

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

CHAMPION POWER EQUIPMENT, INC.,
Patent Owner

Patent No. 11,143,120

Issued: Oct. 12, 2021

Title: FUEL SYSTEM FOR A MULTI-FUEL
INTERNAL COMBUSTION ENGINE

Inter Partes Review No. IPR2025-01121

PETITION FOR *INTER PARTES* REVIEW

U.S. Patent No. 11,143,120

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EXHIBIT LIST

Exhibit No.	Description
1001	U.S Patent No. 11,143,120 to Collie et al. (“the ’120 Patent”)
1002	File History for U.S. Patent No. 11,143,120 (“the ’120 File History”)
1003	Declaration of Dr. Timothy Morse
1004	JPS61283734A (Original) (“Nakafushi”)
1005	Certified Translation of JPS61283734A (“Nakafushi”)
1006	Small Engine Technology, Second Edition, Schuster, William A, (1999) (“Schuster”)
1007	U.S. Patent No. 5,301,644 (“Olmr”)
1008	Reserved
1009	U.S. Patent No 1,931,698 (“Holzapfel”)
1010	U.S. Patent Pub. No. 2011/0100335A1 (“Parlatore”)
1011	U.S. Patent Pub. No. 2014/0239645 (“Jungmann”)
1012	Kubota DF972-E2 Workshop Manual (“Workshop Manual”)
1013	Kubota DF972-E2 Operator’s Manual (“Operator’s Manual”)
1014	Declaration from Mr. James Strepek re Kubota Manuals
1015	Declaration from Mr. Scott Schlabach re Kubota Manuals

Exhibit No.	Description
1016	Auto Fuel Systems. The Goodheart-Willcox Company. James Duffy and Howard Smith. 1987 (“Duffy”)
1017	DuroMax Manual Next Generation Power Systems
1018	Reserved
1019	Oxford Dictionary of Mechanical Engineering, Tony Atkins & Marcel Escudier, 2013
1020	U.S. Patent No. 9,175,601 (“Markoski”)
1021	Reserved
1022	Reserved
1023	JPH1182083A (Original) (“Imamura”)
1024	Certified Translation of JPH1182083A (“Imamura”)
1025	U.S. Patent No. 7,165,536 (“Kirk”)
1026	U.S. Patent No. 1,679,159 (“French”)
1027	U.S. Patent No. 4,065,096 (“Frantz”)
1028	McGraw-Hill Dictionary of Scientific and Technical Terms, Fifth Edition, 1994

CLAIM LISTING

Element	Claim Language
[1.0]	A multi-fuel engine comprising:
[1.1]	an engine operable on a liquid fuel and a gaseous fuel;
[1.2]	a carburetor attached to an intake of the engine to mix air and fuel and connect a liquid fuel source to the intake, the carburetor comprising a float bowl;
[1.3]	a liquid cutoff solenoid coupled to open and close a liquid fuel path to the engine;
[1.4]	a gaseous cutoff solenoid coupled to open and close a gaseous fuel source to the engine;
[1.5]	a switch selectively coupling a power source to the liquid cutoff solenoid and the gaseous cutoff solenoid to open and close the liquid fuel path and the gaseous fuel path; and
[1.6]	one or more timing circuits electrically coupled to the liquid cutoff solenoid and the gaseous cutoff solenoid that operate to control an actuation time of the liquid cutoff solenoid and the gaseous cutoff solenoid.
2	The multi-fuel engine of claim 1 wherein the one or more timing circuits comprise one or more delay circuits configured to institute a predefined delay before actuating the liquid cutoff solenoid and the gaseous fuel cutoff solenoid.
3	The multi-fuel engine of claim 1 wherein the one or more timing circuits comprise one or more rheostats configured to institute a delay before actuating the liquid cutoff solenoid and the gaseous fuel cutoff solenoid.

Element	Claim Language
4	The multi-fuel engine of claim 1 wherein the one or more timing circuits provide a user adjustable preset delay before actuating the liquid cutoff solenoid and the gaseous cutoff solenoid.
5	The multi-fuel engine of claim 1 wherein the one or more timing circuits control the actuation time of the liquid cutoff solenoid and the gaseous cutoff solenoid to provide simultaneous delivery of fuels to the engine for any fraction of a second or for up to several seconds.
6	The multi-fuel engine of claim 1 wherein the switch and the one or more timing circuits control actuation of the liquid cutoff solenoid and the gaseous cutoff solenoid to enable changing engine operation between the liquid fuel and the gaseous fuel, so as to prevent fuel flow from the liquid fuel source and the gaseous fuel source simultaneously and allow switching between fuel sources on-the-fly during engine operation.
7	The multi-fuel engine of claim 1 wherein the liquid cutoff solenoid comprises a first liquid cutoff solenoid coupled to the carburetor to control flow of liquid fuel within the carburetor, and wherein the multi-fuel engine further comprises a second liquid cutoff solenoid positioned on a liquid fuel line coupling the liquid fuel source to the carburetor to open and close the liquid fuel source to the engine.
8	The multi-fuel engine of claim 7 wherein one of the one or more timing circuits is electrically coupled to the second liquid cutoff solenoid to control an actuation time of the second liquid cutoff solenoid, such that the actuation time of the second liquid cutoff solenoid is controlled along with the actuation time of the first liquid cutoff solenoid and the gaseous cutoff solenoid.
9	The multi-fuel engine of claim 1 wherein the engine is a dual fuel engine that operates on gasoline from the liquid fuel source and LPG from the gaseous fuel source.

Element	Claim Language
10	The multi-fuel engine of claim 1 wherein the carburetor connects the gaseous fuel source to the intake.
[11.1]	The multi-fuel engine of claim 1 further comprising: an alternator driven by the engine to form a generator; and
[11.2]	a fuel regulator system located off-board the generator and comprising:
[11.3]	a primary pressure regulator coupled to a service valve of the pressurized fuel source to regulate the fuel supplied from the pressurized fuel source to a reduced pressure, and
[11.4]	a secondary pressure regulator coupled to the primary pressure regulator to regulate the gaseous fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the engine.
[12.0]	A multi-fuel generator and fuel delivery system comprising:
[12.1]	a multi-fuel internal combustion engine configured to operate on a liquid fuel supplied from a liquid fuel source through a liquid fuel line and a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line;
[12.2]	an alternator driven by the multi-fuel internal combustion engine; and
[12.3]	a fuel regulator system comprising:
[12.4]	a primary pressure regulator coupled to a service valve of the pressurized fuel source to regulate fuel supplied from the pressurized fuel source to a reduced pressure, and

Element	Claim Language
[12.5]	a secondary pressure regulator coupled to the primary pressure regulator to regulate fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the engine.
13	The multi-fuel generator and fuel delivery system of claim 12 an electro-mechanical valve system coupled to the engine and operated by an electrical switch powered by one of the alternator, a battery, and a magneto that controls fuel flow to the engine from the liquid fuel source and the pressurized fuel source.
14	The multi-fuel generator and fuel delivery system of claim 13 wherein the electro-mechanical valve system is configured to switch operation of the generator from multiple fuel sources while the generator is running.
15	The multi-fuel generator and fuel delivery system of claim 13 wherein the electro-mechanical valve system is configured to prevent simultaneous delivery of the liquid fuel and the gaseous fuel to the engine.
16	The multi-fuel generator and fuel delivery system of claim 12 wherein the pressurized fuel source comprises a pressurized fuel container located off-board the generator having a regulator mounting device to secure at least the secondary pressure regulator thereto.
17	The multi-fuel generator and fuel delivery system of claim 12 wherein a dual stage pressure regulator comprises the primary pressure regulator and the secondary pressure regulator.
[18.0]	A carburetor for use in a multi-fuel internal combustion engine, the carburetor comprising:
[18.1]	a throat in which fuel and air are mixed in throat to provide an air-fuel mixture for the multi-fuel internal combustion engine;

Element	Claim Language
[18.2]	a valve located in the throat to provide a choke and throttle for the multi-fuel internal combustion engine;
[18.3]	a float bowl to hold liquid fuel;
[18.4]	a main fuel circuit positioned downstream from the float bowl and extending from the float bowl to the throat;
[18.5]	an idle fuel circuit that provides a flow path to the throat downstream of the throttle to run the engine at idle; and
[18.6]	a carburetor cutoff solenoid configured to selectively control fuel flow through the main fuel circuit and the idle fuel circuit.
19	The carburetor of claim 18 wherein the carburetor cutoff solenoid is operatively coupled to a switch that changes operation of the engine from liquid fuel to gaseous fuel and from gaseous fuel to liquid fuel while the engine is running, and wherein the carburetor cutoff solenoid is closed to stop liquid fuel flow through the main fuel circuit and the idle fuel circuit when the switch changes operation of the engine from liquid fuel to gaseous fuel.

Harbor Freight Tools USA, Inc. (“Harbor Freight”), Generac Power Systems, Inc., and MWE Investments, LLC, (“Petitioners”) petition for *Inter Partes* Review (“IPR”) under 35 U.S.C. §§311-319 and 37 C.F.R. §42 of Claims 1-19 (“the Challenged Claims”) of U.S. Patent No. 11,143,120 (“the ’120 Patent”). This Petition establishes a reasonable likelihood that Petitioners will prevail in showing at least one of the Challenged Claims is unpatentable. Petitioners respectfully request that this IPR be instituted, and that the Challenged Claims be canceled as unpatentable.

I. STANDING AND RELIEF REQUESTED

Petitioners certify that the ’120 Patent is available for IPR. Petitioners are not barred or estopped from requesting this review, and request IPR of the Challenged Claims on the grounds set forth below.

Ground	Claim(s) Challenged	35 U.S.C. §	Reference(s)
1	1-2, 4-6, 9-10	102/103	Imamura
2	3	103	Imamura in view of Frank and/or Frantz
3	7-8	103	Imamura in view of Olmr
4	11	103	Imamura in view of Jungmann and Parlatore
5	12-15, 17-19	102	Kubota DF-972 Workshop Manual
6	16	103	Kubota DF-972 Workshop Manual in view of Parlatore

Ground	Claim(s) Challenged	35 U.S.C. §	Reference(s)
7	12-17	103	Nakafushi in view Jungmann and Parlatore
8	18-19	103	Nakafushi in view of Olmr and Kirk

This Petition explains how the claims are unpatentable under the statutory grounds identified, identifying where each element can be found in the cited prior art and how the prior art renders the Challenged Claims unpatentable. The Petition is further supported by the declaration of Dr. Timothy Morse, an expert in the field of dual-fuel engines and fuel delivery systems. Ex. 1003, ¶¶1-14.

II. STATE OF THE ART

A. Carburetors

A carburetor is a device that supplies an air-fuel mixture to a spark-ignition engine. The diagram below shows a carburetor's basic elements.

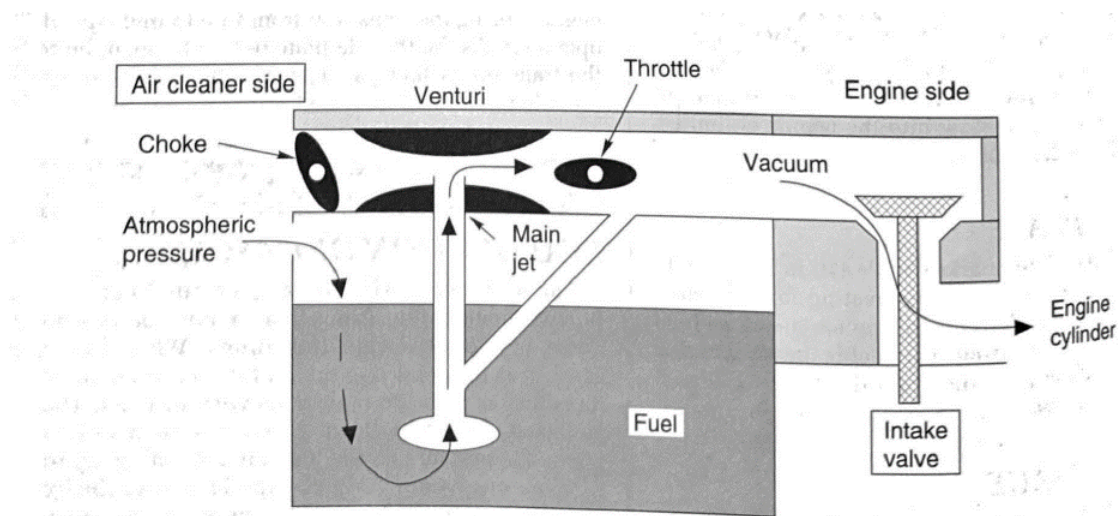


Fig. 4-7 Choke system. (Courtesy of William A. Schuster)

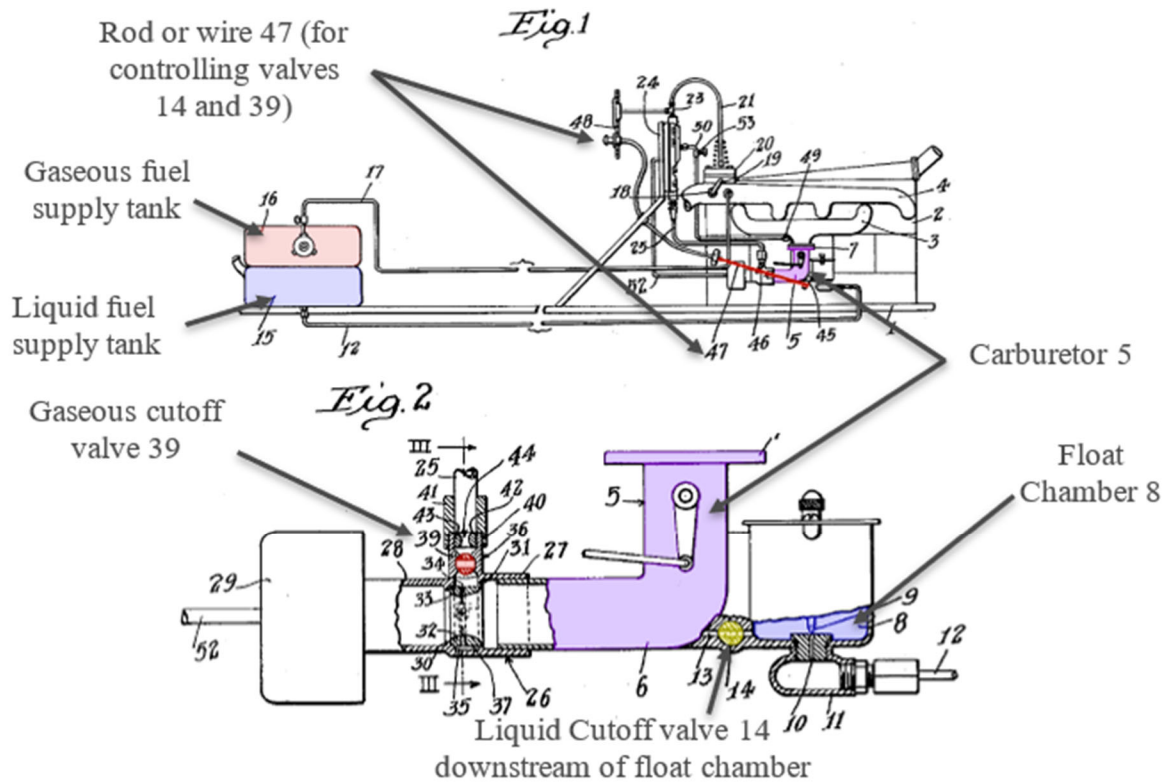
Ex. 1006, 8.

A carburetor contains a Venturi, which is wider at the ends and narrower in the middle. When air flows through the Venturi, the velocity increases and pressure decreases through the narrow portion (the “Venturi effect”), which pulls fuel from the float bowl/chamber through the main jet and mixes it with air. The choke controls air in-flow, while the throttle controls the outflow of the air/fuel mixture to the engine. Ex. 1003, ¶¶34-35.

B. Multi-Fuel Combustion Engines

Dual-fuel engines running alternatively on liquid or gaseous fuels have been known for nearly 100 years. For example, U.S. Patent No. 1,931,698 (“Holzapfel”) was filed in 1931 and discloses “a fuel system embodying the supplying of liquid fuel and gaseous fuel to an engine in alternation at will.” Ex.

1009, 1:1-42. A “rod or wire 47” controls both the liquid and gaseous valves, as seen in Holzapfel’s Figures 1 and 2 below (annotated):



Ex. 1003, ¶¶36-37.

Notably, Holzapfel’s liquid cutoff 14 is located downstream from the carburetor float chamber 8. Ex. 1009, 1:100-107, Fig. 2.

C. Switches and Solenoids

A solenoid valve is a type of electro-mechanical valve. It uses a wire coil to generate a magnetic field when energized, which can be controlled by an electrical switch. The magnetic field moves a piston to open or close the valve. Solenoid valves are widely used in a range of fluid control applications, including the

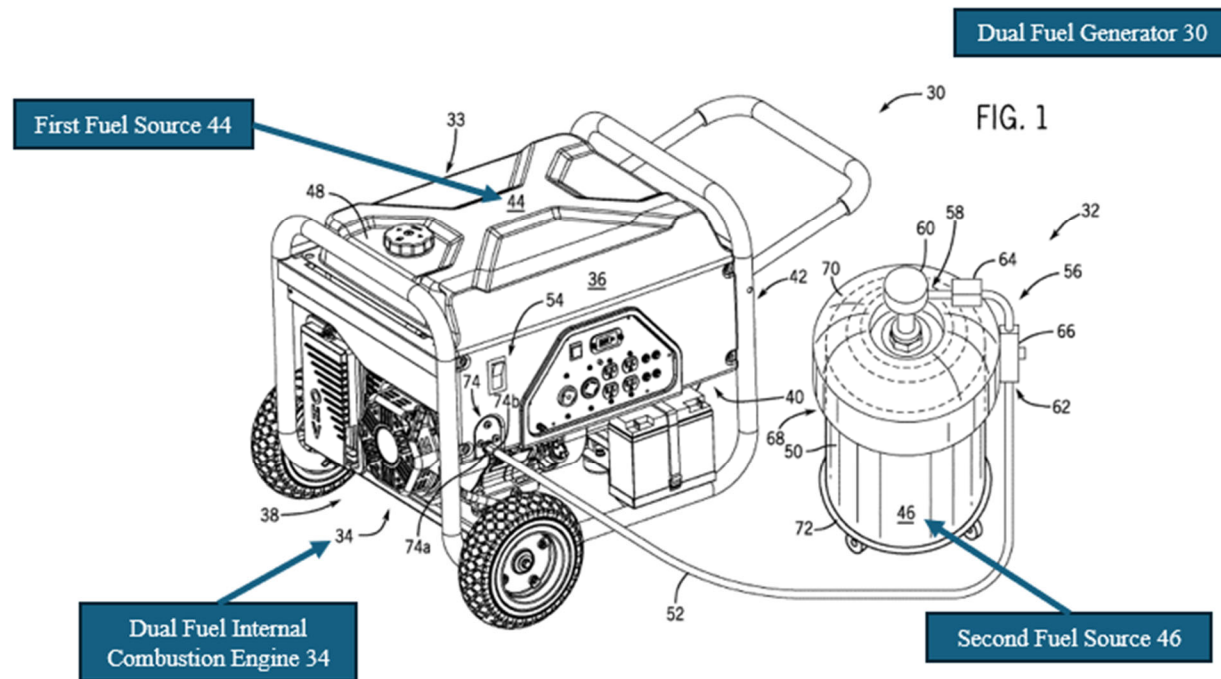
control of fuel flow in an engine. In carbureted engines, solenoid valves are commonly used downstream of the float chamber to control/cut off the flow of fuel and have been known for decades. *See e.g.*, Ex. 1007, Fig. 2, 1:33-48; Ex. 1016, 4-13; Ex. 1003, ¶38.

III. SUMMARY OF THE '120 PATENT

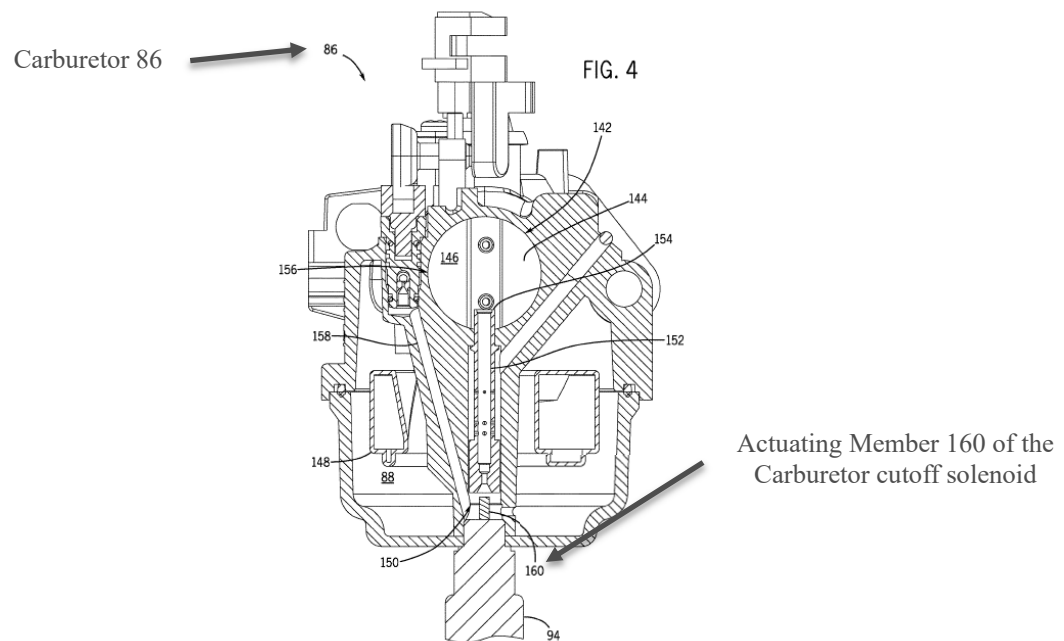
A. The '120 Patent

The '120 Patent discloses multi-fuel internal combustion engines/generators operable on liquid or gaseous fuels. Ex. 1001, 1:21-25. The '120 Patent acknowledges that multi-fuel combustion engines typically run on liquid fuel (such as gasoline) and an alternative gaseous fuel (such as propane). *Id.*, 1:26-43.

