Morse Depo. Tr.) at 50:17-51:8 (agreeing that “the decision of how to configure the transfer piping and all the associated equipment is dictated by the specific application”); 67:2-9 (“[t]he specific problems that could arise [from drawing liquid propane instead of gaseous propane] would depend on the specific engine being evaluate and the specific configuration”); 121:6-15 (increased fuel pressure may or “may not be an advantage in all cases, depending on how you’ve configured everything”); 122:15-123:3 (“the particular mass flow rate of fuel is dictated by the specific configuration of the engine” and “the fluid properties of the fuel and the configuration of the tank where the fuel is stored and the configuration of the fuel line from the tank to the engine”); 176:4-13 (“certainly the working fluid is something that is taken into account when designing a piping system”). In light of Dr. Morse’s repeated emphasis on specific engine characteristics and applications, the conclusory assertion of a motivation to combine based on “similar displacement and layout” is particularly deficient. EX2133, ¶¶168-169. *In re Magnum*, 829 F.3d at 1380 (“[P]etitioner cannot employ mere conclusory statements. [It] must instead articulate specific reasoning, based on evidence of record.”).

Finally, Petitioner’s analysis of a reasonable expectation of success is deficient, at least because it does not account for the difficulties in adding a pull start

to a large, water-cooled engine. For example, Petitioner has not introduced any evidence to establish that an operator would physically be able to start a 962cc water-cooled engine. It would be, at minimum, very difficult to pull start the large, water-cooled engine presented in the Workshop Manual. EX2133, ¶170.

Additionally, pull start engines often require priming the engine with fuel and choking the air flow. However, Petitioner’s proposed combination removes both the battery and electric start system from the Workshop Manual’s engines, and the Workshop Manual *does not* disclose a manual choke or any mechanism to manually prime the engine. As such, a POSITA would not have understood the Workshop Manual’s engine to be operable with a pull start. For these reasons, Petitioner’s proposed motivation to combine and reasonable expectation of success analysis is not sufficient to render Claim 2 obvious. EX2133, ¶171.

2. Claim 4: “The dual fuel engine of claim 1, wherein the engine is a pull-start engine having an electrical power generator to supply electrical power”

The Workshop Manual (alone or in view of Matsushima) does not disclose or otherwise render obvious “The dual fuel engine of claim 1, wherein the engine is a pull-start engine having an electrical power generator to supply electrical power.” EX2133, ¶172.

Although the Petition argues that a POSITA would have found it “obvious to *combine* Matsushima’s recoil-starter assembly with the [Workshop Manual’s]

DF972 engine” (Pet., 43 (emphasis added)), Petitioner actually incorporates its analysis with respect to “§VII.B.1” (referring to Claim 2). EX2133, ¶¶173-174. However, as discussed above, Petitioner’s analysis with respect to Claim 2 refers to *replacing* the Workshop Manual’s battery start (and battery) with Matsushima’s recoil-starter assembly. *See* Claim 2 (“wherein the engine is a pull start, batteryless engine”); Pet., 41 (arguing that a POSITA would have found it obvious to “incorporate a pull-start to start the DF972 engine *in place of* the battery.”).

Therefore, the Petition does not include any analysis of a motivation to *combine* Matsushima’s recoil-starter assembly with the Workshop Manual’s DF972 engine (rather than install the recoil-starter assembly instead of the Workshop Manual’s battery). Likewise, the Petition does not include any analysis of a reasonable expectation of success regarding the same. EX2133, ¶174; *Innogenetics*, 512 F.3d at 1373; *Netflix, Inc. v. DivX, LLC*, 84 F.4th 1371, 1377 (Fed. Cir. 2023) (“the Board should also not have to decode a petition to locate additional arguments beyond the ones clearly made. A petitioner may not rely on a vague, generic, and/or meandering petition and later fault the Board for failing to understand what the petition really meant.”).

Moreover, Petitioner’s incorporated motivation to combine analysis is deficient for the same reasons as discussed with respect to Claim 2 (*i.e.*, it relies on conclusory statements, lacks evidentiary support, and is contradicted by the record

evidence). *See* §VII.B.1, above; EX2133, ¶¶175-176; *In re Magnum*, 829 F.3d at 1380.

3. Claims 5-14

Claims 5-14 depend from Claim 4, and are therefore not invalid for the same reasons. EX2133, ¶¶177-178.

4. Claim 8: “The dual fuel engine of claim 6, wherein the solenoid valve is normally open to provide liquid fuel to the engine when the solenoid valve is unpowered”

The Workshop Manual (alone or in view of Matsushima and/or Olmr) does not disclose or otherwise render obvious “The dual fuel engine of claim 6, wherein the solenoid valve is normally open to provide liquid fuel to the engine when the solenoid valve is unpowered.” EX2133, ¶179.

The “solenoid valve” referred to in Claim 8 is the “liquid fuel cut-off.” EX1001, Cl. 6. Petitioner concedes that the “liquid fuel cut-off” allegedly disclosed by the Workshop Manual is normally closed. Pet., 44 (“The Gasoline Cut Off Solenoid is normally closed”). Therefore, the Workshop Manual alone does not disclose this limitation. EX2133, ¶¶180-181.

a. **Petitioner’s proposed motivation to implement Olmr’s normally open solenoid in the Workshop Manual’s fuel system is conclusory and unsupported.**

Petitioner argues that it “would have been obvious to a POSA to use a normally-open solenoid, instead” of the Workshop Manual’s Gasoline Cut Off

Solenoid. Pet., 44; *see also* Pet., 46 (arguing a POSITA “would have been motivated to use Olmr’s normally-open solenoid rather than a normally-closed solenoid based on the express teachings of Olmr.”). According to Petitioner, a normally-open solenoid is preferred because (1) “many small engines do not utilize a battery or other source of power for starting,” and (2) “should the valve control circuit fail, the spool valve plunger 45 will fail in the normally open position allowing continued operation of the engine.” Pet., 46 (citing EX1007, 3:43-53). EX2133, ¶¶182-183.

As discussed above, Petitioner’s motivation to combine analysis is deficient at least because it failed to consider specific characteristic(s) of the engines in question, which Petitioner’s expert repeatedly emphasized is important. *See* §VII.B.1, above; *see also* EX2133, ¶183; *ActiveVideo Networks*, 694 F.3d at 1328.

Moreover, as explained in additional detail below, Petitioner’s proposed motivations are not applicable to the DF972 engine disclosed by the Workshop Manual. Specifically, Petitioner has not established that the DF972 engine is a “small” engine, as contemplated by Olmr, and thus, has failed to establish that Olmr’s stated motivation is applicable to the DF972 engine. EX2133, ¶184. In fact, Olmr teaches that it is applicable for “[s]mall internal combustion engines, such as those used to power lawn and garden equipment.” EX1007, 1:10-11. As discussed above, a POSTIA would have understood these types of engines to be orders of magnitude smaller than those disclosed in the Workshop Manual. *See* §VII.B.1,

above; EX2133, ¶184. Conversely (and as explained above) the Workshop Manual discloses a much larger and more complex engine that includes a water cooling system and a vaporizer. *See* §VII.B.1, above; EX2133, ¶184.

Similarly, the DF972 engine disclosed by the Workshop Manual *does* “utilize a battery or other source of power for starting,” thus explicitly rendering Olmr’s stated motivation inapplicable. EX1012, 8, 76-80 (referring to the Workshop Manual’s battery and electrical system); EX2133, ¶185; *Innogenetics, N.V. v. Abbott Labs.*, 512 F.3d 1363, 1373 (Fed. Cir. 2008) (“[K]nowledge of a problem and motivation to solve it are entirely different from motivation to combine *particular references...*”).

b. Petitioner’s proposed combination disregards the Workshop Manual’s electrical system.

Moreover, Olmr does not relate to a dual fuel engine. As Petitioner previously acknowledged, the Workshop Manual discloses a fuel select switch (8) which determines whether current flows to the gasoline cut off solenoid (6) or the LPG cut off solenoid (3):

With the fuel select switch (8) in the "GASOLINE" position "D" and the main switch in the "ON" position, the battery current flows to the gasoline cut off solenoid (6). Therefore gasoline fuel in the float chamber flows to the mixing chamber.

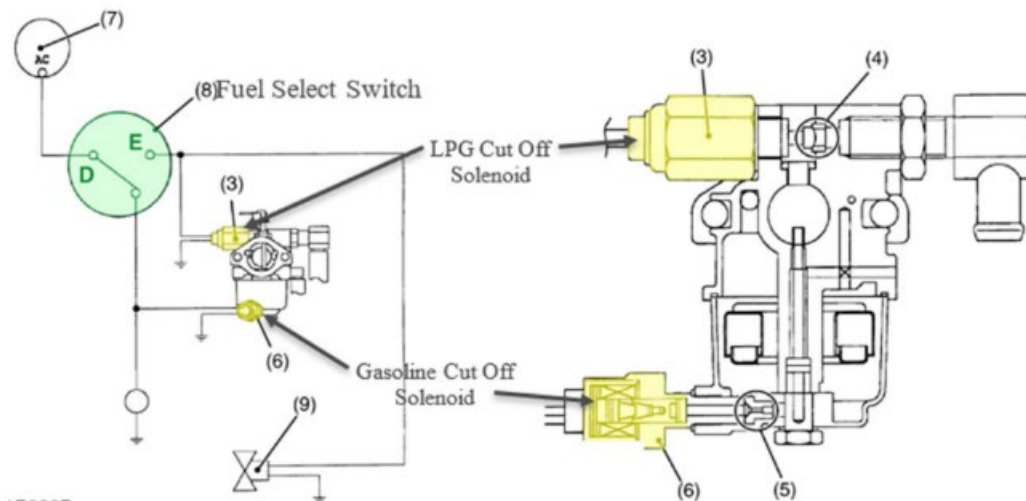
When the fuel select switch (8) is turned to the "LPG" position "E", the battery current stops to the gasoline cut off solenoid (6) and flows to the LPG cut off solenoid (3) and LPG shut off solenoid valve (9).

...

When the main switch (7) turned to the "OFF" position, the battery current stops to the both of solenoids.

EX1012, 68; *see also* Pet., 24-25; EX2133, ¶186.

Petitioner's annotations of the pertinent Workshop Manual figures are reproduced below:



Pet., 25 (citing EX1012, 68)

Given the overall structure and layout of the Workshop Manual's switching system, replacing the Gasoline Cut Off Solenoid with a normally-open solenoid (as allegedly suggested by Olmr) would render the resulting device inoperable. EX2133, ¶¶187-188.

The Workshop Manual teaches that “[w]hen the main switch (7) turned to the ‘OFF’ position, the battery current stops to the both of solenoids.” EX1012, 68. Under Petitioner’s proposed combination, turning the main switch to “off” would result in *stopping* current to the (now) normally-open Gaseous Cut Off Solenoid, resulting in the solenoid opening and allowing gasoline to flow into the carburetor. This is precisely the opposite of the desired result (*i.e.*, no fuel reaches the carburetor when the switch is “off”). EX2133, ¶189. Petitioner does not explicitly address this deficiency. Presumably, Petitioner will argue that its conclusory assertion that the proposed combination “would have involved a simple substitution and a rewiring of the DF972’s switch” is sufficient to resolve this deficiency. EX2133, ¶190. This is wholly insufficient. *In re Magnum*, 829 F.3d at 1380.

Moreover, Petitioner does not explain at any point what the proposed “rewiring” entails. In fact, generically asserting that a POSITA would have been able to “rewire” the prior art to match the configuration disclosed by the challenged patent—without any explicit disclosure of the “rewired” configuration—is the very definition of hindsight. EX2133, ¶190; *see also W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553 (Fed. Cir. 1983) (“To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught

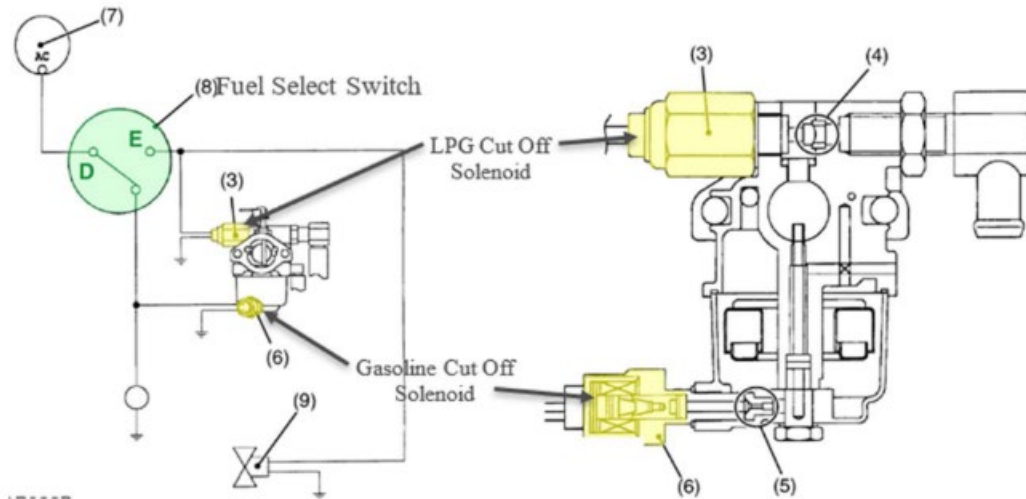
is used against its teacher.”). Simply put, Petitioner’s generic reference to “rewiring” does not prove obviousness because it lacks “a reasoned explanation that avoids conclusory generalizations.” *Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1328-29 (Fed. Cir. 2009); *see also Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1361-62 (Fed. Cir. 2016) (“references to common sense ... cannot be used as a wholesale substitute for reasoned analysis and evidentiary support, especially when dealing with a limitation missing from the prior art references specified”).

Regardless, the Workshop Manual’s inoperable “Off” switch is not the only issue caused by Petitioner’s proposed combination. The Workshop Manual’s “Fuel Select Switch” identified by Petitioner as allegedly anticipating Element 1.2 (Pet., 24-25) operates by directing current *either* to the LPG Cut Off Solenoid *or* the Gasoline Cut Off Solenoid, both of which are normally closed in the configuration disclosed by the Workshop Manual. EX1012, 68. Petitioner’s proposed combination suggests replacing the Workshop Manual’s Gasoline Cut Off Solenoid with a normally open solenoid. Pet., 44. However, this also renders the DF972 Engine inoperable. EX2133, ¶191.

Fuel Select Switch (8) functions by providing current either to Gasoline Cut Off Solenoid (6) or LPG Cut Off Solenoid (3) (but not both simultaneously). Due to the normally-closed configuration disclosed by the Workshop Manual, the *powered* solenoid is the only open solenoid, and turning off main switch (7) removes power

from both solenoids and prevents any fuel flow into the carburetor. EX2133, ¶192.