Figure 1 of the '120 Patent discloses a perspective view of a generator with such an engine, as shown below:



The '120 Patent states that switching fuel sources in conventional multi-fuel engines can cause overly rich air-fuel ratios and unstable operating conditions when both liquid and gaseous fuels are fed to the engine. *Id.*, 1:61-2:11. The '120 Patent purports to solve this problem by implementing a switch that powers cutoff solenoids for controlling liquid and gaseous fuel flow. *Id.*, 2:19-31. The '120 Patent also locates a gasoline cutoff downstream of the float bowl to prevent excess gasoline from passing to the engine, as depicted in Figure 4:



Id., 11:46-50.

The '120 Patent also discloses the use of delay circuits for any of the solenoids to delay their actuation, such as to “provide simultaneous delivery of fuels to the engine for any fraction of a second or for up to several seconds.” *Id.*, 8:22-33. The '120 Patent discusses how a “slight overlap in fuel delivery to the engine ensure[s] a smooth transition during changeover” from gasoline and LPG and vice versa. *Id.*, 8:6-21.

The '120 Patent further discloses using two pressure regulators in the gaseous fuel line—a primary regulator coupled to the gaseous fuel source, and a downstream regulator to further regulate the pressure of the gaseous fuel as it enters the engine. *Id.*, 4:28-39. The '120 Patent further recognizes that the

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regulator system may be located on the generator or “off-board.” *Id.*, 4:22-25, 4:40-45.

B. Prosecution History

The '120 Patent is part of a family that includes at least 12 U.S. patents and/or pending applications.¹ The '120 Patent issued from U.S. Application No. 16/946,439, which was filed on June 22, 2020, and claims priority to multiple applications, the earliest of which is U.S. Application No. 14/738,060 (“the '060 Application”), which was filed on June 12, 2015.

The claims of the '120 Patent were allowed without rejection. Ex. 1002.

IV. Level of Ordinary Skill in the Art

A person of ordinary skill in the art (hereinafter “POSA”) would “be aware of all the pertinent prior art” at the time of the alleged invention (*Custom Accessories, Inc. v. Jeffrey-Allan Indus.*, 807 F.2d 955, 963 (Fed. Cir. 1986)), including specialized knowledge applicable to various aspects of the claimed invention. *See, e.g., AVX Corp. v. Greatbatch, Ltd.*, IPR2014-00697, Paper 60 at 3 (P.T.A.B. Jan. 11, 2016). A POSA is also a person of ordinary creativity, not an automaton, and thus is able to make inferences from the art. *KSR Int'l Co. v. Teleflex*, 550 U.S. 398, 420-21 (2007).

¹ Family members include U.S. Patent App. Nos. 14/738,060; 14/925,441; 15/285,215; 15/332,264, 16/191,503; 16/358,822, 16/783,455, 16/946,438, 17/937,046; 18/183,734; and 18/443,487.

For purposes of this IPR, a POSA would have a degree in mechanical engineering, physics, materials science, or related fields, and three years of work experience in combustion engines. Ex. 1003, ¶¶30-33. Additional higher graduate education could substitute for work experience, and additional work experience/training could substitute for formal education. *Id.*

V. Claim Construction

The Board construes claims under the standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). 37 C.F.R. §42.100(b). Under this standard, claim terms should be given their plain and ordinary meaning as understood by a person of ordinary skill in the art and the prosecution history. Petitioner has not identified any claim terms that need construction in order to address the issues raised by this petition, but Petitioner reserves the right to respond to any constructions offered by Patent Owner or the Board.

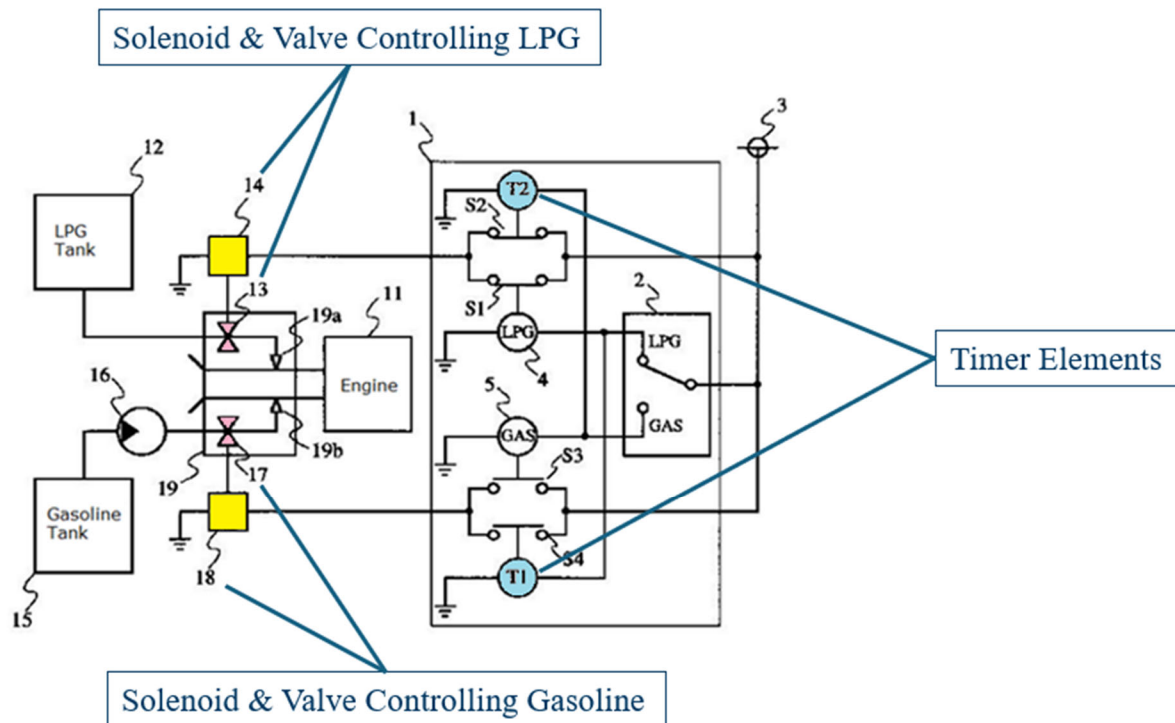
VI. OVERVIEW OF THE ASSERTED PRIOR ART

A. JPH1182083A (“Imamura”)

Imamura (Ex. 1023 (original); Ex. 1024 (certified translation)) was filed on September 12, 1997 and published on March 26, 1999. Imamura is prior art under 35 U.S.C. §102(a).

Imamura discloses a dual-fuel engine that runs on gasoline and LPG. Ex. 1024, ¶[0001], Fig. 1. Imamura discloses solenoids 14 and 18 that control valves 13 (for LPG) and 17 (for gasoline) that open and close to allow gasoline and LPG

to flow to the engine. *Id.*, ¶[0017], Fig. 1. Imamura also discloses timing circuits (timer elements T1 and T2) that delay the closing of the valves 13 and 17 to allow a continuous supply or slight overlap of fuel when switching operation of the engine from gasoline to LPG (and vice versa) to prevent the engine from stopping. *Id.*, ¶¶[0005]-[0007], [0017]-[0023].



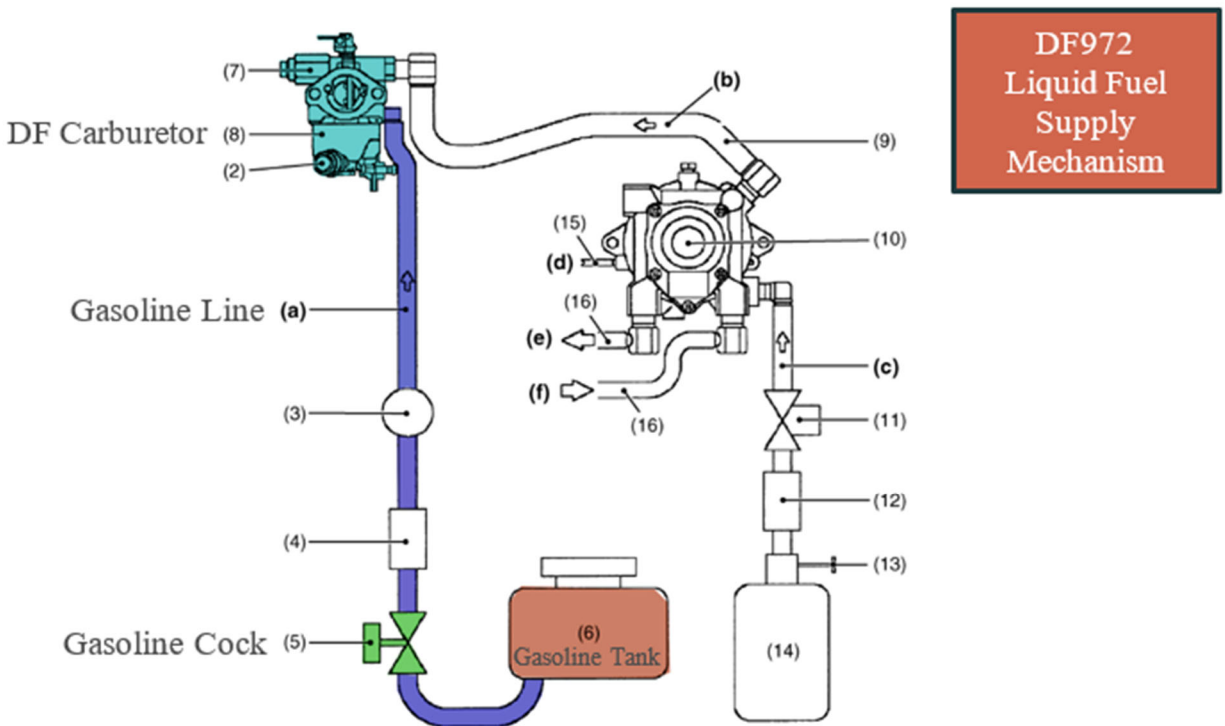
Id., Fig. 1 (annotated).

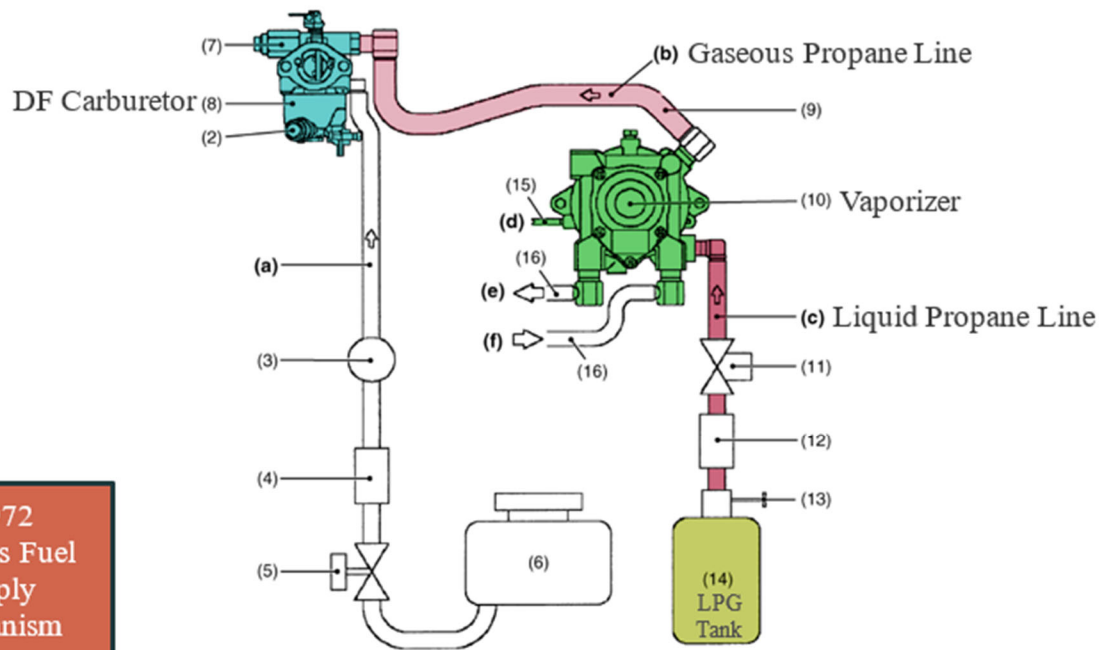
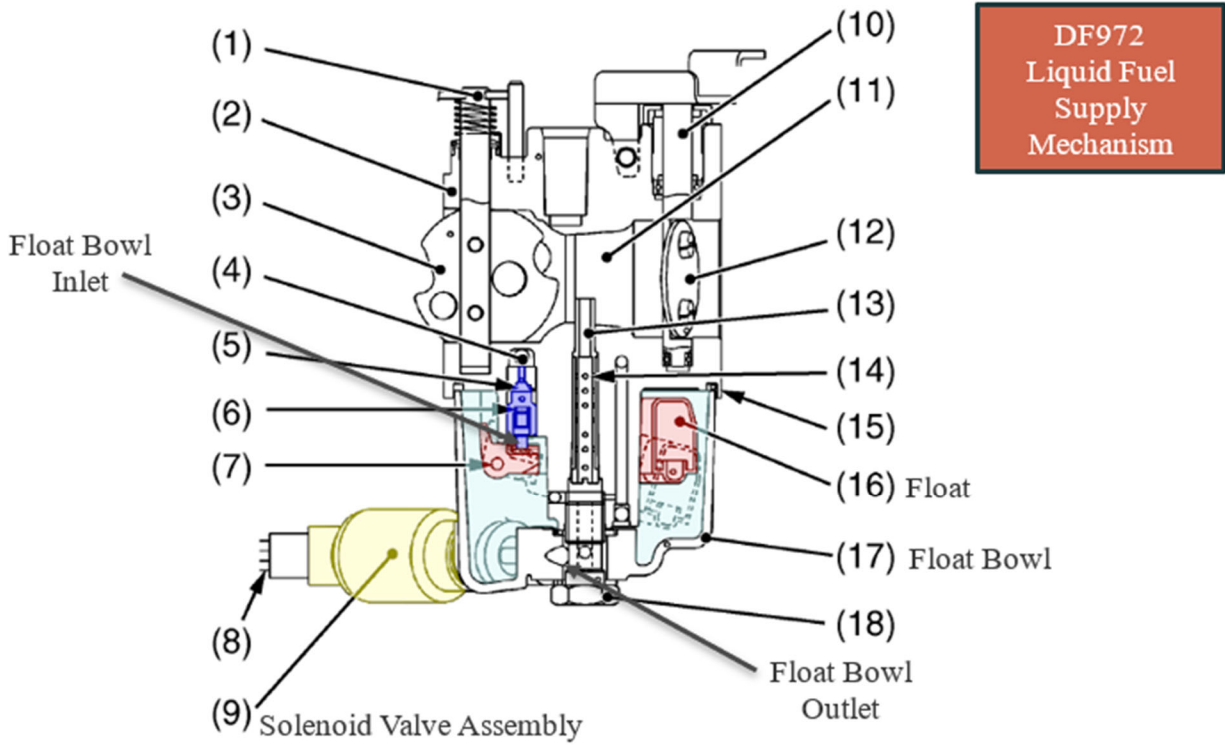
B. Kubota DF972-E2 Workshop Manual (“Workshop Manual”)

The Workshop Manual (Ex. 1012) was published/publicly available at least by June 2009 (Ex. 1014, ¶¶4-10; Ex. 1015, ¶¶4-14), before the earliest priority date (i.e., June 12, 2015). Specifically, the Workshop Manual is a public, non-confidential document that was publicly accessible to purchasers, end-users, and

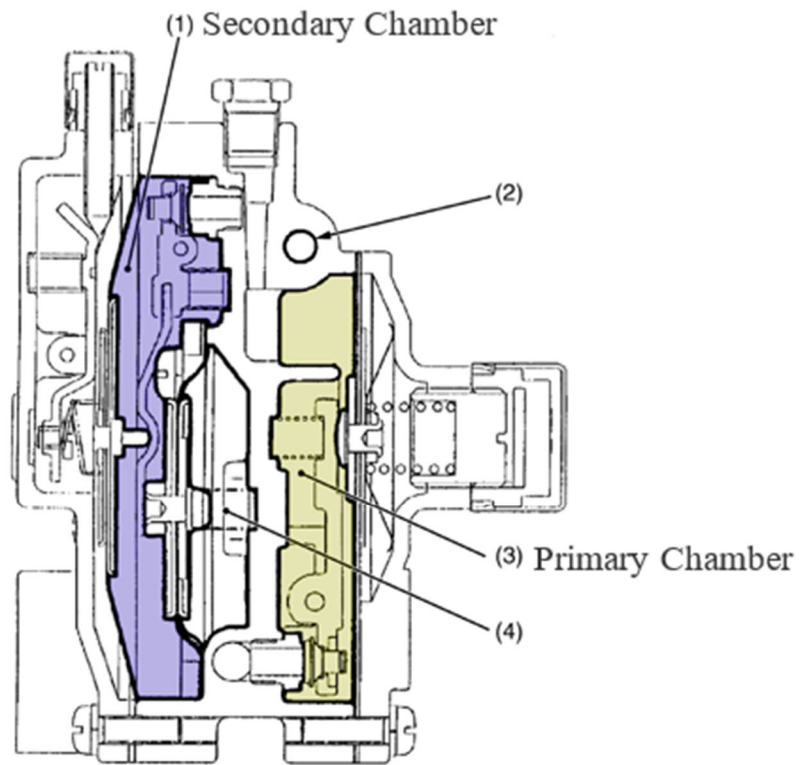
service personnel working on Kubota DF-972 engines, through their exercise of reasonable diligence (e.g., requesting a copy directly from Kubota, obtaining a copy from a Kubota service center, etc.). *Id.* The Workshop Manual was created for dissemination to the interested public to provide instructions about how to safely assemble/disassemble, maintain, and service the DF-972 engine, and is prior art under 35 U.S.C. §102(a). *Weber, Inc. v. Provisur Technologies, Inc.*, 92 F.4th 1059, 1067-69 (Fed. Cir. 2024).

The Workshop Manual describes the Kubota DF972-E2 engine—a dual-fuel engine with an alternator to function as a generator that runs alternatively off of gasoline or LPG. Ex. 1012, 65. The Workshop Manual discloses a carburetor through which gasoline and LPG are selectively routed, as shown below:



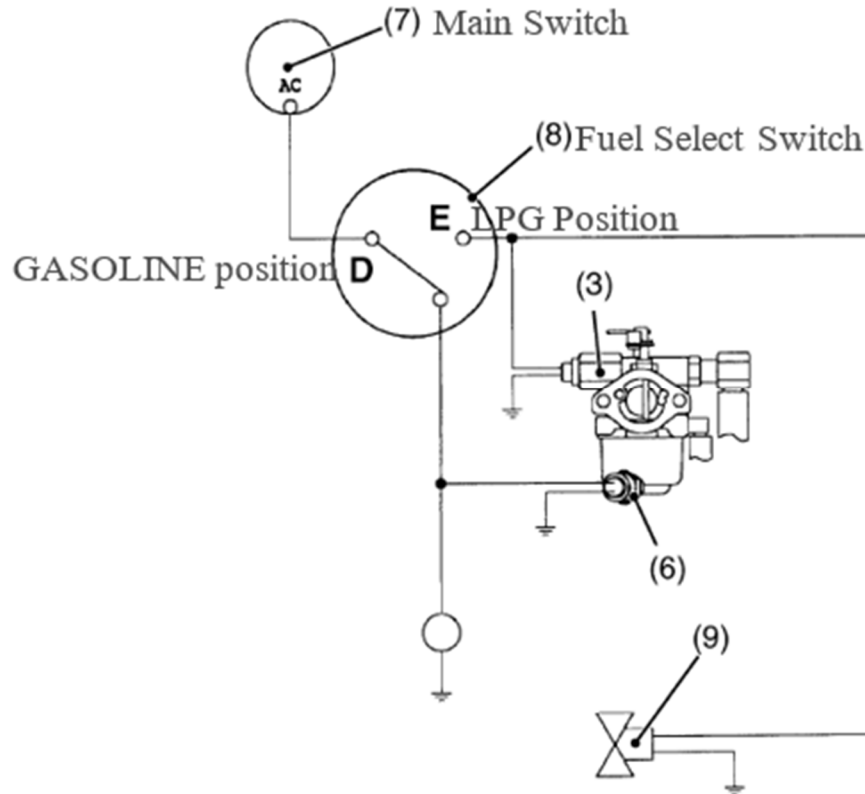


DF972
Gaseous Fuel
Supply
Mechanism



Id., 65, 67, 69 (annotated); Ex. 1003, ¶¶49-54.

The Workshop Manual teaches a fuel select switch that controls whether a gasoline cut off solenoid (located downstream of the float bowl) allows gasoline to pass through the carburetor, or whether an LPG cut off solenoid allows LPG to pass through the carburetor, to power the engine/generator, shown below:



Ex. 1012, 68 (annotated); Ex. 1003, ¶55.

C. Kubota DF972-E2 Operator’s Manual (“Operator’s Manual”)

The Operator’s Manual was published and publicly available at least by the end of 2014 (Ex. 1014, ¶¶4-10; Ex. 1015, ¶¶4-14), before the filing date of the earliest application to which the ’120 Patent claims priority (i.e. June 12, 2015). Specifically, the Workshop Manual was a public, non-confidential document that was publicly accessible to purchasers, end-users, and service personnel working on Kubota DF-972 engines, and which was shipped to the customer with every sold engine. *Id.* The Operator’s Manual was created for dissemination to the interested public to provide instructions about how to operate, maintain, and service the DF-

972 engine, and is thus prior art under 35 U.S.C. §102(a). *Weber*, 92 F.4th at 1067-69.