Petitioner's annotations of this configuration are reproduced below:



Pet., 25 (citing EX1012, 68)

Under Petitioner's proposed modification (ostensibly based on the teachings of Olmr) the Gaseous Cut Off Solenoid would be normally open, and the LPG Cut Off Solenoid would be normally closed. Thus, when the Fuel Select Switch (8) is in Position "D" ("Gasoline"), current is provided to the normally open Gasoline Cut Off Solenoid (meaning the solenoid is closed), but current is not provided to the normally closed LPG Cut Off Solenoid (meaning the solenoid is also closed). EX2133, ¶193.

Conversely, when the Fuel Select Switch (8) is in Position "E" ("LPG"), current is provided to the normally closed LPG Cut Off Solenoid (meaning the

solenoid is open), but current is not provided to the normally open Gasoline Cut Off Solenoid (meaning the solenoid is also open). EX2133, ¶194.

The impact of Fuel Select Switch (8) on the alleged Gaseous Cut Off Solenoid and LPG Cut Off Solenoid under Petitioner’s proposed modification in view of Olmr is represented in the table below:

	Powered Solenoid	Gasoline Cut Off Solenoid Position	LPG Cut Off Solenoid Position
Switch Position “D” (“GASOLINE”)	Gasoline Cut Off Solenoid	Closed	Closed
Switch Position “E” (“LPG”)	LPG Cut Off Solenoid	Open	Open

Simply put, under Petitioner’s proposed configuration, the Workshop Manual’s engine either receives both fuels simultaneously when in Switch Position “D” (resulting in problematic engine “flooding”) (EX1001, 8:29-40), or receives no fuel at all when in Switch Position “E”. Neither outcome is desirable. Once again, Petitioner does not identify any explanation regarding how this problem would have been resolved. EX2133, ¶¶195-196.

Finally, Petitioner also makes the conclusory statement that “[a]lthough the DF972 engine has a battery, a POSA would have been nonetheless motivated to use this configuration to allow engine starting **if** the engine is modified to operate without a battery or if the battery is dead.” Pet., 46 (emphasis added). Specifically,

Petitioner’s proposed motivation is improperly grounded in a hypothetical (“if the engine is modified to operate without a battery”) which is not true.

As discussed above, Petitioner proposed replacing the Workshop Manual’s battery with respect to Claim 2, but argued for “combin[ing] Matsushima’s recoil-starter assembly with the [Workshop Manual’s] DF972 engine” when discussing Claim 4. Pet., 43. Claim 8 depends from Claim 4 (not from Claim 2). Petitioner’s conclusory motivation is improperly grounded in hindsight, and is therefore deficient. *Sci. Plastic Prods. v. Biotage AB*, 766 F.3d 1355, 1359 (Fed. Cir. 2014) (“The pertinence of the reference as a source of solution to the inventor’s problem must be recognizable with the foresight of a person of ordinary skill, not with the hindsight of the inventor’s successful achievement.”); EX2133, ¶¶197-198.

5. Claim 9

Claim 9 depends from Claim 8, and is therefore not invalid for the same reasons. EX2133, ¶199.

6. Claim 20: “The dual fuel engine of claim 1 further comprising: a spring pushing the liquid fuel cut-off to interrupt liquid fuel; and an actuating magnet coupled to the carburetor to selectively pull the liquid fuel cut-off against the spring away from a position interrupting liquid fuel”

The Workshop Manual (alone or in view of Matsushima and/or Olmr) does not disclose or otherwise render obvious “The dual fuel engine of claim 1 further comprising: a spring pushing the liquid fuel cut-off to interrupt liquid fuel; and an

actuating magnet coupled to the carburetor to selectively pull the liquid fuel cut-off against the spring away from a position interrupting liquid fuel.” EX2133, ¶200.

Specifically, Petitioner concedes the Workshop Manual does not disclose a spring. Pet., 51 (“the Workshop Manual does not depict a spring in the Gasoline Cut Off Solenoid”). Nevertheless, Petitioner contends that a POSITA “would understand the Gasoline Cut Off Solenoid has a spring” because “solenoid valves (like the Gasoline Cut Off Solenoid) typically consist of a spring-plunger design.” Pet., 50-51; EX2133, ¶201.

However, Petitioner does not provide any support for its statement that solenoid valves “typically” consist of a spring-plunger design, such that a POSITA would have understood the depicted solenoid to disclose the claimed structure. In fact, numerous other configurations of solenoid valves exist, and Petitioner’s expert (Dr. Morse) concedes that “you don’t need to have a spring-plunger design to have a solenoid valve.” EX2127 (Morse Depo. Tr.) at 181:15-182:5; EX2133, ¶202.

For example, U.S. Patent No. 8,631,972 (“Kessler”) teaches that “Bistable solenoid or valves are known from the prior art. In order to change between valve positions (open/closed), a bistable valve requires a pulse and then remains in this position until a counter-pulse is transmitted to the valve.” EX2131, 13:64-14:50. Kessler also discloses that Figure 19 (reproduced below) “is a schematic

representation of a cross-sectional view through an actuator 18 as a bistable solenoid,” which does not include springs. *Id.*, 29:3-13; EX2133, ¶203.

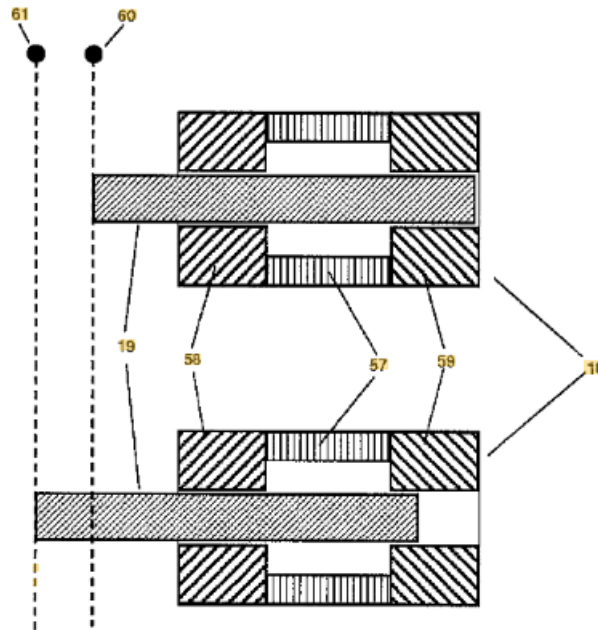


Figure 19

EX2131 (Kessler), Fig. 19

Petitioner has not established that the mere disclosure of a “solenoid” is sufficient to anticipate claim elements directed to a precise configuration of solenoid. EX2133, ¶204. Petitioner’s analysis is deficient at least because it lacks “a reasoned explanation that avoids conclusory generalizations.” *Perfect Web*, 587 F.3d at 1328-29; *see also Arendi S.A.R.L.*, 832 F.3d at 1361-62.

Alternatively, Petitioner argues it would have been obvious to replace the Gasoline Cut Off Solenoid with either (1) a solenoid structured like “the starter solenoid for the DF972 engine” or (2) “Olmr’s cutoff solenoid.” Pet., 51. However,

Petitioner does not identify any motivation to replace the Gasoline Cut Off Solenoid with either of the proposed replacements. For example, Petitioner does not identify any deficiencies in the Gasoline Cut Off Solenoid, or any benefits in either of the proposed replacements. Instead, Petitioner's analysis is entirely conclusory and unsupported. EX2133, ¶¶205-206; *In re Magnum*, 829 F.3d at 1380 (“[P]etitioner cannot employ mere conclusory statements. [It] must instead articulate specific reasoning, based on evidence of record.”).

7. Claim 21

Claim 21 depends from Claim 20, and is therefore not invalid for the same reasons. EX2133, ¶207.