The Operator's Manual discusses the same Kubota DF972-E2 engine as the Workshop Manual (Ex. 1003, ¶56), and teaches how to operate the DF972 engine. *Id.*

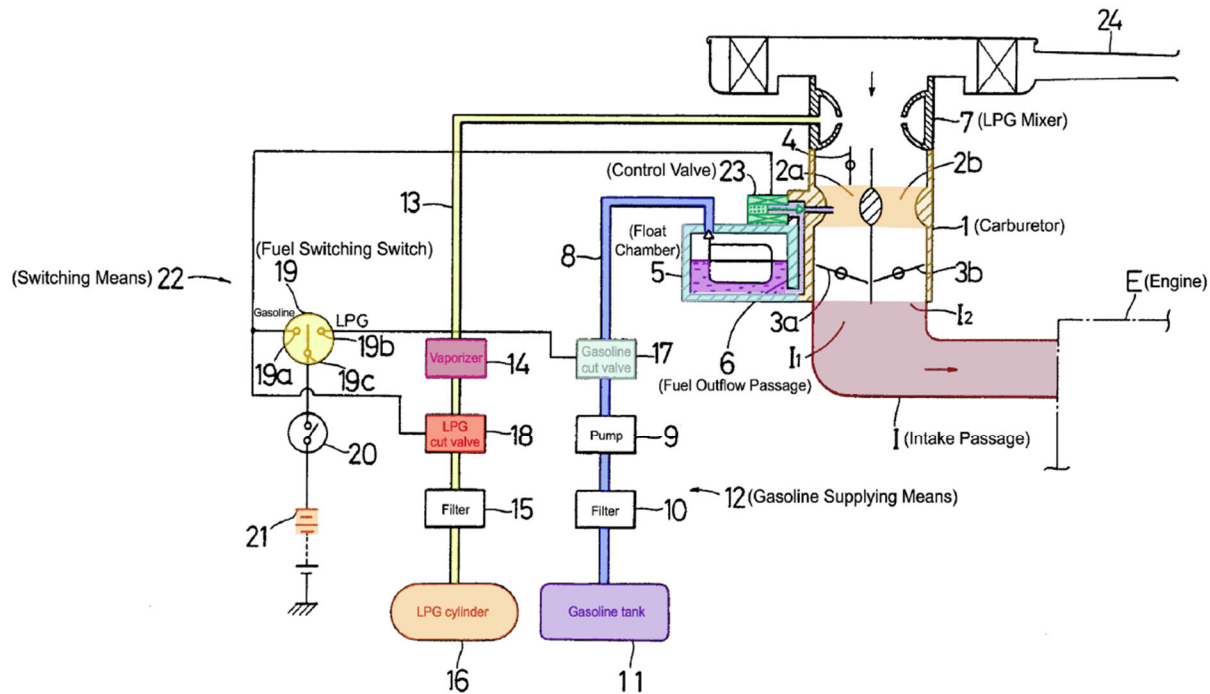
D. JPS61283734A (“Nakafushi”)

Nakafushi (Ex. 1004 (original); Ex. 1005 (certified translation)) was filed on June 7, 1985 and published on December 13, 1986. Nakafushi is prior art under 35 U.S.C. §102(a).

Nakafushi is directed to an engine configured to selectively use gasoline or liquefied petroleum gas (“LPG”) as fuel. Ex. 1005, ¶[0001]. Nakafushi notes that when engine operation is switched from gasoline to LPG, a residual amount of gasoline remains in the float chamber (i.e., float bowl) and gets mixed with the LPG, resulting in over-rich air-to-fuel ratio. *Id.*, ¶¶[0003]-[0004]. Also, because the residual gasoline is drained from the float chamber, when the engine is switched back to gasoline, gasoline delivery is delayed until the level of gasoline in the float chamber recovers. *Id.*, ¶[0004]. During this delay, the air-to-fuel ratio becomes over-lean. *Id.* Nakafushi solves these problems by including a control valve 23 downstream of the float chamber to prevent it from being emptied of gasoline when switching to LPG operation. *Id.*, ¶¶[0006]-[0008], Fig. 1.

Nakafushi discloses a carburetor 1 having venturi portions 2a and 2b and an intake passage I, as seen below:

FIG. 1



Id., ¶[0010], Fig. 1 (annotated); Ex. 1003, ¶¶57-58. Gasoline is stored in tank 11 and pumped to float chamber 5 through gasoline supply passage 8, which is opened and closed by gasoline cut valve 17. Ex. 1005, ¶¶[0012]-[0013]. Gasoline in the float chamber 5 is sucked into the venturi portions 2a and 2b through a fuel outflow passage 6. *Id.*, ¶[0010]. Control valve 23 opens and closes the fuel outflow passage 6, thus controlling gasoline flow from the float chamber 5 to the intake I. *Id.*, ¶[0014].

LPG is stored in cylinder 16, and travels to LPG mixer 7 in the carburetor through LPG supply passage 13, which is opened and closed with LPG cut valve 18. *Id.*, ¶¶[0011]-[0013].

Nakafushi discloses a fuel switching switch 19 that controls which fuel is fed to the engine. *Id.*, ¶¶[0013]-[0014]. When switch 19 is set to the gasoline side contact 19a: (1) LPG cut valve 18 closes to block the LPG supply; (2) gasoline cut valve 17 opens to allow gasoline flow through passage 8 to the carburetor float chamber; and (3) control valve 23 opens to allow gasoline flow from the float chamber to the intake. *Id.*

Conversely, when the switch 19 is set to the LPG side contact 19b: (1) gasoline cut valve 17 and control valve 23 are closed to block the flow of gasoline; and (2) LPG cut valve 18 is opened, allowing LPG to flow through passage 13 to the carburetor mixer 7. *Id.*

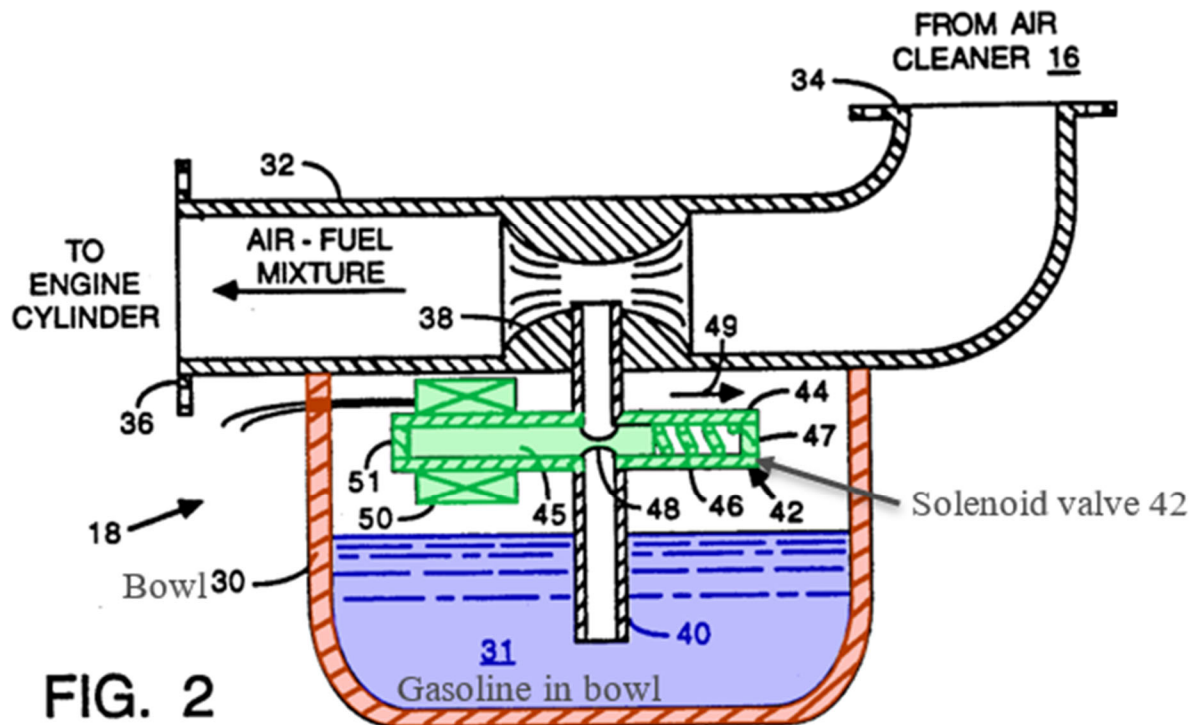
Closing control valve 23, which is downstream of the float chamber, prevents residual gasoline from exiting the float chamber when switching to LPG operation. *Id.*, ¶[0014], Fig. 1. Because gasoline is not drained from the float chamber, that gasoline is more readily available to fuel the engine upon switching back to gasoline operation. *Id.*

Nakafushi thus addresses the alleged “problems” identified by the ’120 Patent, and discloses the same solution claimed in the ’120 Patent some 30 years earlier than the ’120 Patent. Ex. 1003, ¶¶60-63.

E. U.S. Patent No. 5,301,644 (“Olmr”)

Olmr (Ex. 1007) was filed on June 16, 1993, and issued on April 12, 1994. Olmr is prior art under 35 U.S.C. §102(a).

Olmr teaches locating a solenoid valve within the float bowl 30 of the carburetor. Ex. 1007, 1:33-48, 2:30-42, Fig. 2. Specifically, solenoid valve 42 “provide[s] a mechanism for cutting off the supply of fuel to an internal combustion engine when the engine is being stopped,” as seen in Olmr’s Figure 2:



U.S. Patent No. 11,143,120

Id., 1:33-37 (annotated); Ex. 1003, ¶64.

F. U.S. Patent Pub. No. 2011/0100335A1 (“Parlatore”)

Parlatore (Ex. 1010) was filed on November 5, 2009, and published on May 5, 2011. Parlatore is prior art under 35 U.S.C. §102(a).

Parlatore discloses various fuel delivery system embodiments, including one with a propane tank, a first regulator coupled to the tank, and a second regulator connected to the first regulator, all located remote/off-board from the engine/generator, as depicted in Parlatore’s Figures 1 and 3:

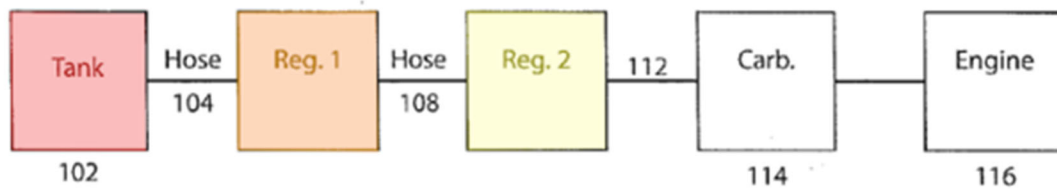


Fig. 1

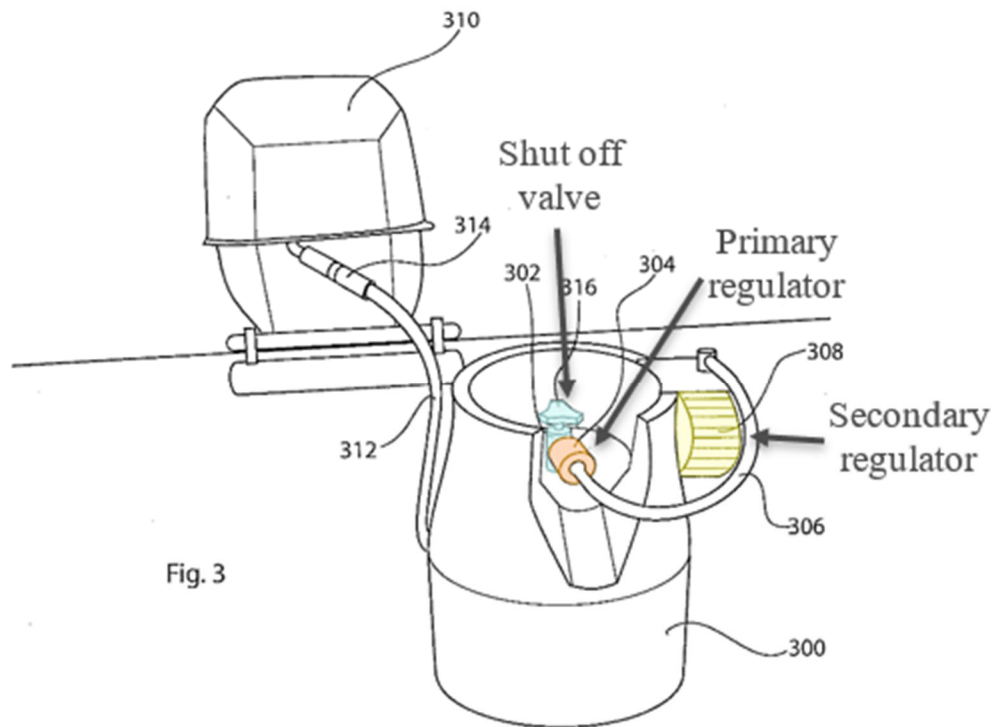


Fig. 3

Id., ¶¶[0005]-[0006], Figs. 1, 3 (annotated). Parlatores thus discloses the use of off-board primary and secondary pressure regulators delivering gaseous fuel to an engine/generator. Ex. 1003, ¶¶65-66.

G. U.S. Patent Pub. No. 2014/0239645 (“Jungmann”)

Jungmann discloses a generator comprising an alternator driven by an internal combustion engine, with the engine operable on gaseous fuels (propane, natural gas) or liquid fuels (gasoline, diesel), shown in Figure 3:

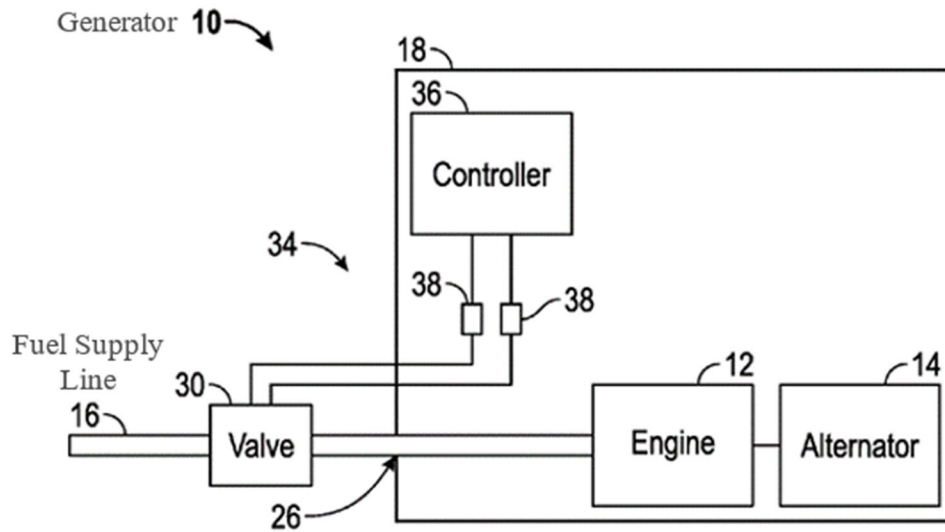


FIG. 3

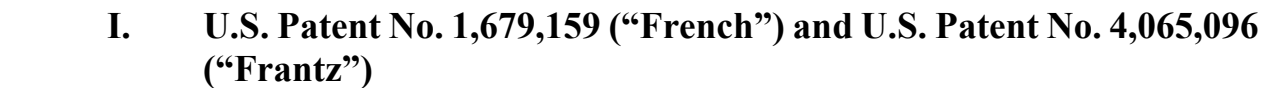
Id. (annotated), Abstract, ¶¶[0002], [0015]. Jungmann thus discloses an engine that uses liquid or gaseous fuels in a generator. Ex. 1003, ¶¶67-68.

H. U.S. Patent No. 7,165,536 (“Kirk”)

Kirk (Ex. 1025) was filed February 22, 2005 and issued January 23, 2007.

Ex. 1025. Kirk is prior art under 35 U.S.C. §102(a).

Kirk discloses an idle fuel circuit that provides a flow path to the throat downstream of the throttle to run the engine at idle. Ex. 1025, 6:36-46, Fig. 2A. Specifically, Kirk discloses an idle fuel circuit 78 that extends from the main fuel nozzle 76 and opens into the throat 46 of the carburetor 42. *Id.* The idle fuel circuit 78 provides a flow path to the throat downstream of the throttle (throttle valve plate 68) “to provide idling fuel to throat 46 of carburetor 42 when throttle valve plate 68 is in a closed position.” *Id.*, 6:42-46; Fig. 2A.



French (Ex. 1026) issued July 31, 1927. Frantz (Ex. 1027) issued December 27, 1977. French and Frantz are prior art under §102(a).

French discloses the use of a rheostat in a timing circuit to control a solenoid valve in an internal combustion engine. Ex. 1026, 1:1-11; 1:99-107, 2:48-49.

Frantz discloses the use of a variable resistor (another name for a rheostat) in a timing circuit to control a solenoid valve in a locomotive. Ex. 1027, 4:31-44; Ex. 1028, 3 (definition of “rheostat” is also known as a “variable resistor”).

VII. THE CHALLENGED CLAIMS ARE UNPATENTABLE

This Petition shows how the cited prior art references, alone or in combination, disclose the limitations of the Challenged Claims, thereby invalidating Claims 1-19 of the '120 Patent. As detailed below, this Petition establishes a reasonable likelihood that Petitioners will prevail with respect to one or more of the Challenged Claims. *See* Ex. 1003, ¶¶70-354.

A. Ground 1: Claims 1-2, 4-6, and 9-10 are anticipated by Imamura or, alternatively, are obvious over Imamura

Claims 1-2, 4-6, and 9-10 of the '120 Patent are anticipated under 35 U.S.C. §102, or, alternatively, are obvious under §103, as detailed below and in the declaration of Dr. Morse (*see* Ex. 1003, ¶¶71-112).

1. Claim 1

a. Element [1.0]

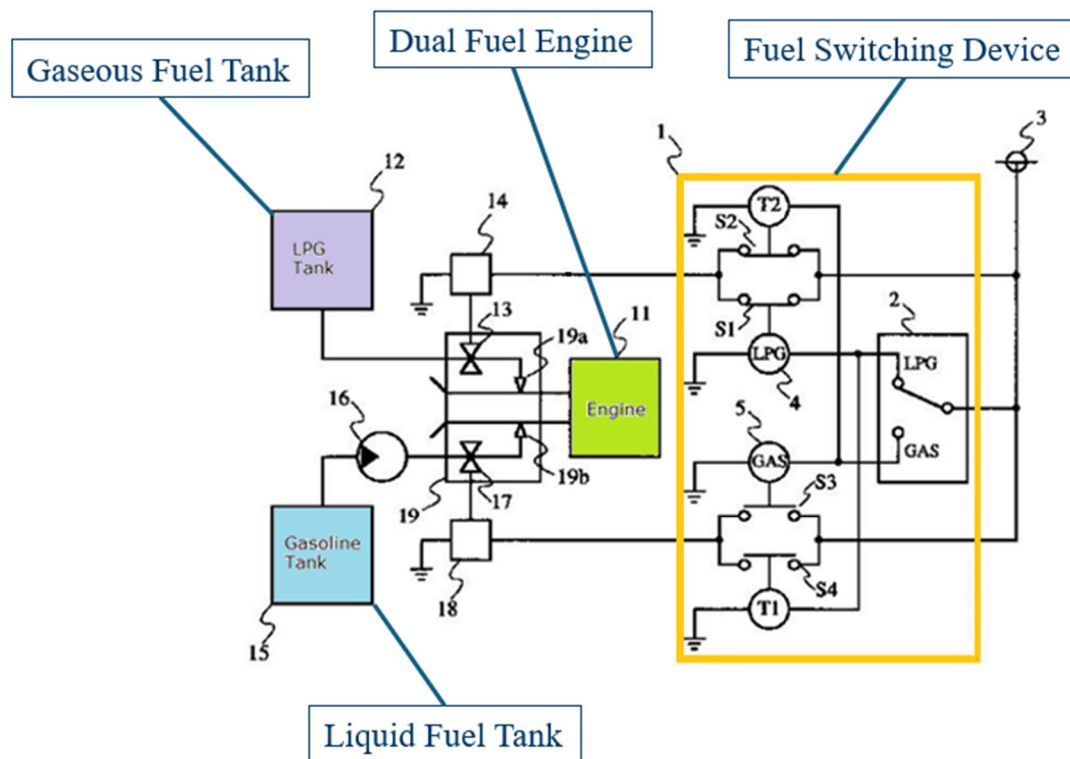
Element [1.0] recites “a multi fuel engine.”

Imamura discloses a dual-fuel engine. Ex. 1024, ¶[0001].

b. Element [1.1]

Element [1.1] recites “an engine operable on a liquid fuel and a gaseous fuel.”

Imamura discloses “a dual-fuel engine that selectively switches between supplying a gaseous fuel such as liquefied petroleum gas (LPG) and a liquid fuel such as gasoline....” Ex. 1024, ¶[0001].

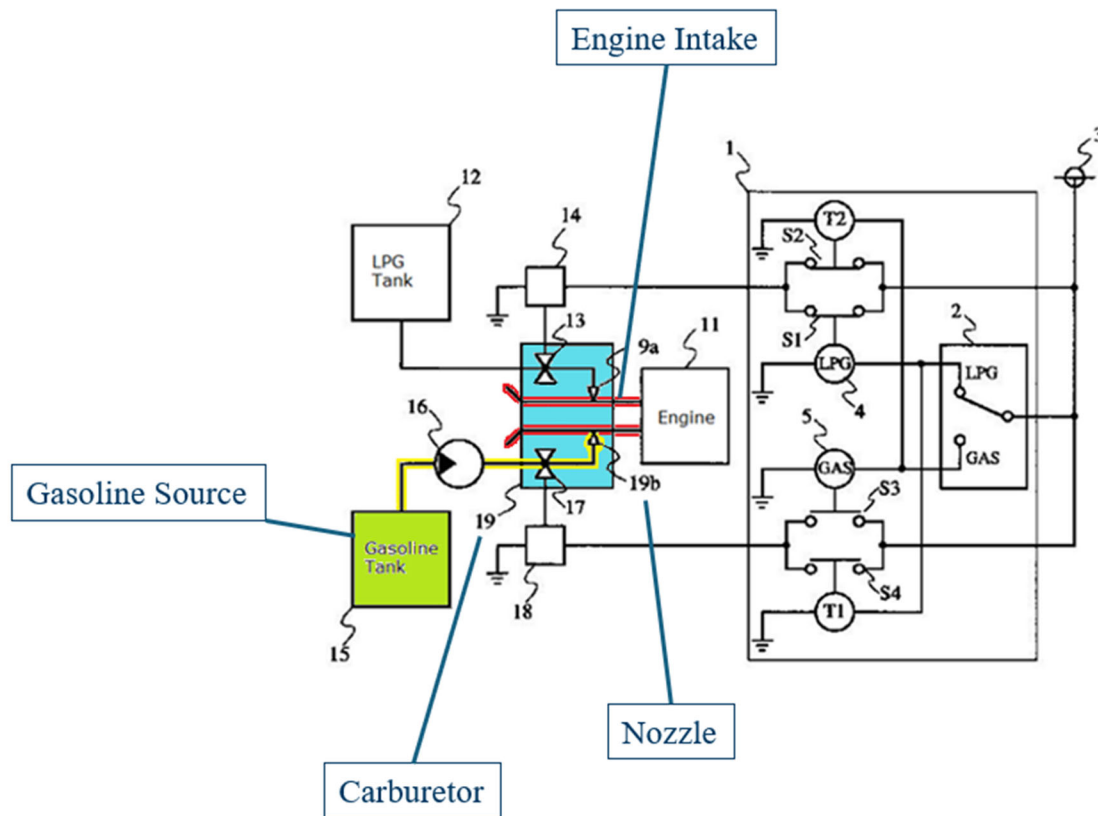


Id., Fig. 1 (annotated).

c. Element [1.2]

Element [1.2] recites “a carburetor attached to an intake of the engine to mix air and fuel and connect a liquid fuel source to the intake, the carburetor comprising a float bowl.”

Imamura discloses a carburetor 19 attached to an intake of the engine 11. Ex. 1024, ¶[0017], Fig. 1; Ex. 1003, ¶78. The carburetor mixes the LPG and gasoline with air and connects the gasoline source (tank 15) to the intake through nozzle 19b. *Id.*, ¶¶[0017], [0024]-[0025], Fig. 1; Ex. 1003, ¶78.

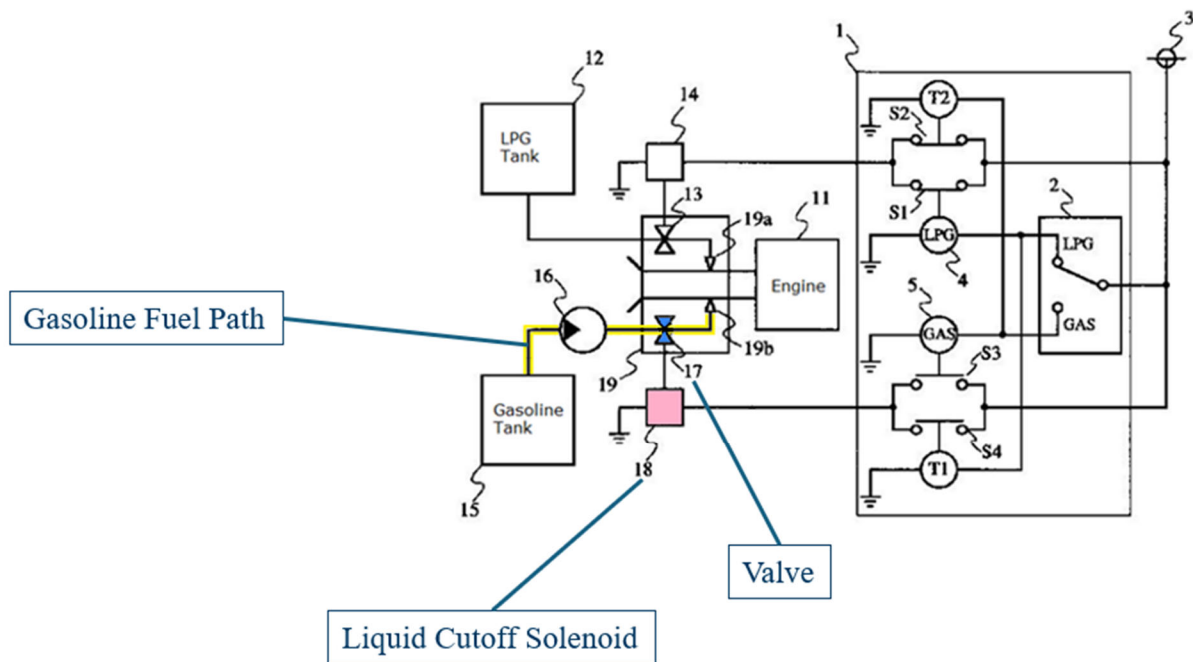


Ex. 1024, Fig. 1 (annotated). The carburetor comprises a float bowl. *Id.*, ¶[0025].

d. Element [1.3]

Element [1.3] recites “a liquid cutoff solenoid coupled to open and close a liquid fuel path to the engine.”

Imamura discloses a liquid cutoff solenoid (solenoid 18) that controls valve 17 to open and close the gasoline fuel path to the engine. Ex. 1024, ¶¶[0017], Fig. 1; Ex. 1003, ¶¶80-81.

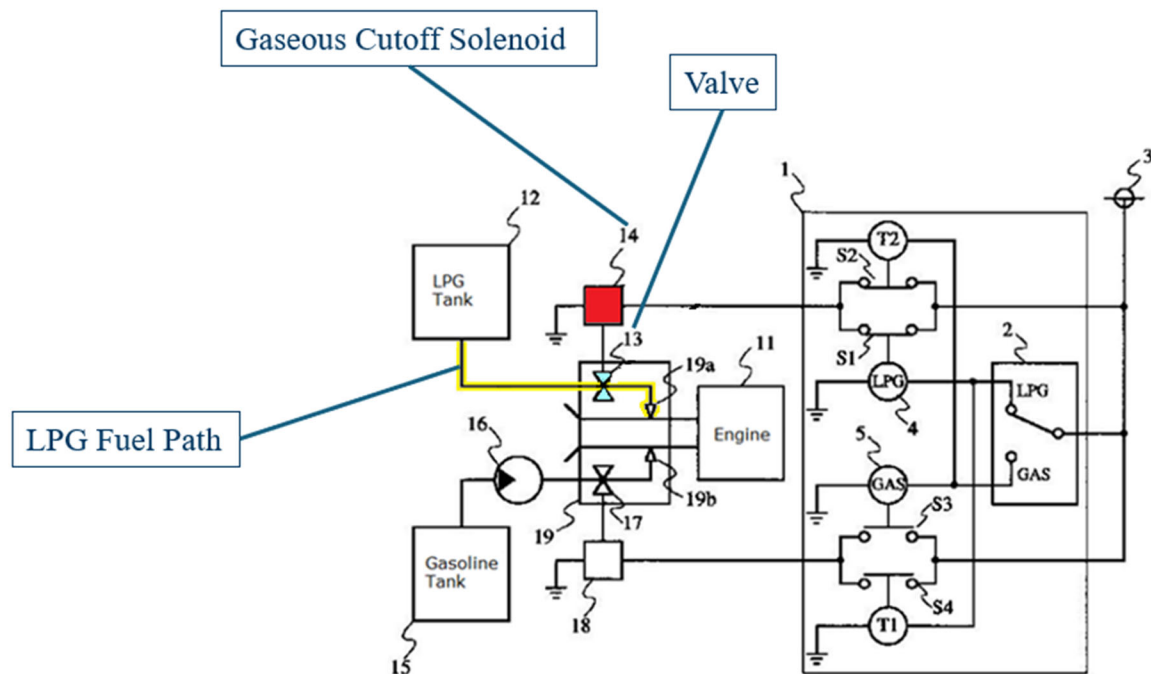


Ex. 1024, Fig. 1 (annotated).

e. Element [1.4]

Element [1.4] recites “a gaseous cutoff solenoid coupled to open and close a gaseous fuel source to the engine.”

Imamura discloses a gaseous cutoff solenoid (solenoid 14) that controls valve 13 to open and close the LPG fuel source to the engine. Ex. 1024, ¶[0017], Fig. 1; Ex. 1003, ¶¶83-84.

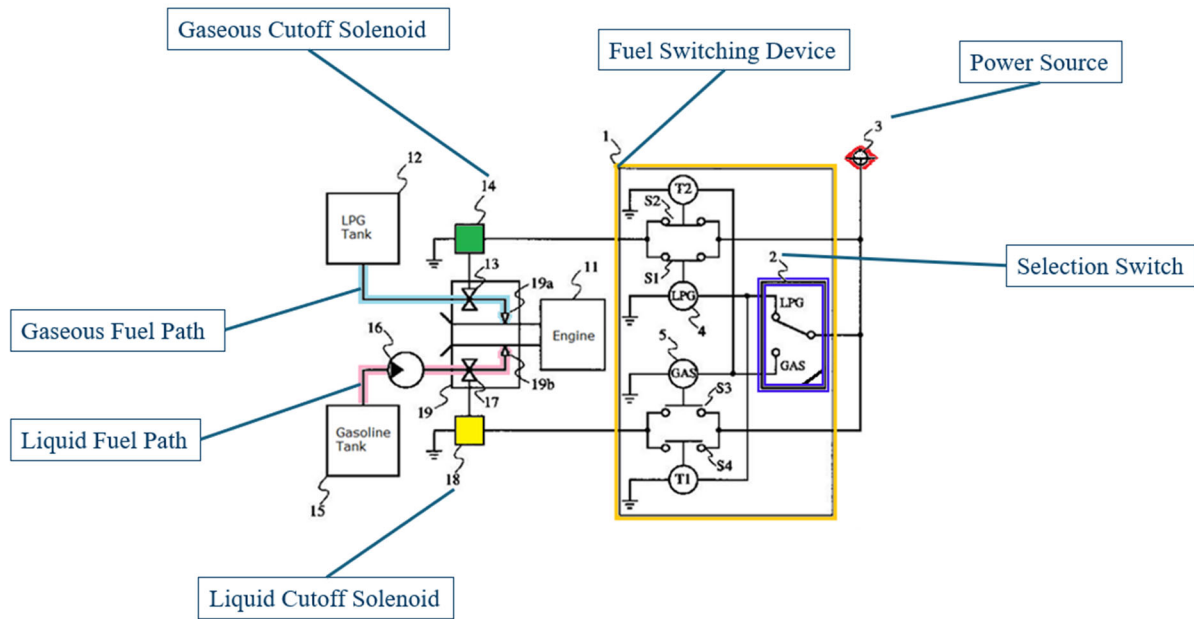


Ex. 1024, Fig. 1 (annotated).

f. Element [1.5]

Element [1.5] recites “a switch selectively coupling a power source to the liquid cutoff solenoid and the gaseous cutoff solenoid to open and close the liquid fuel path and the gaseous fuel path.”

Imamura discloses a fuel switching device 1 with a selection switch 2 coupling a power source 3 to the liquid cutoff solenoid (solenoid 18) and the gaseous cutoff solenoid (solenoid 14) to open and close the gasoline fuel path and the LPG fuel path. *Id.*, ¶¶[0017]-[0023], Fig. 1; Ex. 1003, ¶¶86.



Ex. 1024, Fig. 1 (annotated).

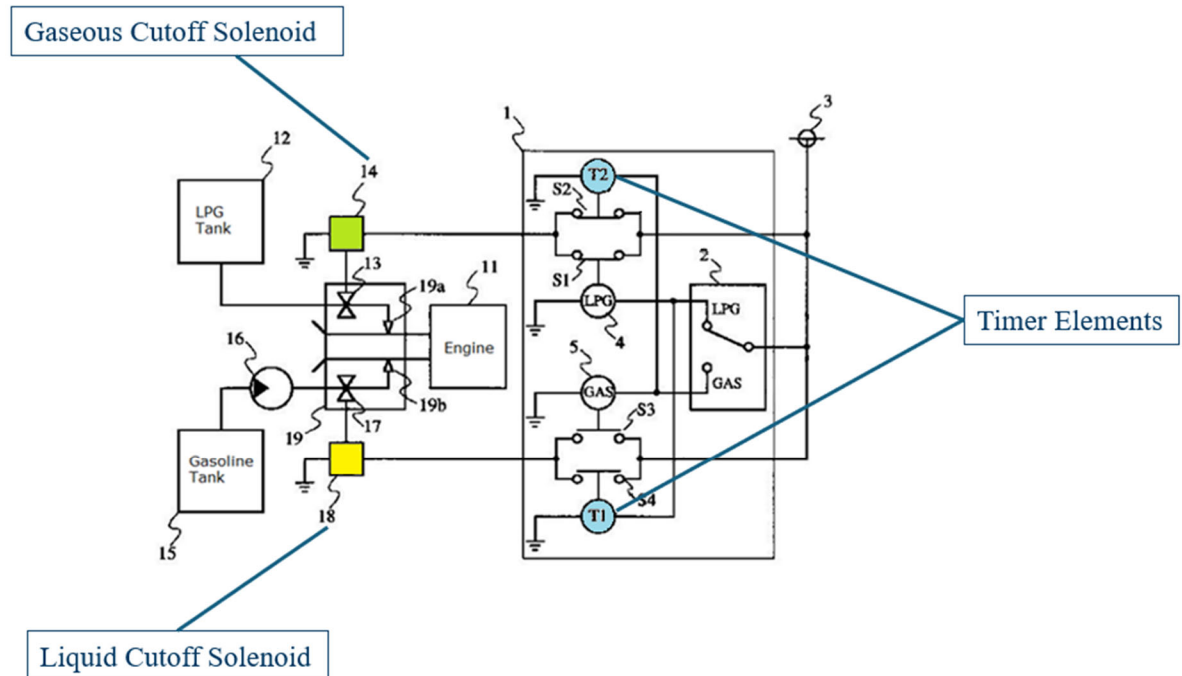
g. Element [1.6]

Element [1.6] recites “one or more timing circuits electrically coupled to the liquid cutoff solenoid and the gaseous cutoff solenoid that operate to control an actuation time of the liquid cutoff solenoid and the gaseous cutoff solenoid.”

Imamura discloses timing circuits (timer elements T1 and T2) to control the actuation time of the liquid cutoff solenoid (solenoid 18) and the gaseous cutoff solenoid (solenoid 14). Ex. 1024, ¶¶[0017]-[0023]; Fig. 1; Ex. 1003, ¶89. Timer element T1 is electrically coupled to the liquid cutoff solenoid (solenoid 18) and timer element T2 is electrically coupled to the gaseous cutoff solenoid (solenoid

14). *Id.* The timer elements operate by delaying the closing of contacts S2 and S4.

*Id.*²



Ex. 1024, Fig. 1 (annotated).

The opening and closing of valve 13 (for LPG) is dictated by contacts S1 and S2. *Id.*, ¶¶[0019]-[0020], Fig. 1; Ex. 1003, ¶91. When *either* contact S1 or S2 is closed, a drive current from the power source 3 flows to the solenoid 14, valve

² Imamura appears to have a mistake in ¶[0018], indicating that timer element T1 delays the opening of contact S2 and timer element T2 delays the opening of contact S4. Ex. 1024, ¶[0018]. Based on Figure 1 and other paragraphs of Imamura (e.g., paragraph [0021]), the reverse is true (T1 delays the opening of S4 and T2 delays the opening of S2). A POSA would recognize ¶[0018] contains typographical errors. Ex. 1003, ¶90.

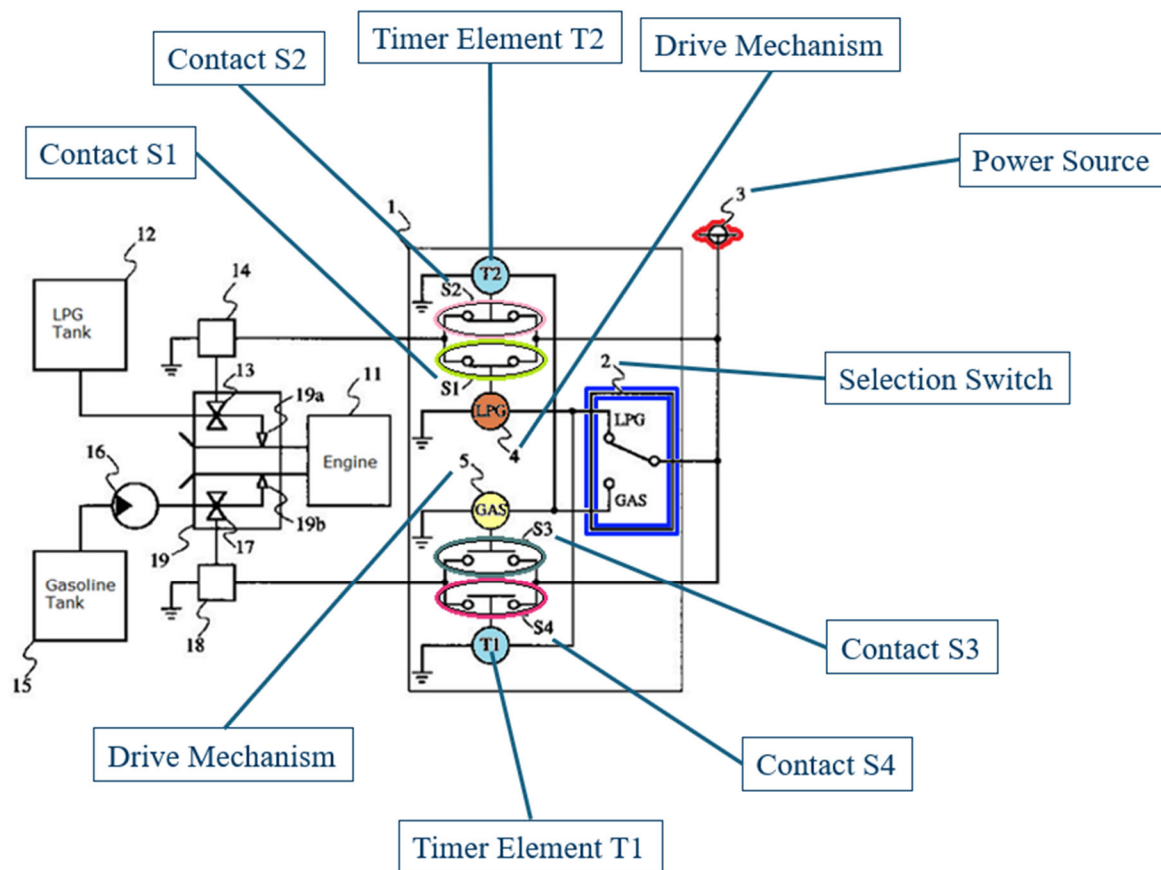
13 is opened, and LPG flows into the carburetor 19. *Id.* When **both** contacts S1 and S2 are opened, the drive current from the power source 3 stops flowing to solenoid 14, valve 13 is closed, and LPG does not flow into the carburetor 19. *Id.*

Similarly, the opening and closing of valve 17 (for gasoline) is dictated by contacts S3 and S4. Ex. 1024, ¶[0020], Fig. 1; Ex. 1003, ¶92. When **either** contact S3 or S4 is closed, a drive current from the power source 3 flows to the solenoid 18, valve 17 is opened, and gasoline flows into the carburetor 19. *Id.* When **both** contacts S3 and S4 are opened, the drive current from the power source 3 stops flowing to solenoid 18, valve 17 is closed, and gasoline does not flow into the carburetor 19. *Id.*

Contacts S1 and S3 are normally open contacts that are open when no current flows through drive mechanisms 4 and 5; contacts S2 and S4 are normally closed contacts that are closed when no current flows through timer elements T1 and T2. Ex. 1024, ¶[0021]; Ex. 1003, ¶93.

When switch 2 is switched to the LPG side, current flows through drive mechanism 4, causing S1 to close, which causes valve 13 to open, and LPG flows into the carburetor 19. Ex. 1024, ¶¶[0019], [0022], Fig. 1; Ex. 1003, ¶94. Current also flows through timer element T1, which causes S4 to open after delay time t1 has elapsed. *Id.* Switching switch 2 to the LPG side also causes current to stop flowing through drive mechanism 5, causing S3 to open. *Id.* Therefore, both S3

and S4 are open after delay time t1, causing valve 17 (for gasoline) to close, stopping the flow of gasoline to the engine. Ex. 1024, ¶¶[0020], [0022]; Ex. 1003, ¶94.



Ex. 1024, Fig. 1 (annotated).

Conversely, when switch 2 is switched to the gasoline side, current flows through drive mechanism 5, causing S3 to close, which causes valve 17 to open, and gasoline flows into the carburetor 19. Ex. 1024, ¶¶[0020], [0023], Fig. 1; Ex. 1003, ¶95. Current also flows through timer element T2, which causes S2 to open after delay time t2 has elapsed. *Id.* In the meantime, current stops flowing through

drive mechanism 4, causing S1 to open. *Id.* Therefore, both S1 and S2 are open after delay time t2, causing valve 13 (for LPG) to close, stopping the flow of LPG to the engine. Ex. 1024, ¶¶[0019], [0023]; Ex. 1003, ¶95.