C. Ground 3: The '398 Patent is Not Anticipated by Nakafushi

The Petition alleges that Claims 1, 3, 22, and 57 of the '398 Patent are anticipated by Nakafushi. Petitioner's allegations are deficient at least because Nakafushi does not disclose (1) a *gaseous* fuel source, (2) a gaseous fuel valve *positioned along* a gaseous fuel line, and (3) *attaching* a liquid fuel cut-off to the carburetor. Each argument is addressed in turn, below. EX2133, ¶208.

1. Claim 1

As discussed above, a POSITA would have understood Claim 1 distinctly claimed the state of the fuel (*i.e.*, gaseous or liquid) at three separate locations: the *source* of the fuel, the fuel *line*, and the *engine*. See §§II.B, VII.A.1, *supra*; EX2133,

¶¶115-123; *see also Regeneron Pharm.*, 130 F.4th at 1379; *Kyocera*, 22 F.4th at 1382; *Schindler Elevator*, 593 F.3d at 1282. Nakafushi does not disclose at least (1) a *gaseous* fuel source, and (2) a gaseous fuel valve *positioned along* a gaseous fuel line. EX2133, ¶209.

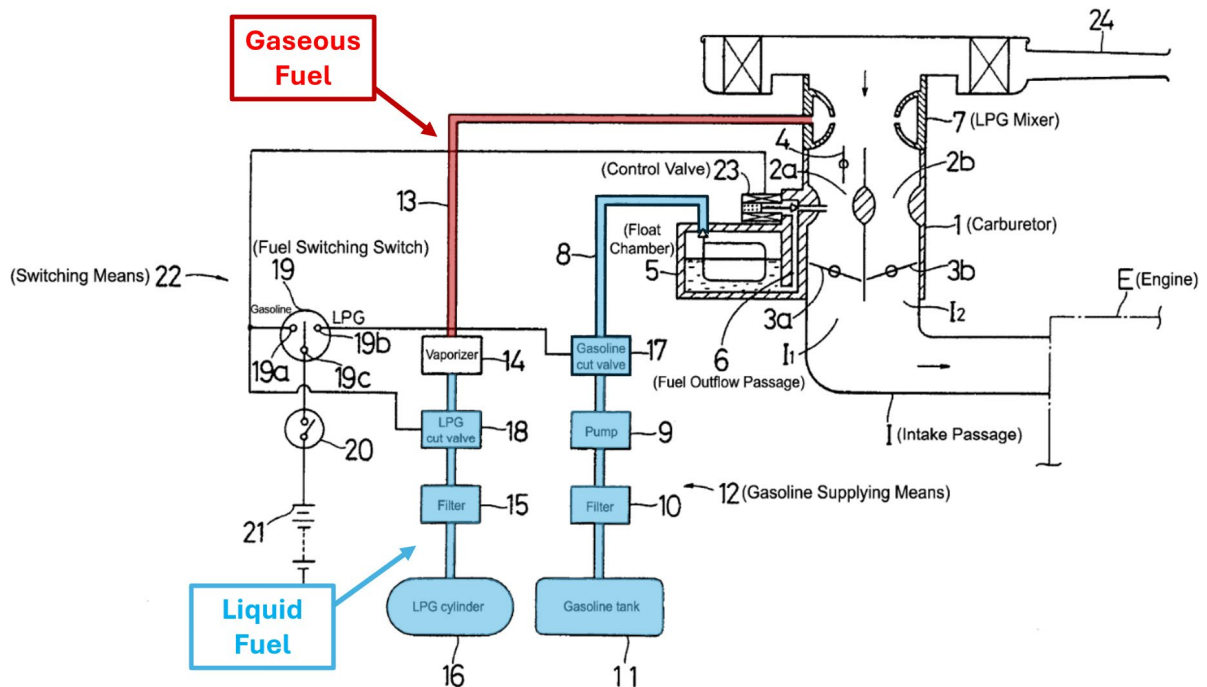
a. Element [1.3]: “a carburetor attached to an intake of the engine to mix air and fuel and connect to a gaseous fuel source and a liquid fuel source”

Nakafushi does not disclose “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.” Specifically, Nakafushi does not disclose a “gaseous fuel source.” EX2133, ¶¶210-211.

As discussed above, Nakafushi describes a dual fuel engine that draws fuel from two different sources of liquid fuel: Gasoline Tank 11 and LPG Cylinder 16. *See* §VI.B, above; EX2133, ¶212.

Petitioner explicitly maps the claimed liquid and gaseous fuels sources to Gasoline Tank 11 and LPG Cylinder 16. Pet., 66 (“Nakafushi discloses a carburetor 1 attached to the intake of the engine E, and the carburetor connects the LPG cylinder and gasoline tank to the intake.”). EX2133, ¶213. Contrary to Petitioner’s representations, LPG is liquid fuel when leaving the fuel source, and only becomes gaseous fuel after reaching the vaporizer, as depicted by the below annotated figure:

FIG. 1



EX1005, Fig. 1 (annotated)

Specifically, liquid LPG is vaporized into a gaseous state by the vaporizer, and then passed through the carburetor. EX2133, ¶¶214-217. As explained in the prosecution history, the mere fact that the liquid fuel in the LPG tank is converted to its gaseous state prior to reaching the carburetor would not have led a POSITA to believe that the LPG tank was a gaseous fuel source. §II.B, *supra*; EX2133, ¶218. Rather, a POSITA would have viewed both the Gasoline Tank 11 and LPG Cylinder 16 as liquid fuel sources, which supply liquid fuel that is subsequently converted into a gaseous state. EX2133, ¶218.

As further evidence that Nakafushi does not disclose a gaseous fuel source, the presence of the vaporizer actually precludes LPG Cylinder 16 from being considered a “gaseous fuel source.” For example, if an LPG cylinder was used improperly such that LPG vapor exited the LPG tank and was sent to the vaporizer, then the vaporizer could not function properly to generate an appropriately-rich fluid flow into the carburetor. In such a case, the engine would die. In fact, this is exactly what happens when the LPG cylinder runs out of liquid LPG. Therefore, Nakafushi does not disclose Element [1.3]. EX2133, ¶219.

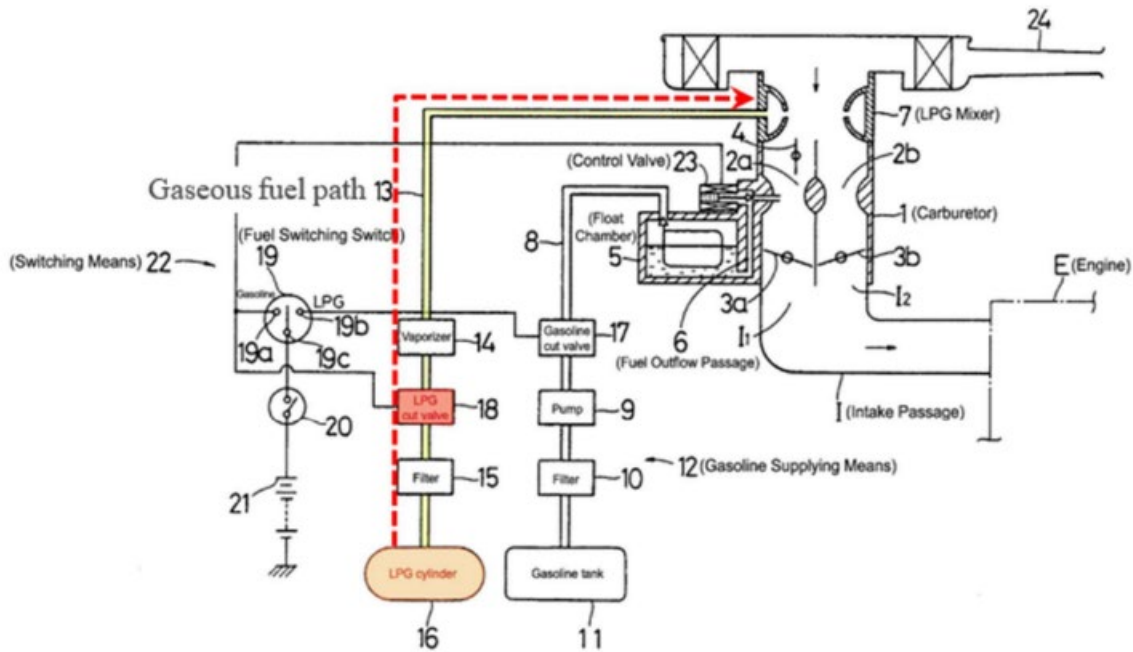
A POSITA would have considered a fuel source to be a gaseous fuel source only if it provided gaseous fuel. Conversely, LPG Cylinder 16 provides *liquid* fuel, and is therefore not a gaseous fuel source. EX2133, ¶220.