2. Claim 2

Claim 2 depends from Claim 1, and further recites “wherein the one or more timing circuits comprise one or more delay circuits configured to institute a predefined delay before actuating the liquid cutoff solenoid and the gaseous fuel cutoff solenoid.”

Imamura discloses that the timing circuits (timer elements T1 and T2) comprise delay circuits configured to institute a predefined delay before actuating the liquid cutoff solenoid (solenoid 18) and the gaseous fuel cutoff solenoid (solenoid 14). Ex. 1024, ¶¶[0017]-[0024], Figs. 1-2; Ex. 1003, ¶97; *supra* §VII.A.1.g. In particular, Imamura discloses timer element T1 has a delay time t1 and timer element T2 has a delay time t2. *Id.* When switch 2 is switched to the LPG side, timer element T1 causes a delay time t1 before actuating the gasoline solenoid 18. *Id.* When the switch 2 is switched to the gasoline side, timer element T2 causes a delay time t2 before actuating the LPG solenoid 14. *Id.*

3. Claim 4

Claim 4 depends from Claim 1, and further recites “wherein the one or more timing circuits provide a user adjustable preset delay before actuating the liquid cutoff solenoid and the gaseous cutoff solenoid.”

Imamura discloses the timing circuits provide a user adjustable preset delay before actuating the liquid cutoff solenoid (delay time t1) and the gaseous cutoff solenoid (delay time t2) by explaining:

if the delay times t1 and t2 are set too long, the time during which two types of fuel are supplied from the carburetor 19 to the engine 11 will become long, which will cause the engine 11 to malfunction. For this reason, the delay times t1 and t2 should be set as short as possible within a range that satisfies the above-mentioned conditions.

Ex. 1024, ¶[0026]; Ex. 1003, ¶99.

4. Claim 5

Claim 5 depends from Claim 1, and further recites “wherein the one or more timing circuits control the actuation time of the liquid cutoff solenoid and the gaseous cutoff solenoid to provide simultaneous delivery of fuels to the engine for any fraction of a second or for up to several seconds.”

Imamura discloses that during the delay times t1 and t2, both the LPG valve 14 and the gasoline valve 17 are open. Ex. 1024, ¶[0026]; Ex. 1003, ¶101.

Imamura cautions that if the delay times t_1 and t_2 are too long, the time during which both types of fuel are supplied to the engine will be too long, and will cause the engine to malfunction. *Id.* Imamura therefore teaches that “delay times t_1 and t_2 should be set to be as short as possible....” *Id.*

Therefore, a POSA would understand the delay times should be set to provide simultaneous delivery of fuels for any fraction of a second or for up to several seconds. Ex. 1003, ¶¶101-103. Alternatively, this would have been obvious. *Id.*

The purpose of providing a slight overlap in fuels is to ensure enough fuel during the switchover to keep the engine running. *Id.*, ¶104. If there is a gap when no fuel is provided to the engine, the engine will stall. *Id.* Providing a slight overlap of fuels ensures a continuous supply of fuel to the engine, to prevent the engine from stalling. *Id.* On the other hand, providing an overlap of fuels to the engine for too long will cause an incorrect air-fuel ratio in the engine and will be harmful to the components of the engine, as Imamura discloses. Ex. 1024, ¶[0026]; Ex. 1003, ¶104. Providing an over-rich fuel supply can also cause the engine to stall, causes excess pollution, can cause the engine to run too hot and decreases the fuel efficiency of the engine. Ex. 1003, ¶104. Therefore, a POSA would understand the fuel overlap should be as short as possible, including as short as a few seconds or a fraction of a second. *Id.* The specific duration of overlap would depend on the

size of the carburetor and float bowl, and the flow rate of gasoline in the fuel line. A POSA would have no difficulty determining the appropriate timing for a particular engine through routine optimization. *Id.*

Alternatively, this would have been obvious to a POSA because these were basic principles of engine operation at the time of the invention. *Id.*, ¶105. A POSA would have had a reasonable expectation of success in implementing this timing because timing the opening and closing of valves down to the second (or down to fractions of a second) could be achieved at the time of the invention with off-the-shelf components for analog circuits or microprocessors for digital circuits. *Id.*

5. Claim 6

Claim 6 depends from Claim 1, and further recites “wherein the switch and the one or more timing circuits control actuation of the liquid cutoff solenoid and the gaseous cutoff solenoid to enable changing engine operation between the liquid fuel and the gaseous fuel, so as to prevent fuel flow from the liquid fuel source and the gaseous fuel source simultaneously and allow switching between fuel sources on-the-fly during engine operation.”

Imamura discloses an embodiment to prevent simultaneous gasoline and LPG fuel flow and allow switching between fuel sources on-the-fly during engine operation. Ex. 1024, ¶¶[0027]-[0028]; Ex. 1003, ¶107. In this configuration, when the switch 2 is switched to LPG, “*gasoline is continuously supplied to the*

carburetor 19 during the period from when opening/closing valve 13 is opened *until LPG reaches nozzle 19a*, and the engine 11 does not stall due to an interruption of fuel supplied to the engine 11 during this time.” Ex. 1024, ¶[0027] (emphasis added). On the other hand, when the switch 2 is switched to gasoline, “*LPG is continuously supplied to the carburetor 19* during the time from when the opening/closing valve 17 is opened *until gasoline reaches nozzle 19b*, and the engine 11 does not stall due to the interruption of fuel supplied to the engine 11 during this time.” *Id.*, ¶[0028] (emphasis added). Therefore, Imamura discloses timing the valves to stop the flow of gasoline once LPG reaches the carburetor and vice versa, so as to prevent simultaneous fuel flow from the liquid fuel source and the gaseous fuel source. Ex. 1003, ¶¶107-108.

6. Claim 9

Claim 9 depends from Claim 1, and further recites “wherein the engine is a dual fuel engine that operates on gasoline from the liquid fuel source and LPG from the gaseous fuel source.”

Imamura discloses that the dual-fuel engine operates on gasoline and LPG. Ex. 1024, ¶[0001], Fig. 1.

7. Claim 10

Claim 10 depends from Claim 1, and further recites “wherein the carburetor connects the gaseous fuel source to the intake.”

Imamura discloses that carburetor 19 connects the LPG fuel source (tank 12) to the intake. Ex. 1024, Fig. 1; Ex. 1003, ¶112. The carburetor connects the LPG fuel source to the intake through nozzle 19a. *Id.*, ¶[0024], Fig. 1; Ex. 1003, ¶112.

B. Ground 2: Claim 3 is obvious over Imamura in view of French and/or Frantz

Claim 3 of the '120 Patent is obvious under 35 U.S.C. §103, as detailed below and in the declaration of Dr. Morse (*see* Ex. 1003, ¶¶103-119).

1. Claim 3

Claim 3 depends from Claim 1, and further recites “wherein the one or more timing circuits comprise one or more rheostats configured to institute a delay before actuating the liquid cutoff solenoid and the gaseous fuel cutoff solenoid.”

It would have been obvious to us one or more rheostats in Imamura’s timing circuits T1 and T2. Ex. 1003, ¶¶115-119. French discloses use of a rheostat in a timing circuit to control a solenoid valve in an internal combustion engine. Ex. 1026, 1:1-11; 1:99-107, 2:48-49; Ex. 1003, ¶¶117-118. Similarly, Frantz discloses use of a variable resistor (i.e., a rheostat) in in a timing circuit to control a solenoid valve in a locomotive. Ex. 1027, 4:31-44; Ex. 1028, 3; Ex. 1003, ¶116.

a. Motivation/Expectation of Success

A POSA would have been motivated to use rheostats because they were simple to implement and were commonly used in timing circuits at the time of the invention. Ex. 1003, ¶¶115-119. A POSA would have had a reasonable expectation

of success because rheostats were commonly used in circuits, like the circuits disclosed in Imamura, at the time of the invention. *Id.*

C. Ground 3: Claims 7-8 are obvious over Imamura in view of Olmr

Claims 7-8 of the '120 Patent are obvious under 35 U.S.C. §103, as detailed below and in the declaration of Dr. Morse (*see* Ex. 1003, ¶¶120-133).

1. Claim 7

Claim 7 depends from Claim 1, and further recites “wherein the liquid cutoff solenoid comprises a first liquid cutoff solenoid coupled to the carburetor to control flow of liquid fuel within the carburetor, and wherein the multi-fuel engine further comprises a second liquid cutoff solenoid positioned on a liquid fuel line coupling the liquid fuel source to the carburetor to open and close the liquid fuel source to the engine.”

Imamura discloses a liquid cutoff solenoid (solenoid 18) positioned on a liquid fuel line coupling the liquid fuel source (gasoline tank 15) to the carburetor to open and close the liquid fuel source to the engine. Ex. 1024, ¶[0017], Fig. 1; Ex. 1003, ¶122. Therefore, Imamura’s solenoid 18 is a second liquid cutoff solenoid for purposes of Claim 7. *Id.*

It would have been obvious to a POSA to also include a first liquid cutoff solenoid in Imamura’s engine coupled to the carburetor to control flow of gasoline within the carburetor. Ex. 1003, ¶123.

Olmr discloses a first liquid cutoff solenoid (solenoid valve 42) coupled to a carburetor 18 in a bowl 30. Ex. 1007, 2:30-42, Fig. 2; Ex. 1003, ¶124. The solenoid valve 42 controls the flow of gasoline within the carburetor 18 by preventing the flow of gasoline from the bowl 30 to the engine when the engine is stopped. *Id.*, 1:33-48, Fig. 2; Ex. 1003, ¶124.

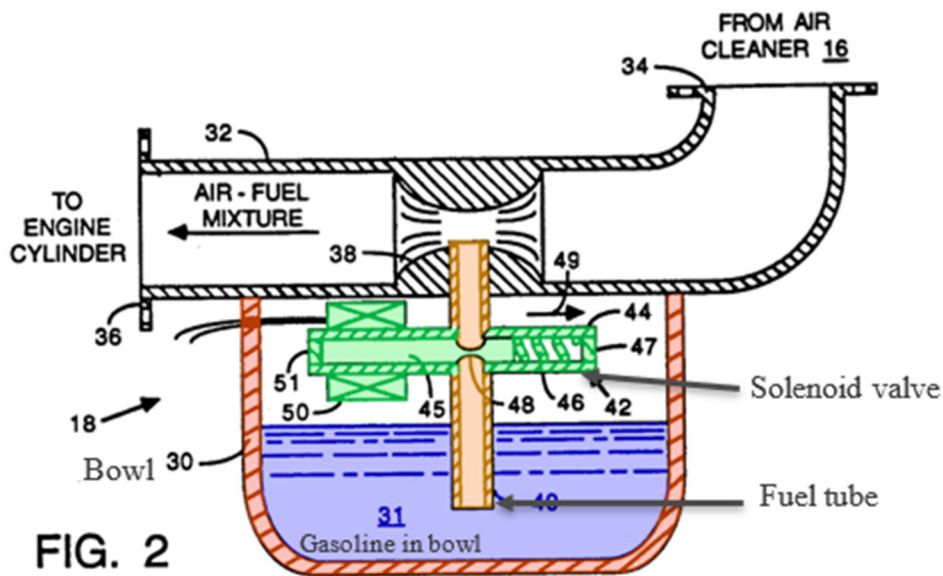


Fig. 2 (annotated). Olmr's solenoid valve 42 would be a first liquid cutoff solenoid with the elements of Claim 7 when included in Imamura's float bowl. Ex. 1003, ¶¶124-127.

a. Motivation/Expectation of Success

A POSA would have been motivated to include the solenoid valve 42 of Olmr in the float bowl of Imamura for the same reasons explained by Olmr: to prevent gasoline in the float bowl from entering the engine while the engine is

being stopped, which can cause backfires and damage to the muffler. Ex. 1007, 1:18-48; Ex. 1003, ¶128. Indeed, Imamura recognized that liquid fuel in the float chamber “is sucked out by negative pressure” in the engine, downstream of the liquid fuel valve 17. Ex. 1024, ¶[0005]; Ex. 1003, ¶128. Not only can this cause backfires and damage to components of the engine, burning gasoline when not needed causes excess pollution. Ex. 1003, ¶128.

A POSA would have had a reasonable expectation of success in incorporating the solenoid valve 42 of Olmr into the float bowl of Imamura because it would have merely involved incorporating another solenoid valve in the system, which is a basic engineering concept and had already been done by Olmr, as well as others (such as the DF-972 engine discussed in the Workshop Manual and Nakafushi). Ex. 1003, ¶129.

2. Claim 8

Claim 8 depends from Claim 7 and further recites “wherein one of the one or more timing circuits is electrically coupled to the second liquid cutoff solenoid to control an actuation time of the second liquid cutoff solenoid, such that the actuation time of the second liquid cutoff solenoid is controlled along with the actuation time of the first liquid cutoff solenoid and the gaseous cutoff solenoid.”

Imamura discloses timing circuits electrically coupled to the second liquid cutoff solenoid (Imamura’s solenoid 18) and the gaseous cutoff solenoid

(Imamura's solenoid 14). *Supra* §VII.A.1.g. It would have been obvious to include Olmr's solenoid valve 42 in Imamura's float bowl to serve as the first liquid solenoid. *Supra* §VII.C.1. It would have been obvious to electrically couple a timing circuit to Olmr's solenoid valve 42 when incorporated into Imamura's float bowl, similar to the timing circuits T1 and T2 coupled to Imamura's solenoids 18 and 14. Ex. 1003, ¶131.

a. Motivation/Expectation of Success

A POSA would have been motivated to couple a timing circuit to a solenoid valve in Imamura's float bowl to achieve the same objects of Imamura's invention, i.e., to provide a continuous fuel supply with up to a slight overlap in fuel when changing operation from gasoline to LPG and vice versa. Ex. 1003, ¶132. For example, it would not make sense to delay the closing of gasoline valve 17 and not a solenoid valve downstream in the float bowl because the closed solenoid valve in the float bowl would prevent the gasoline from reaching the engine during the delay time. *Id.*

A POSA would have had a reasonable expectation of success because using a timing circuit to control a solenoid valve in the float bowl would be no different than Imamura's disclosure of using the timing circuit T1 to control solenoid 18. Ex. 1003, ¶133.

D. Ground 4: Claim 11 is obvious over Imamura in view of Jungmann and Parlatore

Claim 11 of the '120 Patent is obvious under 35 U.S.C. §103, as detailed below and in the declaration of Dr. Morse (*see* Ex. 1003, ¶¶134-165).

1. Claim 11

Claim 11 depends from Claim 1, and recites additional elements.

a. Element [11.1]

Element [11.1] recites “an alternator driven by the engine to form a generator.”

Imamura discloses a dual fuel engine. Ex. 1024, ¶[0001].

Jungmann discloses an alternator driven by an internal combustion engine to form a generator:

One embodiment of the invention relates to a generator including an enclosure, an internal combustion engine provided within the enclosure, ***an alternator provided within the enclosure and driven by the internal combustion engine***, [and] a fuel supply line for providing fuel to the internal combustion engine....

Ex. 1011, ¶[0002] (emphasis added).

Indeed, alternators were common components in generators. Ex. 1003, ¶248. A POSA would have found it obvious to combine the alternator from Jungmann with the dual-fuel engine in Imamura to create a generator. Ex. 1003, ¶138.

i. Motivation/Expectation of Success

A POSA would have been motivated to use Imamura's engine in a generator to provide the user with the option of alternatively using gasoline or LPG to generate electricity. *Id.* Jungmann discloses the use of various types of fuels for an engine used in a generator, including propane (LPG) and gasoline. Ex. 1011, ¶[0015]. Jungmann thus demonstrates that using such engines in a generator was well-known. Ex. 1003, ¶140; *see also* Ex. 1017.

Multi-fuel engines such as Imamura's were recognized as especially useful for generators because, for example, in certain power outages (such as major storms), the user may not have access to gasoline if the gasoline stations are out of service. Ex. 1003, ¶141. Alternatively, the user may not have LPG on hand, but may have gasoline on hand for other uses, making it a readily available fuel source. *Id.* Enabling the option of using gasoline or LPG makes the generator more versatile. *Id.* Purposing Imamura's engine for use in/as a generator would have involved nothing more than a simple substitution, whereby Imamura's engine is used in place of Jungmann's engine. *Id.*

A POSA would have reasonably expected success in using Imamura's multi-fuel engine in a generator given that this implementation was already demonstrated by Jungmann. *Id.*, ¶142. Moreover, Imamura's engine could be used in a generator simply by adding an alternator to the engine, as was already common and well

known by that time (for example, alternators were (and still are) commonly combined with car engines to generate electricity, and generators driven by multi-fuel engines were already commonly available). *Id.*; *see also* Ex. 1017.

To the extent Imamura does not disclose this element, a POSA would have found it obvious to use Imamura's engine in a generator. Ex. 1003, ¶143.

Alternators were common components in generators to convert the mechanical energy from the engine into electrical energy for output. *Id.*

b. Element [11.2]

Element [11.2] recites “a fuel regulator system located off-board the generator.” According to the '120 Patent, the “fuel regulator system”:

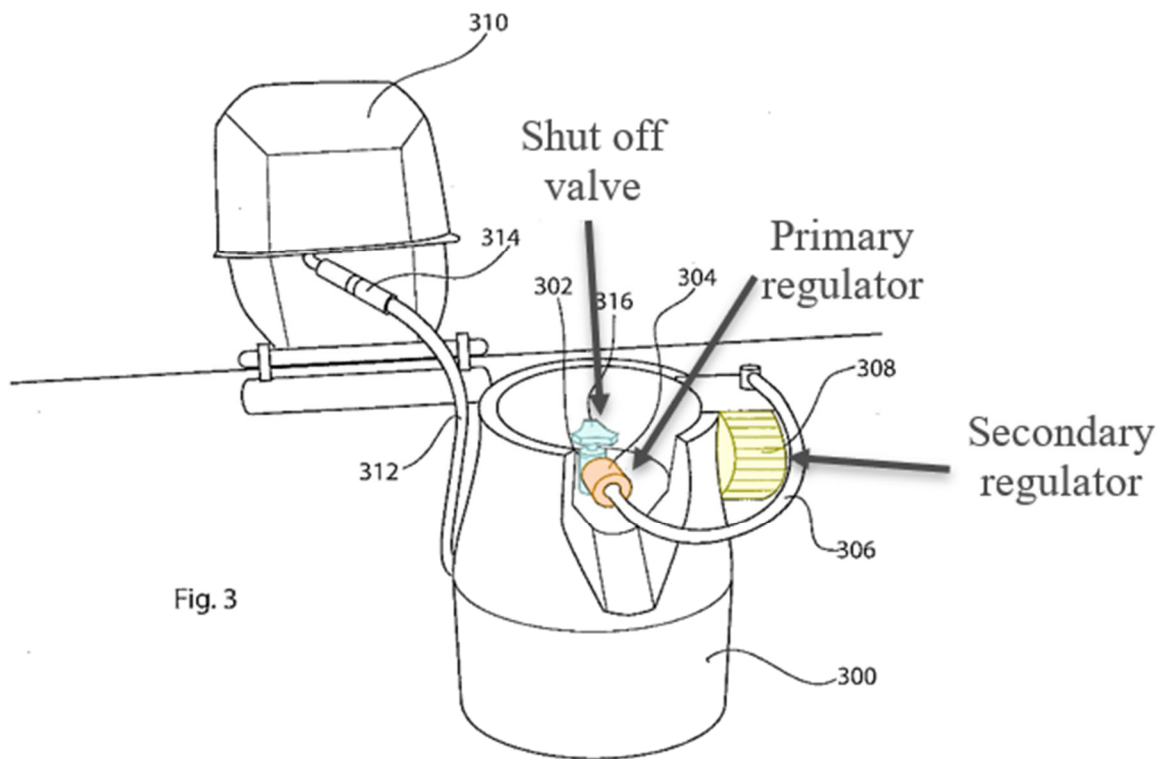
includes one or more pressure regulators that reduce and control the pressure of the fuel from pressurized fuel container 50 and delivers fuel at a desired pressure for operation of the engine.

Ex. 1001, 3:66-4:3.

Jungmann discloses a fuel regulator system, comprising pressure regulator 28. Ex. 1011, ¶[0017]. A POSA would have understood Jungmann's pressure regulator 28 to constitute the claimed “fuel regulator system” because it reduces pressure and controls the fuel flow from the pressurized fuel container, delivering it to the engine at the pressure desired for operation. *Id.*; Ex. 1003, ¶145.

A POSA would have found it obvious to use an off-board regulator system for a generator (like Jungmann) with Imamura's engine, as explained below.

Parlatore discloses an off-board fuel regulator system located off-board. Specifically, Parlatore's fuel-regulator system comprises primary and secondary pressure regulators 304 and 308 positioned adjacent to the LPG tank, located "off-board" the engine. Ex. 1010, ¶¶[0020]-[0022], Fig. 3; Ex. 1003, ¶147.



Ex. 1010, Fig. 3 (annotated).

i. Motivation/Expectation of Success

One reason to locate the fuel delivery regulators off-board from the generator and near or at the LPG tank is so that the fuel line leading to the engine

will already be at the relatively lower pressure set by the output of the secondary regulator. Ex. 1003, ¶¶148-152. This enhances safety in case this fuel line is punctured or damaged in some way, since the fuel in this line will be at a lower pressure. *Id.*

In addition, connecting a separate gaseous fuel source (e.g., a propane tank) to a dual-fuel generator using a hose offers additional flexibility and convenience, including that an off-board propane tank can be larger compared to an onboard tank if desired, providing larger fuel capacity. *Id.*, ¶153.

Another benefit is that a remote, detachable propane tank can be stored safely away from the generator and swapped out easily. This modular approach means users can keep multiple tanks and simply rotate as needed, rather than needing to re-fill an onboard tank that is more likely to be connected or strapped onto the generator/end-use device. *Id.*, ¶154.

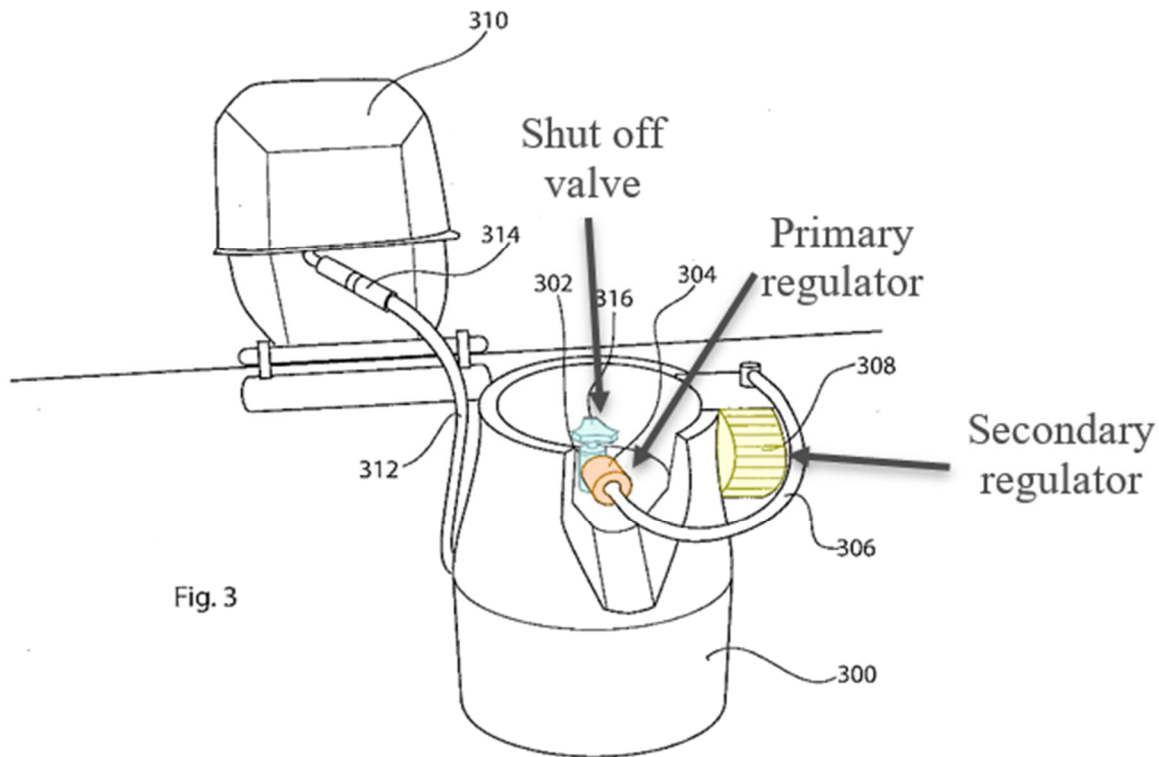
It would have been obvious to a POSA to use the off-board fuel regulator system disclosed in Parlato because Parlato discloses the use a regulator system with “any desired form of engine” and specifically suggests the use of its regulator system with generators. Ex. 1010, ¶¶[0019] & [0025]; *see also id.*, ¶[0024] (suggesting off-board configuration “where more fuel may be desired”); Ex. 1003, ¶155.

Parlatore shows that a POSA would have had a reasonable expectation of success using an off-board fuel regulator system. Ex. 1010, ¶¶[0019]-[0022], Fig. 3; Ex. 1003, ¶156.

c. Element [11.3]

Element [11.3] recites “a primary pressure regulator coupled to a service valve of the pressurized fuel source to regulate the fuel supplied from the pressurized fuel source to a reduced pressure.”

Parlatore discloses a primary regulator 304 coupled to service valve 316 of the pressurized propane tank 300. Ex. 1010, ¶¶[0020]-[0023], Fig. 3; Ex. 1003, ¶158. Regulator 304 regulates the propane to a reduced pressure. *Id.*, ¶[0016]; *see also* ¶[0020] (referring to the “primary regulator 304, as described previously [as primary regulator 106]”). Parlatore’s Figure 3 shows an exemplary embodiment:



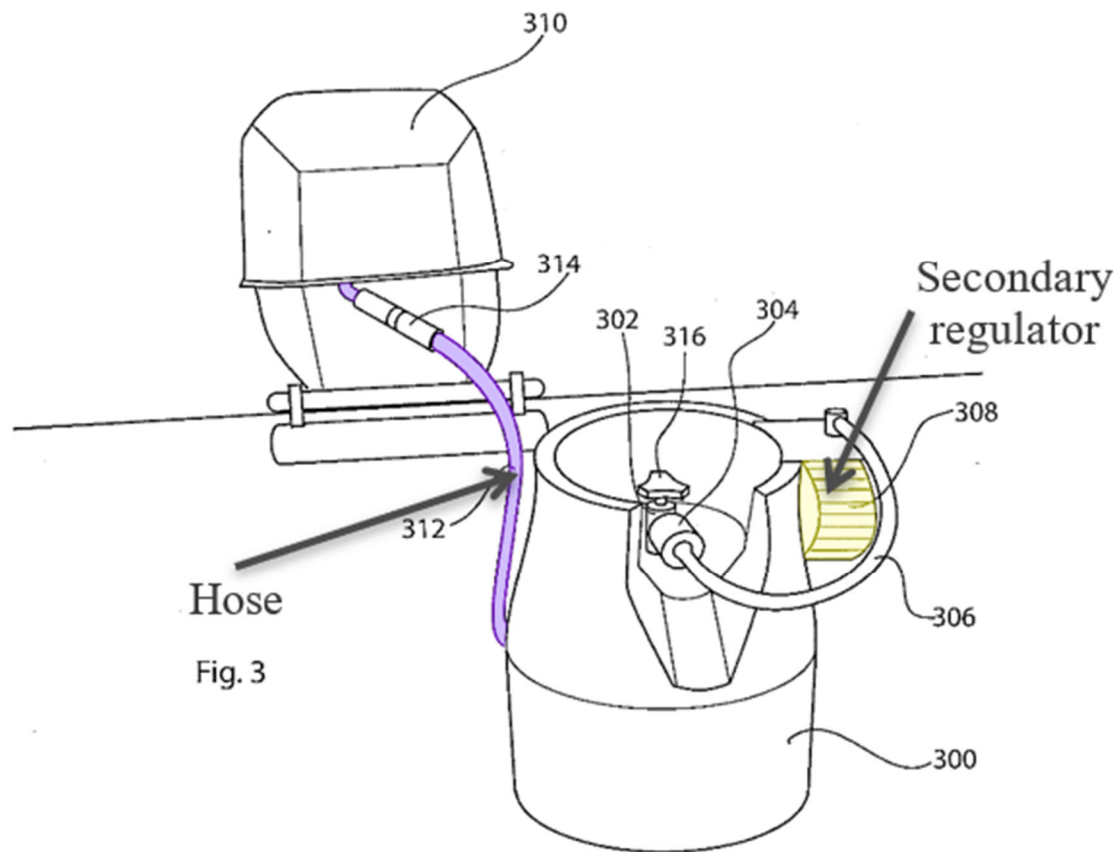
Ex. 1010, Fig. 3 (annotated). Parlature's two-stage regulator 202 also comprises a primary, first-stage regulator coupled to the LPG tank. Ex. 1010, ¶¶[0016], [0018], [0020]-[0021], Fig. 2.

Parlature's regulator system would have been obvious to incorporate for use with Imamura's engine as discussed. *Supra* §VII.D.1.b. Similarly, it would have been obvious to use Parlature's LPG tank 300 along with its service valve 316 with Imamura's engine given that such LPG tanks having service valves were well-known and ubiquitous. Ex. 1003, ¶160. This would have involved nothing more than using Parlature's LPG tank configuration as the LPG fuel source for Imamura, with each performing their intended function without any unexpected results. *Id.*

d. Element [11.4]

Element [11.4] recites “a secondary pressure regulator coupled to the primary pressure regulator to regulate the gaseous fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the engine.”

Parlatore discloses secondary pressure regulator 308, coupled to the primary pressure regulator 304, for regulating the propane to a low pressure for feeding to the carburetor through hose 312. Ex. 1010, ¶[0020], Fig. 3; *see also id.*, ¶¶[0005]-[0006], [0016]-[0017]; Ex. 1003, ¶162. Parlatore’s two-stage regulator 202 also comprises a secondary, second-stage regulator for the same purpose. *Id.*, ¶¶[0019]-[0021]. Parlatore’s regulator system, including its secondary regulator as described above, would have been obvious to incorporate into Imamura to provide gaseous LPG fuel to the engine at the desired pressure via a gaseous fuel line, i.e., where Parlatore’s hose 312 replicates Imamura’s fuel line from the LPG tank 12 to the engine, as seen in Figure 3. Ex. 1003, ¶164.



Ex. 1010, Fig. 3 (annotated).

It would have been obvious to use both a primary and secondary regulator when using Imamura's engine in a generator. *Infra* §VII.G.1.d.

E. Ground 5: Claims 12-15 and 17-19 are anticipated by The Workshop Manual

Claims 12-15 and 17-19 of the '120 Patent are anticipated under 35 U.S.C. §102, as detailed below and in the declaration of Dr. Morse (*see* Ex. 1003, ¶¶166-229).

1. Claim 12

a. Element [12.0]

Element [12.0] recites “a multi-fuel generator and fuel delivery system.”

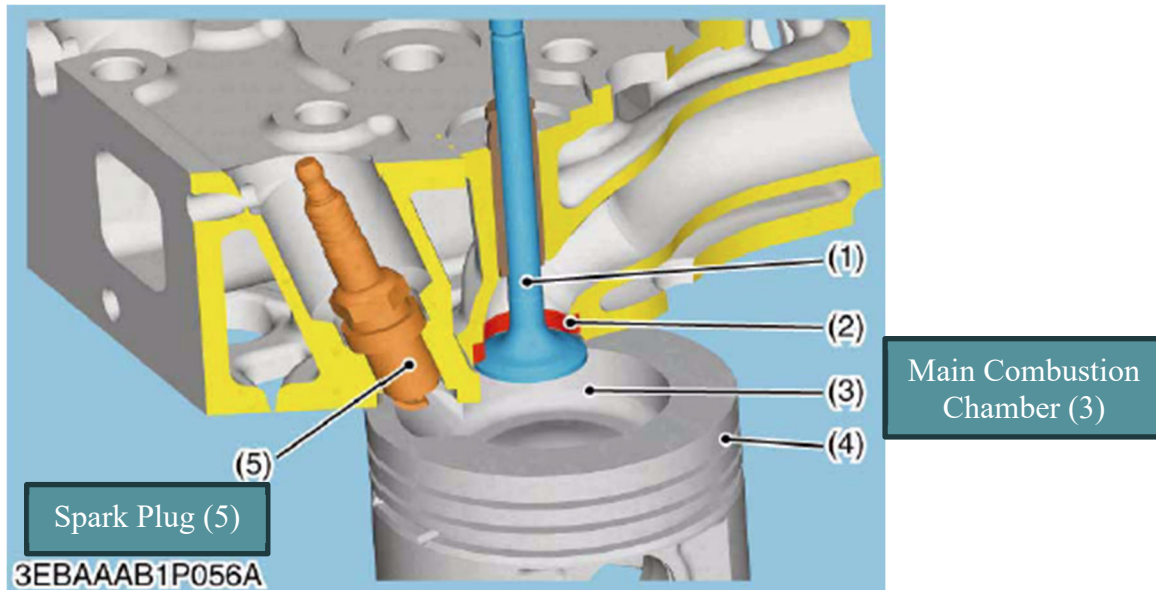
The Workshop Manual discloses a multi-fuel delivery system for a multi-fuel engine operating in a generator.

The Workshop Manual discloses a “Dual Fuel (Gasoline / LPG) Engine.” Ex. 1012, 8. The engine includes “a rotating magnet type generator” (i.e., an alternator) that “produces higher voltage in slow speed rotation, and charges electric current to the battery during engine idling.” *Id.*, 77. The Workshop Manual specifies that the alternator outputs 150W at 12V. *Id.*, 8. Thus, Workshop Manual discloses a generator, powered by operation of the DF-972 engine. Ex. 1003, ¶169.

b. Element [12.1]

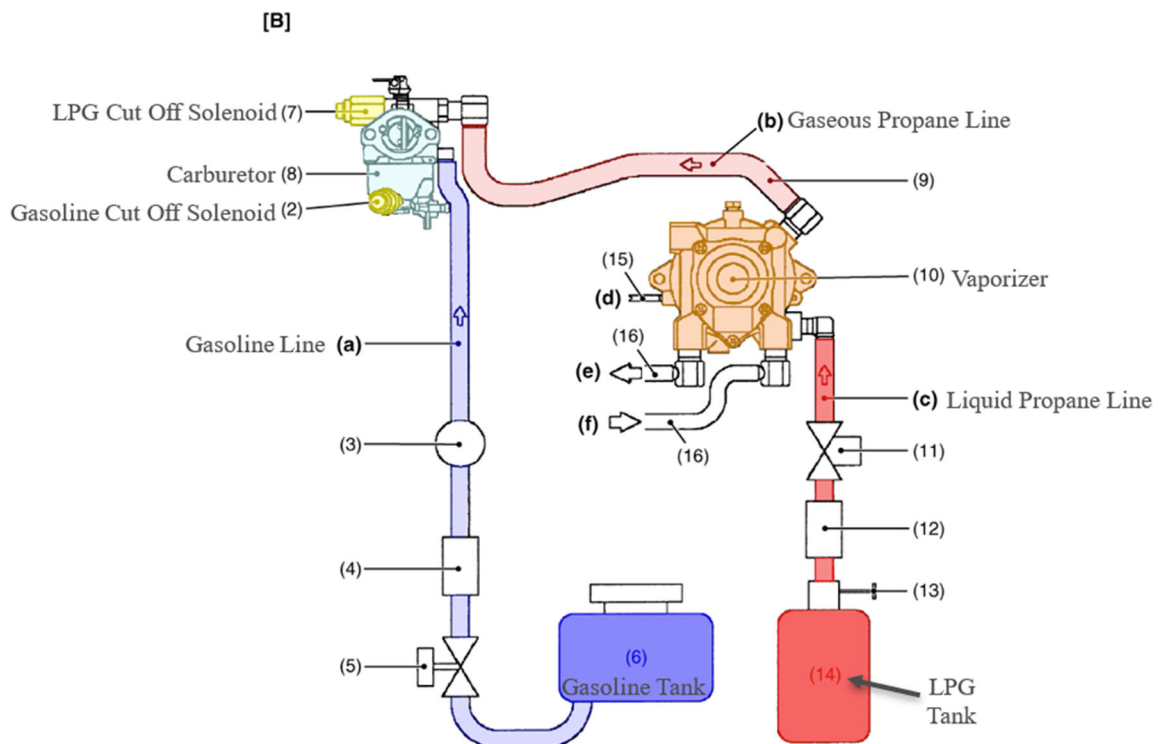
Element [12.1] recites “a multi-fuel internal combustion engine configured to operate on a liquid fuel supplied from a liquid fuel source through a liquid fuel line and a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line.”

The Workshop Manual discloses a multi-fuel internal combustion engine, where fuel (gasoline or LPG) is combusted inside the engine, ignited by spark plugs:



Ex. 1012, 54 (annotated); Ex. 1003, ¶171.

The gasoline and LPG are supplied from tanks through fuel lines:



Id., 65 (annotated); Ex. 1003, ¶310. The LPG tank is pressurized, and the LPG fuel is delivered by the pressure of the gaseous phase in the LPG tank. Ex. 1012, 65; Ex. 1003, ¶¶172-174.

c. Element [12.2]

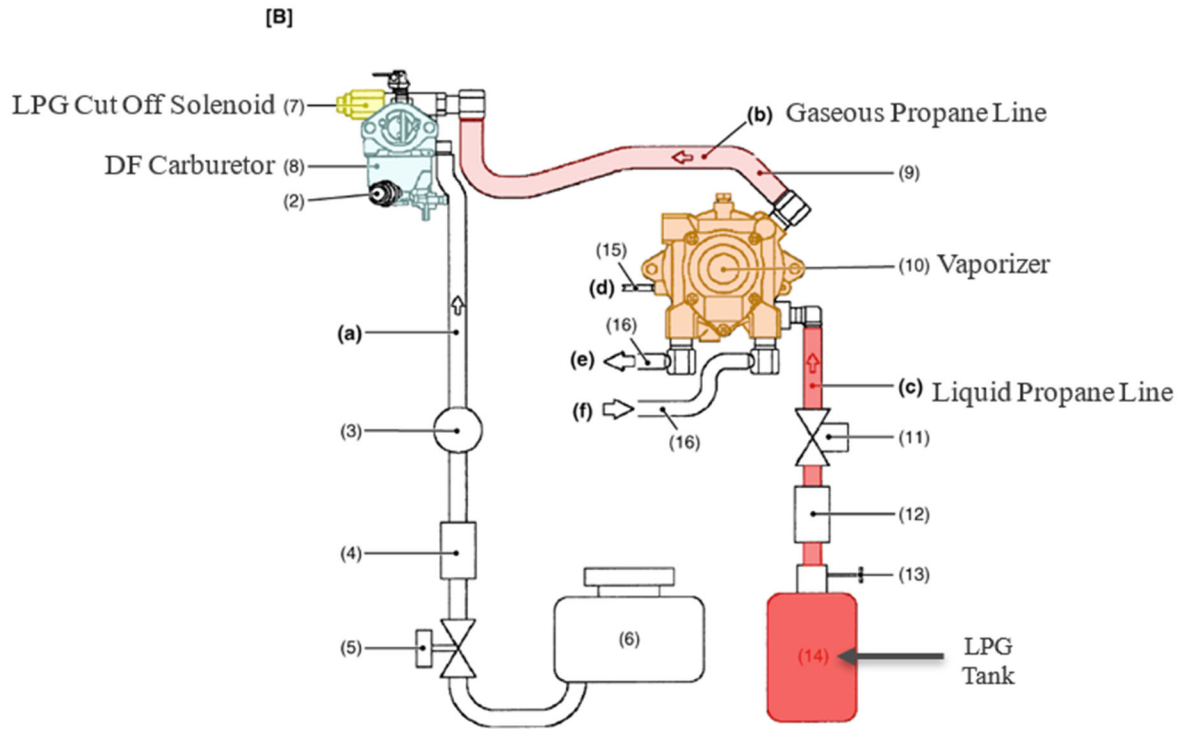
Element [12.2] recites “an alternator driven by the multi-fuel internal combustion engine.”

The Workshop Manual discloses an alternator driven by the engine. *See* Ex. 1012, 77 (describing the construction of the alternator); *see also id.*, 8, 94, 111, 132; *supra* §VII.E.1.a; Ex. 1003, ¶¶176-178.

d. Element [12.3]

Element [12.3] recites “a fuel regulator system.”

The Workshop Manual’s discloses a fuel regulator system (i.e. “Fuel System”):



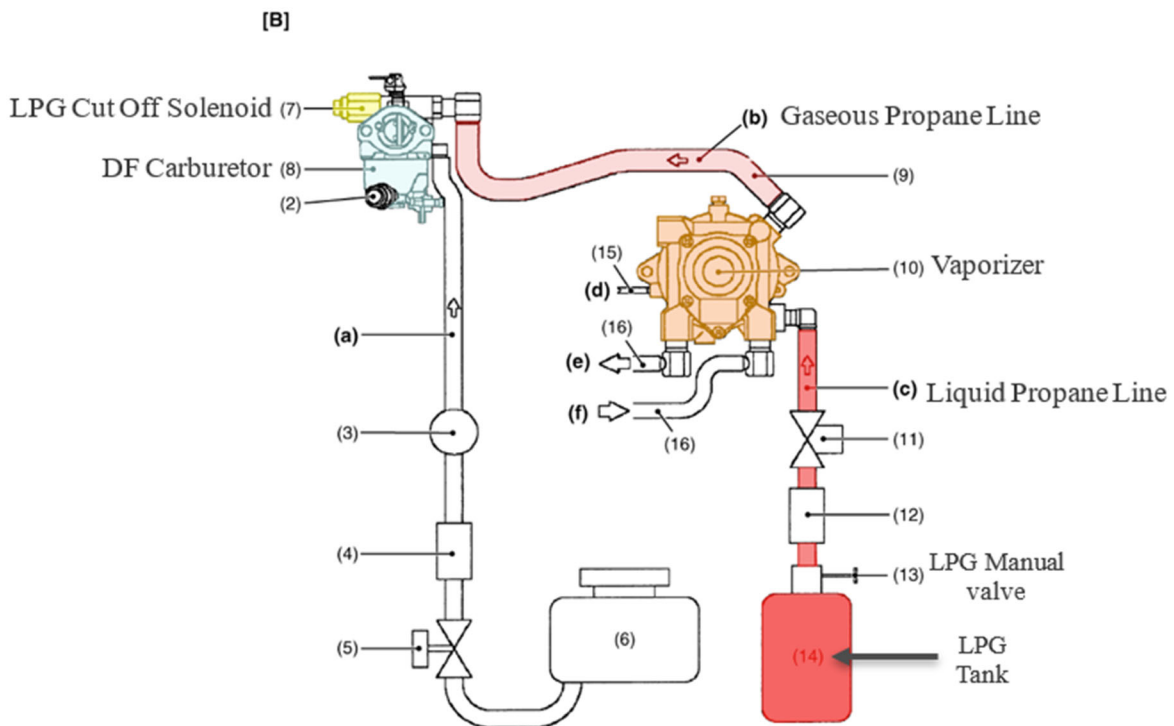
Ex. 1012, 65 (annotated) (explaining liquid LPG fuel is “evaporated in vaporizer and is sent to the DF carburetor (8) as a gaseous fuel of gas pressure near the atmospheric pressure”); Ex. 1003, ¶¶180-184. Thus, the vaporizer operates as the claimed “fuel regulator system” to reduce and control the LPG pressure from the pressurized tank for delivery at the desired pressure to the engine. *See* Ex. 1012, 69-71; Ex. 1003, ¶184.