b. Element [1.5]: “a gaseous fuel valve positioned along a gaseous fuel line coupling the gaseous fuel source to the carburetor”

Nakafushi does not disclose “a gaseous fuel valve positioned along a gaseous fuel line coupling the gaseous fuel source to the carburetor.” EX2133, ¶221.

Petitioner identifies “LPG supplying passage 13” as the alleged “gaseous fuel line.” Pet., 68-69. Petitioner likewise identifies Nakafushi’s “LPG cut valve 18” as the alleged “gaseous fuel valve positioned along a gaseous fuel line.” Pet., 68-69. EX2133, ¶222. Petitioner’s annotations identifying the alleged “gaseous fuel line” and “gaseous fuel valve” are reproduced below:

FIG. 1

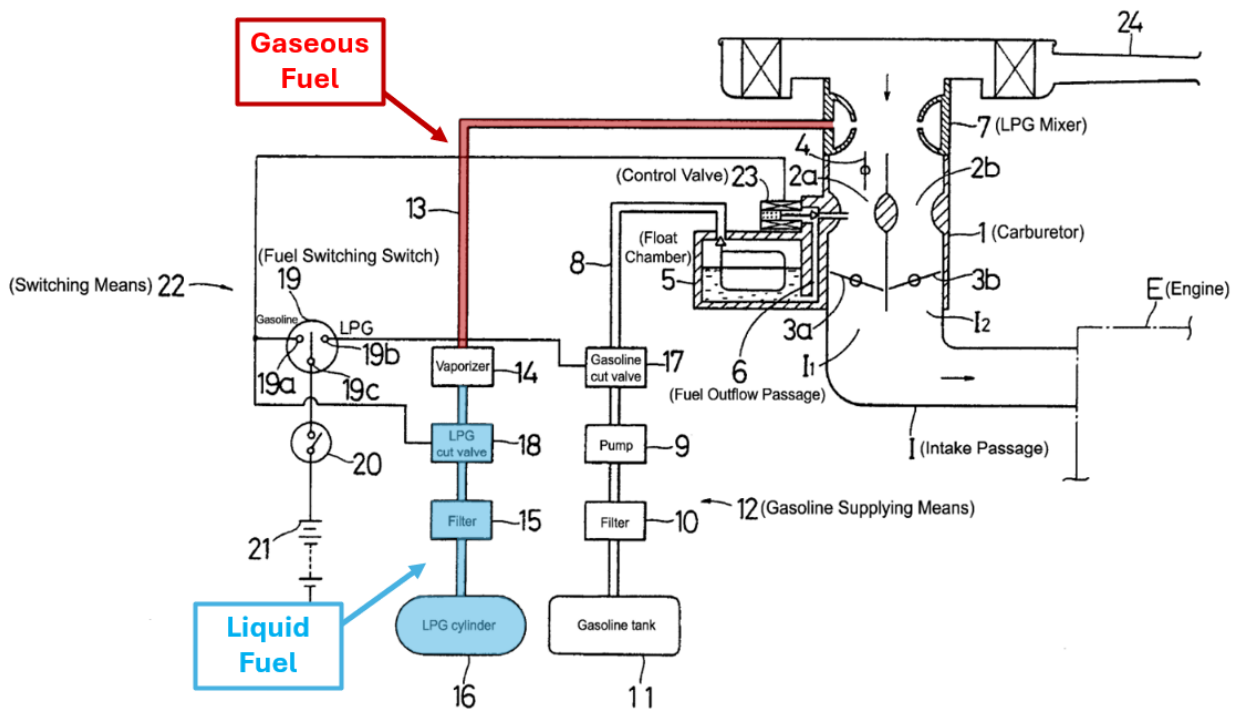


Pet., 69 (annotations in original).

Petitioner asserts that “LPG cut valve 18 is positioned on the LPG supplying passage 13.” Pet., 69. However, contrary to Petitioner’s representations, LPG cut valve 18 is not located *along* a gaseous fuel line. As depicted in the annotated figure, below, LPG cut valve 18 is located between LPG cylinder 16 and vaporizer 14, and is therefore located along a *liquid* fuel line (blue) and not a gaseous fuel line (red). EX2133, ¶¶223-224.⁴

⁴ Petitioner’s expert in a related proceeding regarding Champion’s U.S. Patent No. 11,143,145 (Dr. Mahdi Shahbakhti) testified that Nakafushi’s Fig. 1 “needs more

FIG. 1



EX1005, Fig. 1 (annotated)

details in particular saying that -- because there is no disclosure saying that these parallel lines, what exactly -- if they are representing the pipes between them, that disclosure is not in the patent.” EX2136, 39:13-45:8. Based on Dr. Shahbakhti’s testimony, it is unclear whether Nakafushi’s LPG cut valve 18 is located along “a line” at all. However, it is indisputable that any line which may (or may not) be connected to LPG cut valve 18 is necessarily a *liquid* fuel line and not a *gaseous* fuel line.

For at least the reasons set forth above, Nakafushi does not disclose Element 1.5 (“a gaseous fuel valve positioned along a gaseous fuel line coupling the gaseous fuel source to the carburetor.”). EX2133, ¶225.

2. Claims 3, 22

Claims 3 and 22 depend from Claim 1, and are therefore not invalid for the same reasons. EX2133, ¶226.

3. Claim 57

- a. **Element [57.7]: “attaching a liquid fuel cut-off to the carburetor to close the fuel passage upon actuation of the switch from liquid fuel to gaseous fuel”**

Nakafushi does not disclose “attaching a liquid fuel cut-off to the carburetor to close the fuel passage upon actuation of the switch from liquid fuel to gaseous fuel.” EX2133, ¶227.

The Petition’s purported analysis with respect to Element [57.7] merely incorporates by reference §VII.C.1.g (referring to Element [1.6] (“a liquid fuel cut-off incorporated into the carburetor to interrupt liquid fuel upon actuation of the switch from liquid fuel to gaseous fuel”))). Pet., 77. Elsewhere, Petitioner argues that “[i]t is inherent in Nakafushi that these components were assembled to form the dual-fuel engine, as their described integration into a functional system necessitates assembly steps.” Pet., 72; EX2133, ¶¶228-229.