As discussed below, the vaporizer aligns with the “dual stage regulator” disclosed in the ’120 Patent as an exemplary “fuel regulator system.” *See* Ex. 1001, 4:40-61.

e. Element [12.4]

Element [12.4] recites “a primary pressure regulator coupled to a service valve of the pressurized fuel source to regulate fuel supplied from the pressurized fuel source to a reduced pressure.”

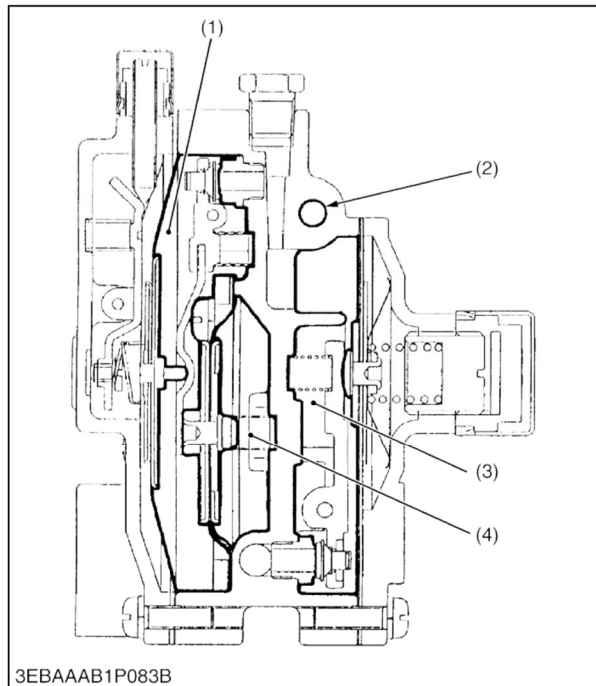
The DF-972 engine obtains LPG fuel from the pressurized LPG tank, which has a service valve on its outlet (i.e., “LPG Manual Valve” (13)), to which vaporizer (10) is coupled:



Ex. 1012, 65 (annotated); Ex. 1003, ¶186.

The Workshop Manual describes the primary and secondary stages of the vaporizer as follows:

[3] VAPORIZER (DF972-E2)



Vaporizer is a device which converts the liquid fuel into the gaseous fuel and the following structures and functions are possessed.

■ **Primary Chamber**

The liquid fuel is decompressed (the first decompression) and it is evaporated.

■ **Secondary Chamber**

The fuel which flows in is decompressed from the primary chamber to the vicinity of the atmospheric pressure further (the second decompression).

■ **Water Passage**

The coolant of the engine is made to circulate as a heat source to evaporate the LPG.

■ **Vacuum Lock Chamber**

When the engine stops, the fuel from primary chamber is prevented from flowing out.

- | | |
|-----------------------|-------------------------|
| (1) Secondary Chamber | (3) Primary Chamber |
| (2) Water Passage | (4) Vacuum Lock Chamber |

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Ex. 1012, 69. The Workshop Manual thus discloses a primary pressure regulator (i.e. the “Primary Chamber” within the vaporizer (10)) coupled to the service valve (i.e. LPG Manual Valve (13)), whereby fuel from the pressurized tank (14) is regulated to a reduced pressure. Ex. 1012, 69 (explaining that in the Primary Chamber, “liquid fuel is *decompressed* (the first decompression) and it is evaporated.” (emphasis added)); Ex. 1003, ¶187. The Workshop Manual describes the “Primary Chamber” operation as follows:



When the diaphragm tears by any chance and the fuel flows in the primary diaphragm spring side, the primary diaphragm spring side is connected with second chamber in the balance passage so that the fuel should not flow out outside.

- | | |
|--------------------------------|-------------------------|
| (1) Primary Chamber | (5) Primary Valve Lever |
| (2) Primary Valve Lever Spring | (6) Primary Valve |
| (3) Primary Diaphragm Spring | (7) Valve Seat |
| (4) Primary Diaphragm | |

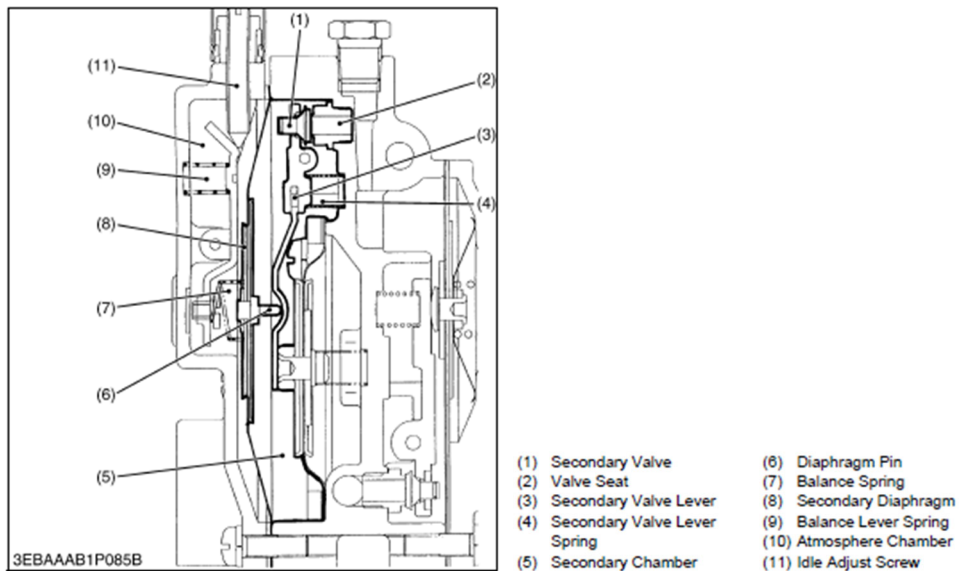
f. Element [12.5]

Element [12.5] recites “a secondary pressure regulator coupled to the primary pressure regulator to regulate fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the engine.”

The Workshop Manual discloses a secondary pressure regulator (i.e. the “Secondary Chamber” of the vaporizer) coupled to the Primary Chamber, to regulate fuel supplied from the Primary Chamber to a desired pressure for delivery through the gaseous fuel line to the DF-972 engine. *Supra* §VII.E.1.e; Ex. 1012,

69; Ex. 1003, ¶190. The Workshop Manual depicts the Secondary Chamber and explains:

The fuel adjusted with primary chamber to the specified pressure enters secondary chamber (5) between secondary valve (1) and the valve seat (2) and is decompressed to the vicinity of the atmospheric pressure almost.



Ex. 1012, 71. Thus, the Secondary Chamber further reduces the LPG pressure to near atmospheric pressure for delivery to the carburetor of the DF-972 engine. Ex. 1003, ¶191.

2. Claim 13

Claim 13 depends from Claim 12 and further recites “an electro-mechanical valve system coupled to the engine and operated by an electrical switch powered

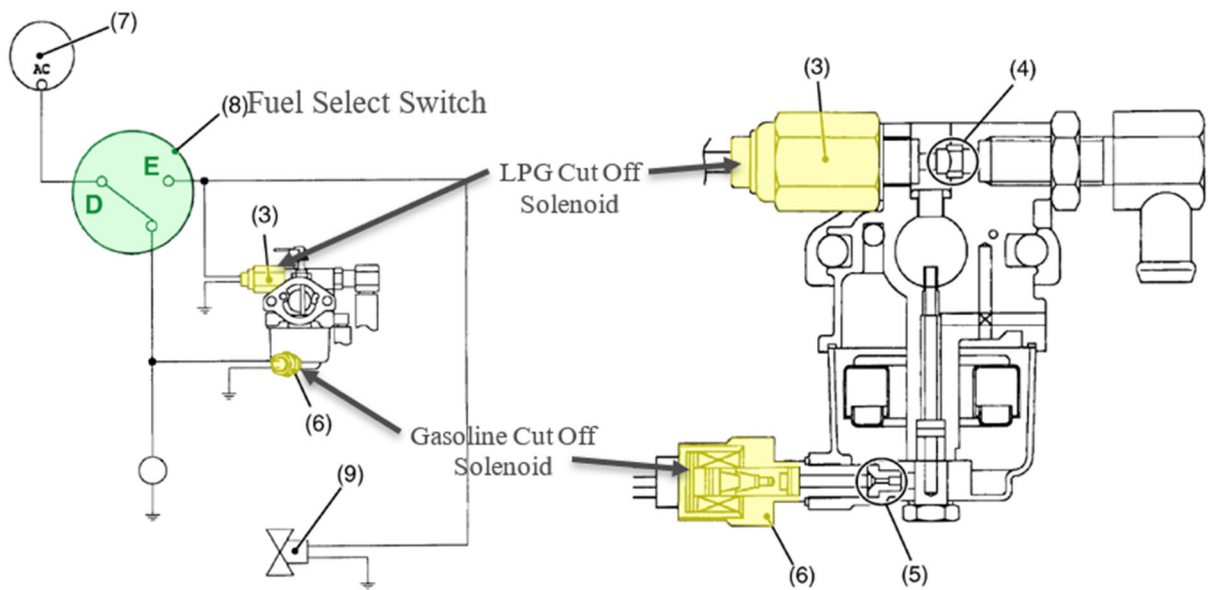
by one of the alternator, a battery, and a magneto that controls fuel flow to the engine from the liquid fuel source and the pressurized fuel source.”

The Workshop Manual discloses an electro-mechanical valve system (i.e. a “Fuel System”) with an electrical switch (i.e. a “Fuel Select Switch”). Ex. 1012, 68; Ex. 1003, ¶193. The Fuel System includes electro-mechanical valves, such as the “LPG Shut Off Solenoid Valve.” *Id.* The Fuel Select Switch is powered by a battery and controls fuel flow to the engine from the liquid fuel source (i.e. Gasoline Tank) and the pressurized fuel source (i.e. LPG Tank) by operating the gasoline and LPG cutoff valves:

With the fuel select switch (8) in the “GASOLINE” position “D”..., 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... [t]hen, the gasoline fuel flow is shut.

Id., 68; Ex. 1003, ¶193.

The Workshop Manual also illustrates the operation of the electro-mechanical valve system (i.e., the gasoline and LPG cut off solenoids) and electrical switch:

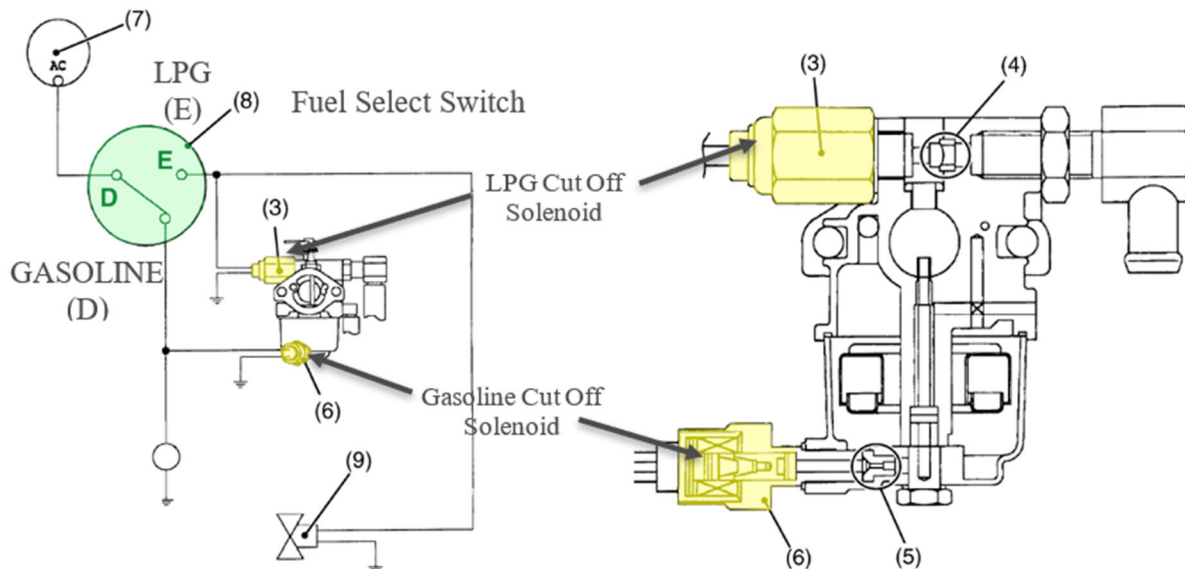


Ex. 1012, 68 (annotated); Ex. 1003, ¶194.

3. Claim 14

Claim 14 depends from Claim 13 and further recites “the electro-mechanical valve system is configured to switch operation of the generator from multiple fuel sources while the generator is running.”

The Workshop Manual’s Fuel Select Switch can be toggled between positions D (gasoline) and E (LPG) and is therefore configured to switch between the fuels used for generator/engine operation:



Ex. 1012, 68 (annotated); Ex. 1003, ¶196; *supra* §VII.E.2.

A POSA would have understood the switch could be toggled between gasoline and LPG positions to switch between fuel sources while the generator/engine is running via operation of the gasoline and LPG cut off solenoids. Ex. 1003, ¶197. Confirming how a POSA would interpret the switching capabilities of the DF-972 engine, the Operator's Manual notes that users can switch the fuel from gasoline to LPG and vice versa while operating the Kubota DF972-E2 engine:

In case of converting the fuel (gasoline ↔ LPG) ***while running the engine***, the engine should be operated with the engine speed high and no-loaded.

Ex. 1013, 19 (emphasis added).

Should the Workshop Manual be deemed to not sufficiently disclose allowing for switching between fuels while the generator is running, it would have been obvious to a POSA to combine the teachings of the Workshop Manual and Operator's Manual to satisfy this limitation. *Id.*; Ex. 1003, ¶199. A POSA would have been motivated to combine the teachings from the manuals and would have had a reasonable expectation of success since they both disclose and discuss the configuration and operation of Kubota's DF-972 engine. *Id.* Thus, a POSA would have learned from the Operator's Manual that the Workshop Manual's disclosed DF-972 engine was configured to allow for switching between fuels while the generator is running, as claimed. *Id.*

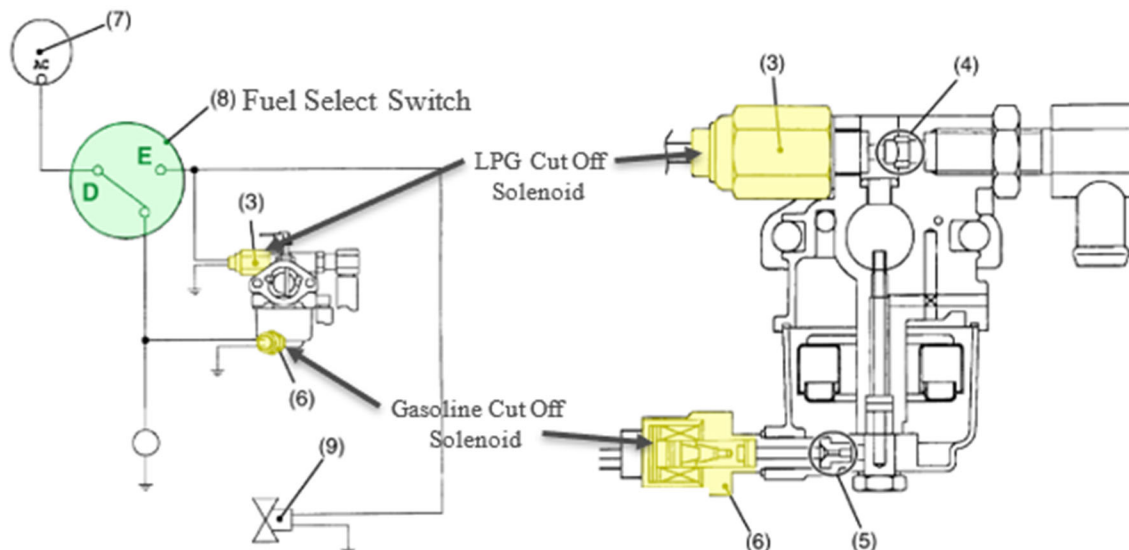
The Workshop Manual thus anticipates Claim 14 under §102, as further informed by the Operator's Manual. In addition, Claim 14 is obvious in view of the Workshop and Operator's Manuals, and Petitioners respectfully request that this argument be assessed under §103 as needed.

4. Claim 15

Claim 15 depends from Claim 13 and further recites "the electro-mechanical valve system is configured to prevent simultaneous delivery of the liquid fuel and the gaseous fuel to the engine."

The Workshop Manual describes the Fuel Select Switch switching between gasoline and LPG engine operation. Ex. 1012, 68; *supra* §VII.E.2. A POSA would

have understood this description to convey that operating both cut-off solenoids with the same switch allows the engine to change between liquid and gaseous fuels whereby simultaneous flow from the liquid and gaseous fuel sources is prevented, because when one fuel line is opened the other is simultaneously closed, and vice versa. Ex. 1003, ¶202. This switching capability is illustrated below, where switching between gasoline and LPG involves closing the switch at position D or E, respectively:



Ex. 1012, 68 (annotated); Ex. 1003, ¶202.

5. Claim 17

Claim 17 depends from Claim 12 and further recites “a dual stage pressure regulator comprises the primary pressure regulator and the secondary pressure regulator.”

The Workshop Manual discloses a dual-stage vaporizer having primary and secondary chambers. *Supra* §§VII.E.1.e, VII.E.1.f. A POSA would understand these chambers are primary and secondary pressure regulators as required by Claim 17. Ex. 1003, ¶204.

6. Claim 18

a. Element [18.0]

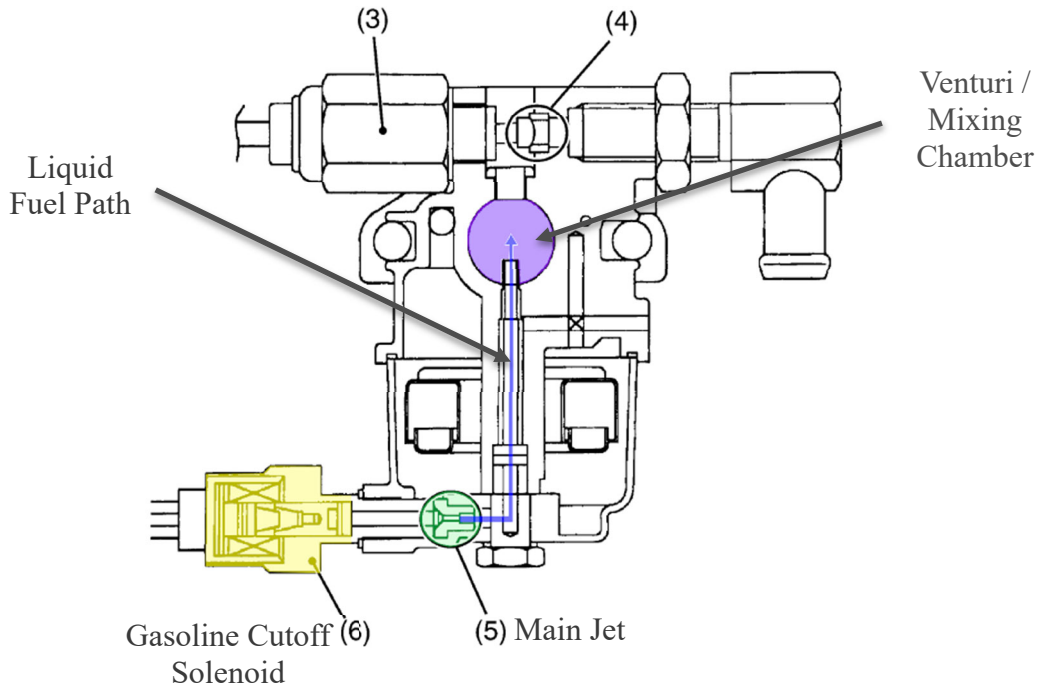
Element [18.0] recites “A carburetor for use in a multi-fuel internal combustion engine.”

The Workshop Manual discloses a carburetor (Ex. 1012, 68) for use in a multi-fuel internal combustion engine (*supra* §§VII.E.1.a, VII.E.1.b).

b. Element [18.1]

Element [18.1] recites “a throat in which fuel and air are mixed in throat to provide an air-fuel mixture for the multi-fuel internal combustion engine.”