However, Petitioner explicitly argues that Nakafushi's control valve 23 is "incorporated into the carburetor." Pet., 70. Neither the Petition nor Dr. Morse's declaration include any explicit disclosure that "attaching" control valve 23 to the carburetor is "necessarily present" in Nakafushi. EX2133, ¶230; *Persion Pharm.*, 945 F.3d at 1191.

D. Ground 4: The '398 Patent is Not Obvious Over Nakafushi in View of Matsushima, Yamamoto, and Olmr

Claims 2, 4-14, and 19-21 depend from Claim 1. Ground 4 does not provide any additional analysis with respect to Claim 1. As such, these claims are not invalid for the same reasons as Claim 1. Likewise, Claim 58 depends from Claim 57. Ground 4 does not provide any additional analysis with respect to Claim 57. As such, Claim 58 is not invalid for the same reasons as Claim 57. Additional analysis with respect to specific dependent claims is addressed below. EX2133, ¶¶231-233.

1. Claim 2: "The dual fuel engine of claim 1, wherein the engine is a pull start, batteryless engine."

Nakafushi (alone or in view of Matsushima) does not disclose or otherwise render obvious "The dual fuel engine of claim 1, wherein the engine is a pull start, batteryless engine." EX2133, ¶234.

Petitioner argues that a POSITA would have found it obvious "to incorporate a pull-start and an electrical power generator to supply electrical power *in place of* Nakafushi's battery" but does not articulate a motivation to replace the battery start

with a pull start or a reasonable expectation of success of the same. Pet., 77 (emphasis added). Instead, Petitioner suggests “the same reasons discussed above with respect to incorporating Matsushima’s pull-start assembly for use with the [Workshop Manual’s] DF972 engine.” Pet., 77 (citing §VII.B.1). EX2133, ¶¶235-236.

However, Petitioner’s prior analysis relates to the combination of Matsushima and the Workshop Manual, *not* the combination of Matsushima and Nakafushi, and Petitioner has not established that the same analysis (which itself is unavailing) is even applicable to Nakafushi. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (“[I]t can be important to identify a reason that would have prompted a [POSITA] to combine the elements in the way the claimed new invention does” and “this analysis should be made explicit.”); *Innogenetics*, 512 F.3d at 1373 (“[K]nowledge of a problem and motivation to solve it are entirely different from motivation to combine *particular references*...”). In fact, the record evidence supports the conclusion that Petitioner’s analysis *is not* equally applicable to the Matsushima/Nakafushi combination. EX2133, ¶¶237-238.

Petitioner previously argued that “[i]ncorporating a pull-start into the Workshop Manual’s dual-fuel engine would improve reliability in cold or remote applications and reduce costs.” Pet., 41. However, Petitioner concedes that Nakafushi does not disclose a use case or specific structure for its engine *at all*, and

as such, there is no evidence that a POSITA would have looked to modify its engine for cold/remote applications. EX2127 (Morse Depo. Tr.) at 74:9-16 (acknowledging that “the Nakafushi reference [does not] identif[y] a specific application for the engine it discloses”); *see also id.* at 74:17-75:2; EX2133, ¶238.

Petitioner’s incorporated analysis also argued that “Matsushima provides a blueprint for implementing a recoil starter on an engine of similar displacement and layout [to the Workshop Manual].” Pet., 41. But again, Petitioner concedes that Nakafushi does not disclose an engine of a specific displacement. EX2127 (Morse Depo. Tr.) at 74:17-75:2 (“I don’t think Nakafushi is limited to any specific engine displacement”). As such, it is unclear how analysis ostensibly comparing Matsushima and the Workshop Manual is applicable to Nakafushi. EX2133, ¶¶239-240.

Finally, Petitioner’s proposed motivation to combine is also deficient for the same reasons set forth with respect to the Workshop Manual. *See* §VII.B.1, above; EX2133, ¶241.

Petitioner’s reasonable expectation of success analysis is also deficient. Specifically, a POSITA would not have had an expectation of success in modifying Nakafushi in the manner suggested because the design of Nakafushi’s fuel control valves 17 and 18, fuel switching switch 19, and switching means 22 are connected

to a battery 21. Those connections would be unpowered without a battery and would not function the same before startup. EX2133, ¶242.

2. Claim 4: “The dual fuel engine of claim 1, wherein the engine is a pull-start engine having an electrical power generator to supply electrical power”

Nakafushi (alone or in view of Matsushima) does not disclose or otherwise render obvious “The dual fuel engine of claim 1, wherein the engine is a pull-start engine having an electrical power generator to supply electrical power.” EX2133, ¶243.

Once again, Petitioner makes the conclusory assertion that a POSITA would have found it “obvious to incorporate Matsushima’s recoil-starter assembly and electrical power generator with Nakafushi’s engine” (Pet., 77) but lacks any explicit analysis. Instead, Petitioner incorporates its analysis with respect to a “§VII.D.1” (referring to Claim 2). This is insufficient for several reasons. EX2133, ¶244.

First, as discussed above, Petitioner’s Claim 2 analysis merely incorporated the motivation to combine and reasonable expectation of success analysis with respect to the Workshop Manual (a different reference). But, Petitioner did not establish that the Workshop Manual and Nakafushi are sufficiently similar, such that the same motivation and expectation of success should apply. *See* §VII.D.1, above; EX2133, ¶245; *KSR*, 550 U.S. at 418; *Innogenetics*, 512 F.3d at 1373 (Fed. Cir.

2008) (“[K]nowledge of a problem and motivation to solve it are entirely different from motivation to combine *particular references*...”).

Second, Petitioner’s Workshop Manual analysis (which is then incorporated into Claim 2, and then again into Claim 4) does not reference incorporating Matsushima’s electrical power generator into the Workshop Manual (presumably because Petitioner asserts that the Workshop Manual already has an electrical power generator). Pet., 43 (alleging that “[t]he Workshop Manual discloses an electrical power generator, powered by operation of the DF972 engine”). As such, Petitioner has not even attempted to identify a motivation to combine Matsushima’s alleged electrical power generator with Nakafushi’s engine (nor a reasonable expectation of success in accomplishing the same). EX2133, ¶246.

Finally, Petitioner’s proposed motivation to combine and reasonable expectation of success analysis is also deficient for the same reasons set forth with respect to Claim 2 and the Workshop Manual. *See* §§VII.D.1; VII.B.1-2; *see also* EX2133, ¶247.

3. Claims 5-14

Claims 5-14 depend from Claim 4, and are therefore not invalid for the same reasons. EX2133, ¶¶248-249.

4. Claim 8: “The dual fuel engine of claim 6, wherein the solenoid valve is normally open to provide liquid fuel to the engine when the solenoid valve is unpowered”

Nakafushi (alone or in view of Matsushima and/or Olmr) does not disclose or otherwise render obvious “The dual fuel engine of claim 6, wherein the solenoid valve is normally open to provide liquid fuel to the engine when the solenoid valve is unpowered.” EX2133, ¶250.

Petitioner maps the “solenoid valve” referred to in Claim 8 to Nakafushi’s “control valve 23” and concedes that “[t]he control valve 23 of Nakafushi is normally closed.” Pet., 81. Therefore, Nakafushi alone does not disclose this limitation. EX2133, ¶251.

Instead, Petitioner argues that it “would have been obvious to a POSA to configure it as a normally-open solenoid for the same reasons discussed above with respect to the [Workshop Manual’s] DF972 engine.” Pet., 81-82 (citing §VII.B.6). However, Petitioner has not established that any alleged motivation to combine the Workshop Manual and Olmr is equally applicable to Nakafushi and Olmr. EX2133, ¶¶252-253; *KSR*, 550 U.S. at 418; *Innogenetics*, 512 F.3d at 1373 (“[K]nowledge of a problem and motivation to solve it are entirely different from motivation to combine *particular references*...”).

For example, Petitioner does not address the differences between the power systems disclosed by the Workshop Manual and Nakafushi. *Compare* EX2127

(Morse Depo. Tr.) at 104:7-13 (testifying that Nakafushi’s “gasoline cut valve 17 and the LPG cut valve 18 are both normally open”) *with id.* at 143:5-15 (testifying that the Workshop Manual’s “valve 6” and “valve 3” are normally closed”); *see also id.* at 102:12-103:3 (referring to Nakafushi’s power system as “a little trickier than I first thought”). EX2133, ¶254.

Petitioner’s proposed motivation to combine is also deficient for at least the same reasons set forth with respect to the Workshop Manual. *See* §VII.B.4, above; EX2133, ¶255.

5. Claim 9

Claim 9 depends from Claim 8, and is therefore not invalid for the same reasons. EX2133, ¶256.

6. Claim 20: “The dual fuel engine of claim 1 further comprising: a spring pushing the liquid fuel cut-off to interrupt liquid fuel; and an actuating magnet coupled to the carburetor to selectively pull the liquid fuel cut-off against the spring away from a position interrupting liquid fuel”

Nakafushi (alone or in view of Matsushima and/or Olmr) does not disclose or otherwise render obvious “The dual fuel engine of claim 1 further comprising: a spring pushing the liquid fuel cut-off to interrupt liquid fuel; and an actuating magnet coupled to the carburetor to selectively pull the liquid fuel cut-off against the spring away from a position interrupting liquid fuel.” EX2133, ¶257.

First, Petitioner relies on Olmr’s solenoid, but does not identify a motivation to replace Nakafushi’s control valve 23 with Olmr’s solenoid, nor a reasonable expectation of success with respect to the same. Pet., 85; EX2133, ¶258. Presumably, Petitioner will attempt to rely on the alleged motivation discussed with respect to Claim 5. Pet., 79-80. However, Claim 20 does not depend from Claim 5, and Petitioner did not incorporate its analysis. EX2133, ¶259; *see also Netflix, Inc. v. DivX, LLC*, 84 F.4th 1371, 1377 (Fed. Cir. 2023) (“the Board should also not have to decode a petition to locate additional arguments beyond the ones clearly made. A petitioner may not rely on a vague, generic, and/or meandering petition and later fault the Board for failing to understand what the petition really meant.”); *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1381 (Fed. Cir. 2016) (the Board may not “adopt arguments on behalf of petitioners that could have been, but were not, raised by the petitioner during an IPR.”).

Regardless, Petitioner’s Claim 5 does not actually identify a motivation to replace Nakafushi’s cut valve 23 with Olmr’s solenoid. For example, Petitioner does not identify any deficiencies in cut valve 23, or any benefits in the proposed replacement. Instead, Petitioner’s analysis is entirely conclusory, unsupported, and is based on hindsight. EX2133, ¶260.

7. Claim 21

Claim 21 depends from Claim 20, and is therefore not invalid for the same reasons. EX2133, ¶261.

E. Ground 5: The '398 Patent is Not Anticipated by Holzapfel

The Petition alleges that Claims 1, 15-16, and 43-44 of the '398 Patent are invalid as anticipated by Holzapfel. Petitioner's allegations are deficient at least because Holzapfel does not disclose (1) "a switch" applying former Petitioner Harbor Freight's construction of the term, (2) a gaseous fuel source, and (3) a liquid fuel valve *positioned along* a liquid fuel line. Each argument is addressed in turn, below. EX2133, ¶262.

1. Claim 1

As discussed above, a POSITA would have understood Claim 1 distinctly claimed the state of the fuel (*i.e.*, gaseous or liquid) at three separate locations: the *source* of the fuel, the fuel *line*, and the *engine*. See §§II.B, VII.A.1, *supra*; EX2133, ¶¶115-123; *see also Regeneron Pharm.*, 130 F.4th at 1379; *Kyocera*, 22 F.4th at 1382; *Schindler Elevator*, 593 F.3d at 1282. Holzapfel does not disclose at least (1) a *gaseous* fuel source, and (2) a gaseous fuel valve *positioned along* a gaseous fuel line. EX2133, ¶¶262-263. Holzapfel also does not disclose the claimed "switch" applying former Petitioner Harbor Freight's proposed construction of the term.

a. Element [1.2]: “a switch to change operation of the engine between gaseous fuel and liquid fuel”

Despite applying the plain and ordinary meaning of “switch” in this IPR, former Petitioner Harbor Freight proposed and argued for narrow constructions of the term “switch ... to change operation of the engine between gaseous fuel and liquid fuel” in parallel district court litigation.⁵ Specifically, Harbor Freight argued that the term should be construed as “a device for making, breaking, or changing the connections in an electrical circuit that causes a change in operation.” EX2110, 21-22. In supplemental briefing, Petitioner modified its proposed construction, as follows:

a device for making, breaking, or changing the connections in an electrical circuit that controls mechanical movement and causes a change in operation of the engine between gaseous and liquid fuel.

EX2124, 5. Harbor Freight asserted that the ’398 Patent “clearly requires an electrical switch, not a purely mechanical one. *Id.*

Conversely, the Petition identifies “rod or wire 47” as the claimed “switch.” *See e.g.*, Pet., 94-95 (alleging that Holzapfel’s “rod or wire 47 ... simultaneously controls valves 14 and 39 by control of operating levers 45 and 46.”). But, “rod or

⁵ District court litigation between Patent Owner and Harbor Freight was resolved, and Harbor Freight withdrew as a Petitioner in this IPR. Paper 13; Paper 17.

wire 47” is not an electrical switch, as would be required by Harbor Freight’s proposed district court construction. Rather, Holzapfel merely discloses a mechanical structure that can be used to actuate two valves simultaneously. EX1009, 2:100-107 (“operating levers 45 and 46 for the valves 14 and 39, respectively, are connected to a rod or wire 47 which extends to a point of convenient access to the operator of the vehicle such as, for example, the dashboard 48 so that the rod or wire 47 may be manipulated to simultaneously control both valves 14 and 39.”); *see also id.*, 2:108-123 (“Operating the rod or wire 47 will reverse the valves 14 and 39 so that the gaseous fuel supply is cut off and the liquid fuel supply connected to feed the carburetor.”).

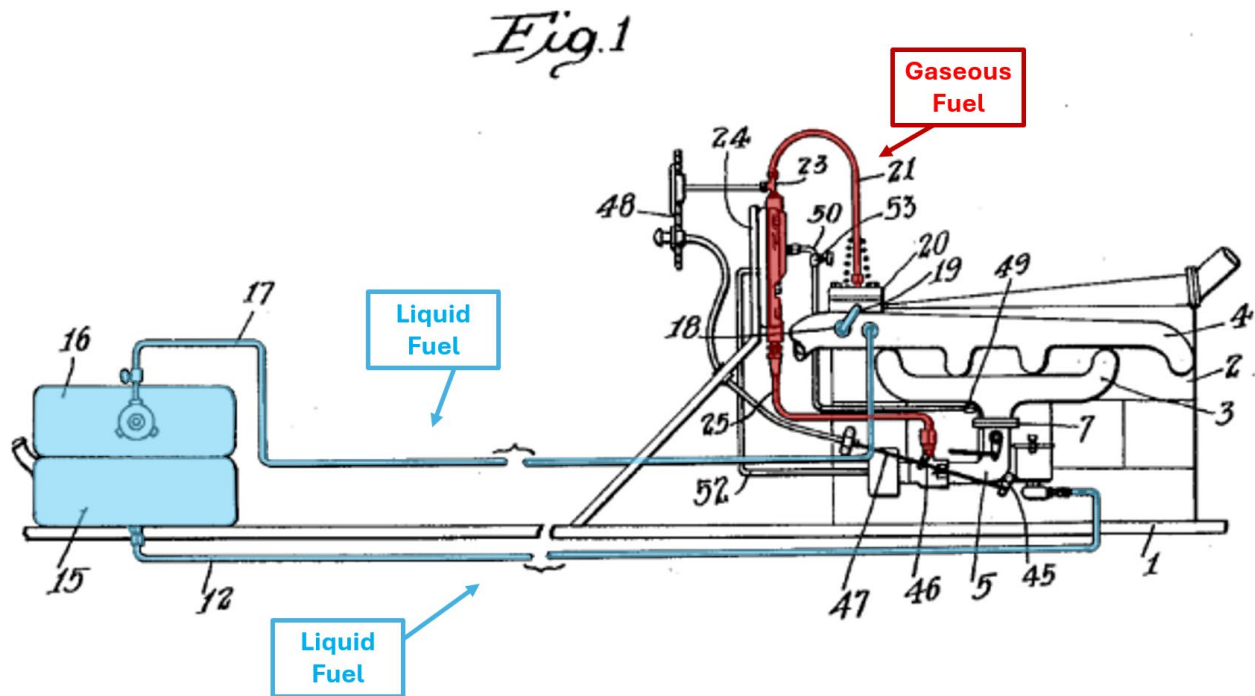
Petitioner’s intentional decision to apply different constructions of “switch” in the instant IPR and in parallel district court litigation is a clear example of gamesmanship. Thus, without conceding that Harbor Freight’s proposed construction is correct, the Petition does not allege that Holzapfel discloses the claimed “switch” under said construction.

b. Element [1.3]: “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”

Holzapfel does not disclose “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.” EX2133, ¶264.

Specifically, Holzapfel does not disclose a “gaseous fuel source.” As discussed above, Holzapfel describes a dual fuel engine that draws fuel from two different sources: main liquid supply tank 15 and fuel supply tank 16. *See* §VI.C, above. Petitioner explicitly maps the claimed liquid and gaseous fuels sources to main liquid supply tank 15 and fuel supply tank 16. Pet., 95 (“Holzapfel discloses carburetor 5 that is attached to intake manifold 3, and that connects gaseous supply tank 16 and liquid supply tank 15.”). EX2133, ¶¶265.

However, Holzapfel explicitly teaches that “From tank 16 there extends a suitable gaseous fuel supply tube 17 extending to the bottom of the tank 16, so as to draw off the liquid *and not gas*.” EX1009, 2:12-16 (emphasis added). Furthermore, Holzapfel teaches that this fuel remains in the liquid state until it “changes to a gas on the release of pressure.” EX1009, 2:125. As shown below, a POSITA would have understood that pressure was not released on this fuel until it entered the heat exchanger 20 and the pressure reducing valve 24. EX2133, ¶266.



EX1009, Fig. 1 (annotated)

Holzapfel explicitly teaches that fuel supply tank 16 does not supply gaseous fuel. A POSITA would have considered a fuel source to be a gaseous fuel source only if it provided gaseous fuel. Conversely, fuel supply tank 16 provides *liquid* fuel, and is therefore not a gaseous fuel source. See §VII.A.1, above; EX2133, ¶267.

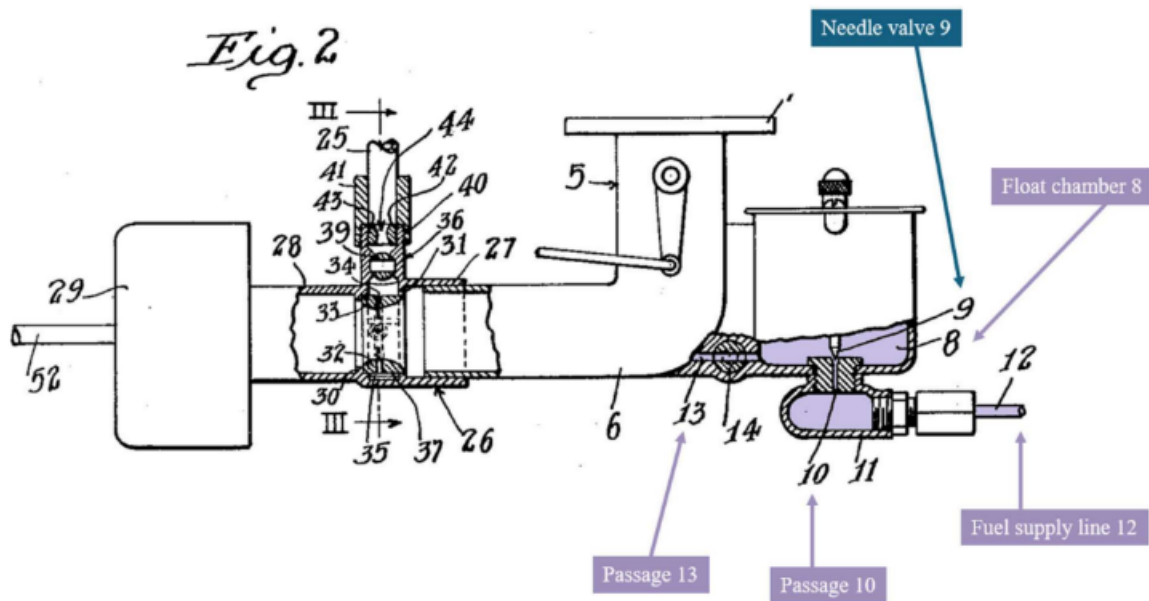
c. **Element [1.4]: “a liquid fuel valve positioned along a liquid fuel line coupling the liquid fuel source to the carburetor”**

Holzapfel does not disclose “a liquid fuel valve positioned along a liquid fuel line coupling the liquid fuel source to the carburetor.” EX2133, ¶268.

Petitioner identifies “Fuel supply line 12” as the alleged “liquid fuel line.” Pet., 97-98. Petitioner likewise identifies Holzapfel’s “needle valve 9” as the alleged

“liquid fuel valve positioned along a liquid fuel line.” Pet., 97-98; EX2133, ¶¶269-270.

Petitioner’s annotations identifying the alleged “liquid fuel line” and “liquid fuel valve” are reproduced below:



Pet., 98 (annotations in original).

Petitioner’s annotations make clear that needle valve 9 is not located *along* Fuel supply line 12. Specifically, Holzapfel discloses an intervening inlet connection 11 and passage 10 between fuel supply line 12 and needle valve 9. EX2133, ¶¶271-272. For at least the reasons set forth above, Holzapfel does not disclose Element [1.4]. EX2133, ¶273.

2. Claims 15-16

Claims 15-16 depend from Claim 1, and are therefore not invalid for the same reasons. EX2133, ¶274.

VIII. CONCLUSION

For at least the reasons discussed above, the Petition fails to establish that at least Claims 1-17, 19-22, and 57-58 are invalid.

Dated: May 26, 2026

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CERTIFICATE OF SERVICE

In accordance with 37 C.F.R. § 42.6(e), the undersigned certifies that on May 26, 2026, a complete and entire copy of the foregoing Patent Owner Champion Power Equipment, Inc.'s 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 Champion Power Equipment, Inc.'s Response, excluding the portions exempted under 37 C.F.R. § 42.24(b), contains 13,868 words according to Microsoft Word's word count feature.

Dated: May 26, 2026

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