The Workshop Manual discloses carburetor mixing chamber, which a POSA would understand to be a throat of the carburetor in which fuel and air are mixed to provide an air-fuel mixture for the engine:



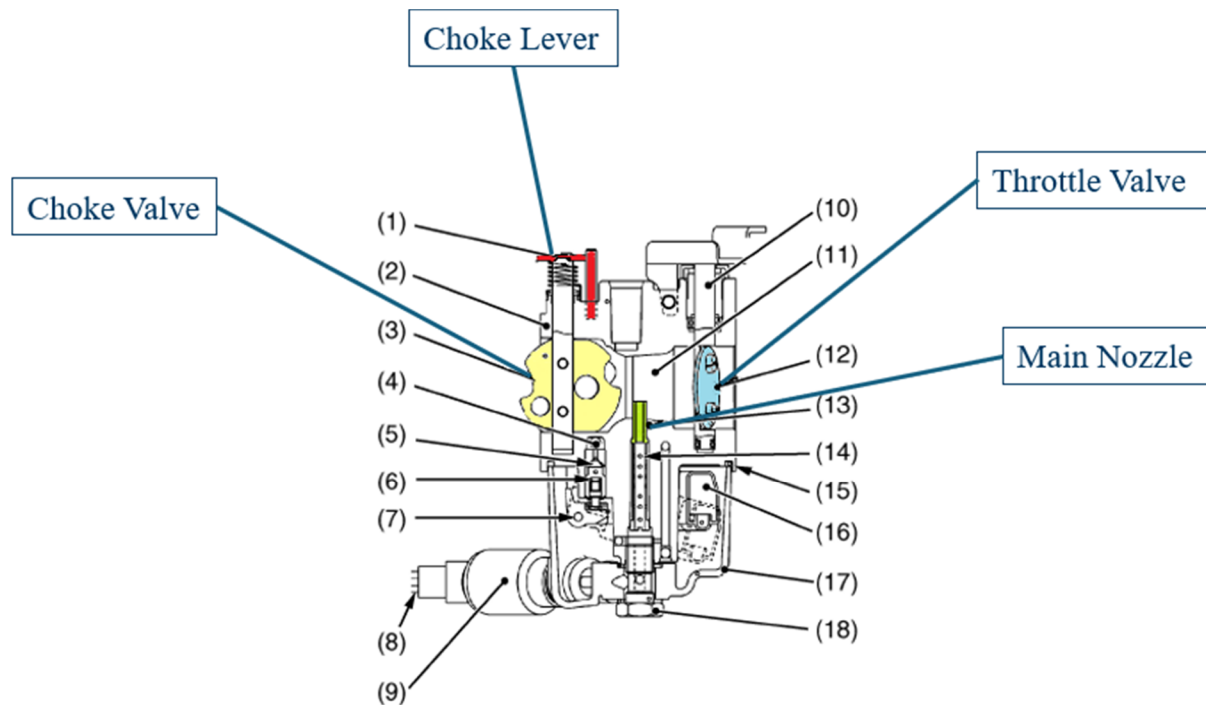
Id., 68 (annotated); Ex. 1003, ¶208.

c. Element [18.2]

Element [18.2] recites “a valve located in the throat to provide a choke and throttle for the multi-fuel internal combustion engine.”

The Workshop Manual discloses a choke valve and a throttle valve in the throat to provide a choke and throttle for the engine. Ex. 1012, 67 (“To start an engine in cold weather, the fuel-air mixture must be richer than normal. A choke valve (3) controlled by the choke lever (1) is provided to enrich the mixture.”), *id.* (“When the throttle valve (12) closes, air that flows into the cylinder passes along the valve at a high speed. As a result, a negative pressure is [created] in the pilot outlet (19) which has an outlet port in the inner wall. This causes gasoline in the

main nozzle (13) to flow through the pilot jet (25) to be sucked into the cylinder.”); *see also id.*, 68; Ex. 1003, ¶210.

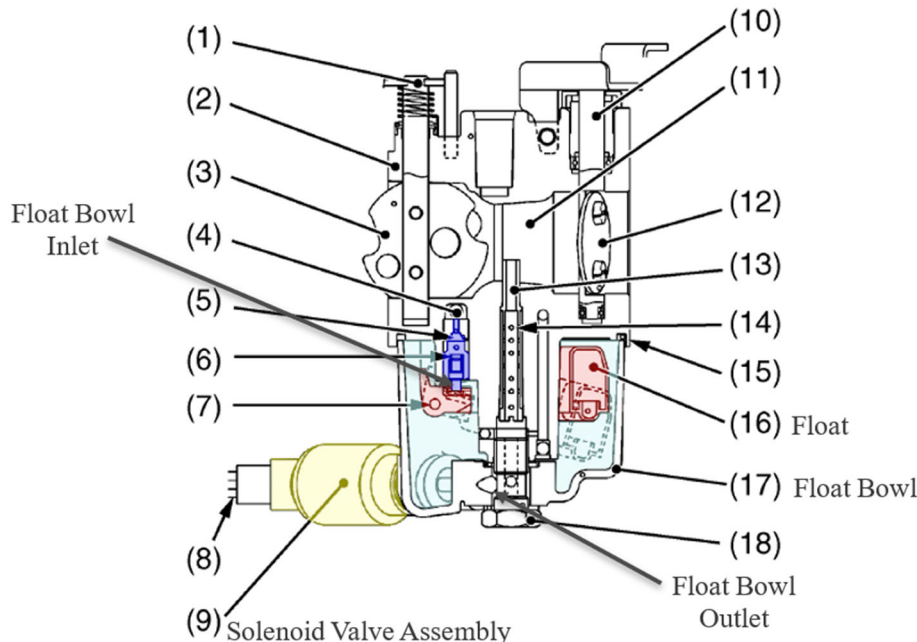


Ex. 1012, 67 (annotated) (showing choke valve in throat upstream of Venturi (11) and throttle valve in throat downstream of Venturi (11)), 68.

d. Element [18.3]

Element [18.3] recites “a float bowl to hold liquid fuel.”

The carburetor for the DF972 engine comprises a float bowl that holds liquid fuel (gasoline), labeled “float chamber (17)” in the Workshop Manual figure for the WG-972 engine (Ex. 1012, 67), which is the same for the DF-972 engine (*see id.*, 68 (noting that the DF carburetor operates the same as the gasoline-only carburetor when operating on gasoline)); Ex. 1003, ¶212.

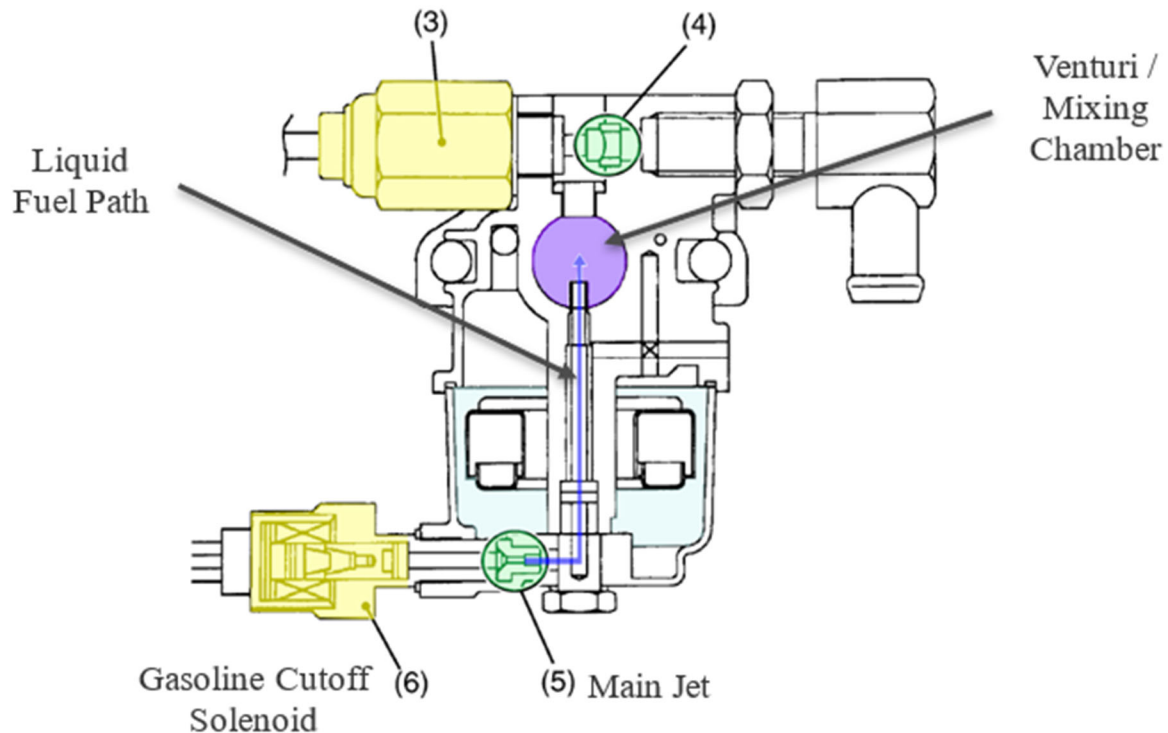


Ex. 1012, 67 (annotated).

e. Element [18.4]

Element [18.4] recites “a main fuel circuit positioned downstream from the float bowl and extending from the float bowl to the throat.”

The Workshop Manual discloses a main fuel circuit positioned downstream from the float bowl (i.e., “float chamber”). Ex. 1012, 68 (“With the fuel select switch (8) in the “GASOLINE” position “D”..., the battery current flows to the gasoline cut off solenoid (6). **Therefore gasoline fuel in the float chamber flows to the mixing chamber.**” (emphasis added)); Ex. 1003, ¶214. A POSA would understand the carburetor mixing chamber to be the throat of the carburetor. Ex. 1003, ¶214.



Ex. 1012, 68 (annotated); Ex. 1003, ¶214. Therefore, the main fuel circuit (in purple) extends from the float chamber to the throat. Ex. 1012, 67-68; Ex. 1003, ¶214.

f. Element [18.5]

Element [18.5] recites “an idle fuel circuit that provides a flow path to the throat downstream of the throttle to run the engine at idle.”

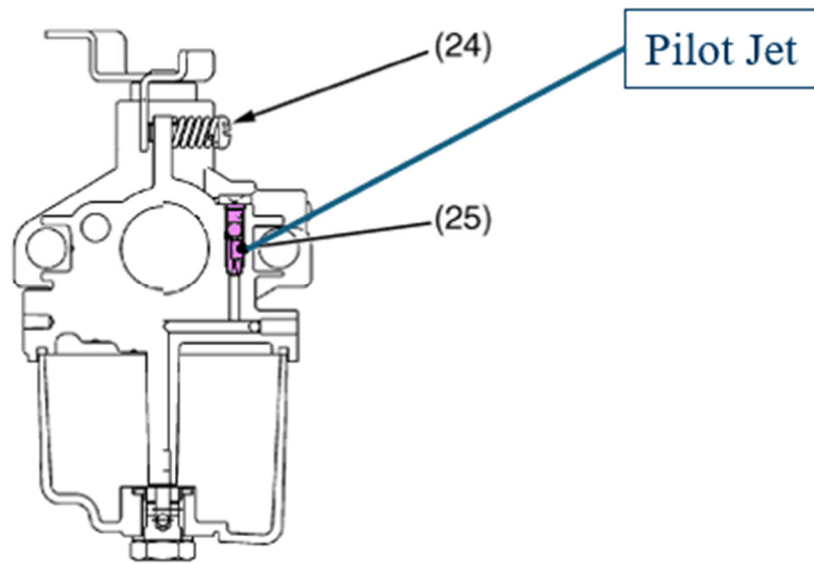
The Workshop Manual discloses a “Slow System,” which includes an idle fuel circuit for purposes of Element [18.5]. Ex. 1012, 67; Ex. 1003, ¶216. The Workshop Manual discloses:

3) Slow System

When the throttle valve (12) closes, air that flows into the cylinder passes along the valve at a high speed. As a result, a negative pressure is [created] in the pilot outlet (19) which has an outlet port in the inner wall. This causes gasoline in the main nozzle (13) to flow through the pilot jet (25) to be sucked into the cylinder. Air that enters from the slow air jet (22) is mixed with gasoline in the pilot jet (25), atomized in an appropriate condition, sprayed from the pilot outlet (19) and sucked into the cylinder through the main passage. The slow speed of the engine is controlled by changing the jet area with the pilot jet (25).

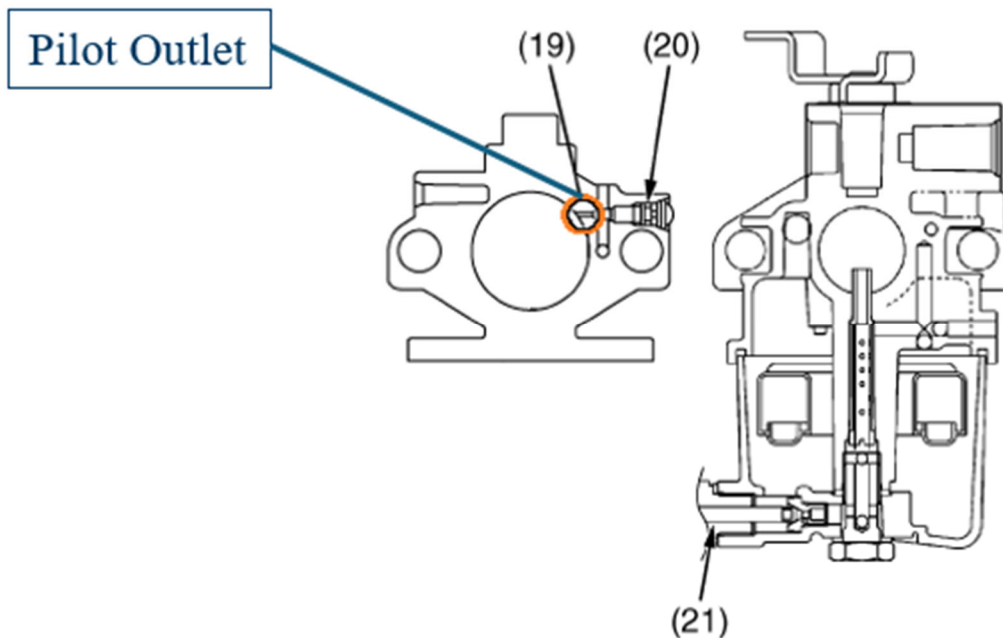
Id. A POSA would understand this to mean that when the engine is at idle (when the throttle valve closes), the gasoline flows through the pilot jet to the throat of the carburetor through the pilot outlet 19. *Id.*; Ex. 1003, ¶216. Therefore, the pilot jet and pilot outlet comprise a flow path for the gasoline to the throat to run the engine at idle. Ex. 1012, 67; Ex. 1003, ¶216.

The pilot jet (25) is shown below:



Ex. 1012, 67 (annotated).

As indicated by the above passage, the atomized gasoline is sprayed from the pilot outlet (19) and sucked into the cylinder, which is downstream of the throttle. Ex. 1012, 67; Ex. 1003, ¶218.

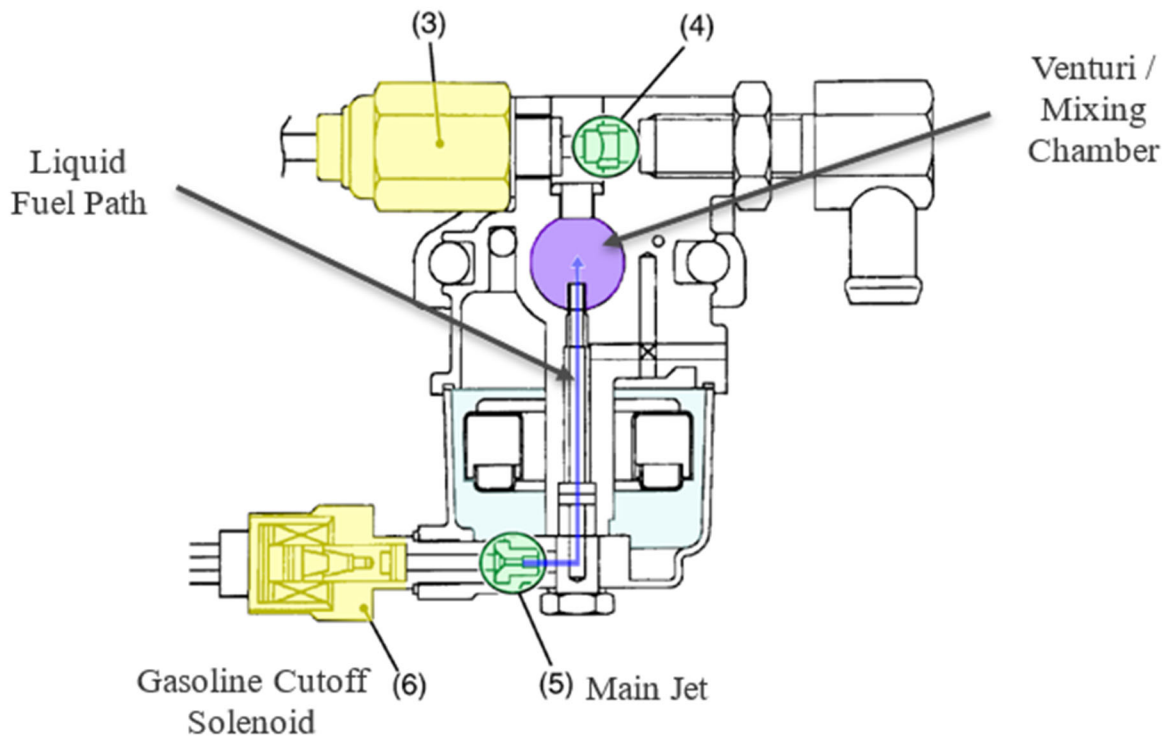
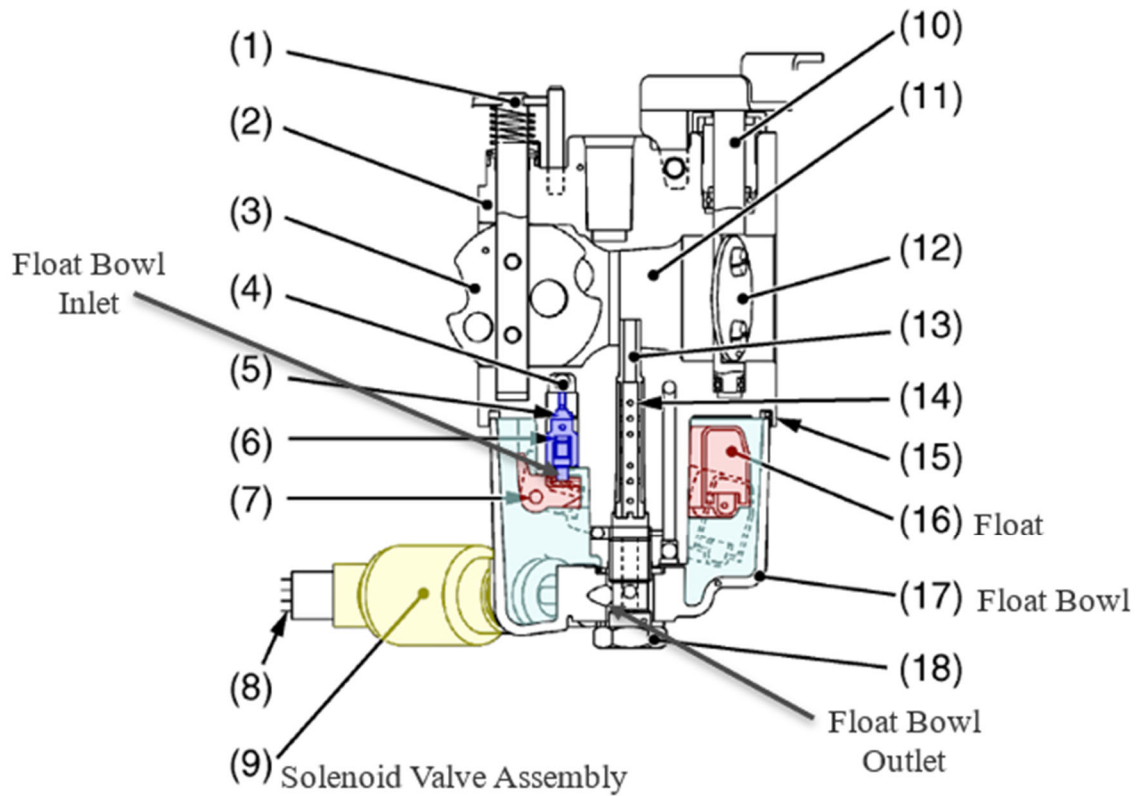


Ex. 1012, 67 (annotated).

g. Element [18.6]

Element [18.6] recites “a carburetor cutoff solenoid configured to selectively control fuel flow through the main fuel circuit and the idle fuel circuit.”

The Workshop Manual discloses a carburetor cutoff solenoid (i.e., a “Gasoline Cut Off Solenoid”) configured to selectively control fuel flow through the main fuel circuit and the idle fuel circuit. Ex. 1012, 65, 68; Ex. 1003, ¶221. The Workshop Manual discloses the Gasoline Cut Off Solenoid controls fuel through the main fuel circuit: “With the fuel select switch (8) in the “GASOLINE” position “D”..., the battery current flows to the gasoline cut off solenoid (6). ***Therefore gasoline fuel in the float chamber flows to the mixing chamber.***” *Id.*, 68 (emphasis added). Ex. 1003, ¶221.



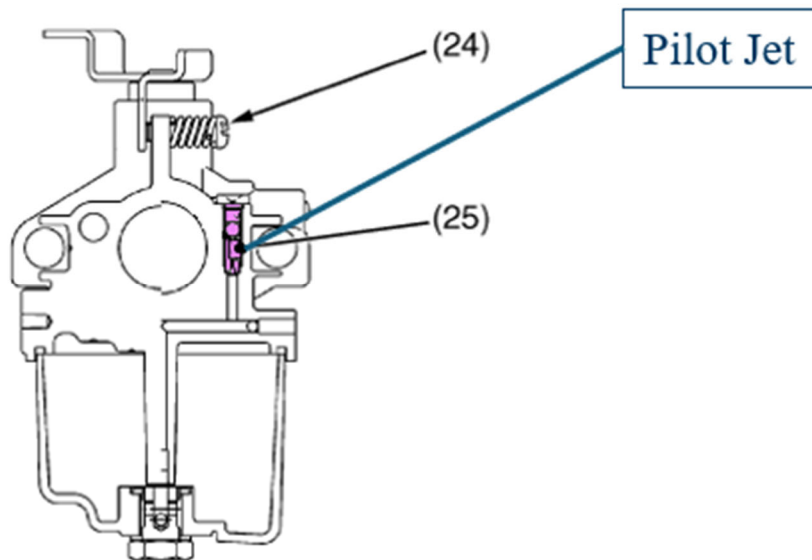
U.S. Patent No. 11,143,120

Ex. 1012, 67-68 (annotated).

The Workshop Manual discloses that in the idle fuel circuit (the Slow System), gasoline flows from the main nozzle to the pilot jet:

When the throttle valve (12) closes, air that flows into the cylinder passes along the valve at a high speed. As a result, a negative pressure is [created] in the pilot outlet (19) which has an outlet port in the inner wall. This causes gasoline in the main nozzle (13) to flow through the pilot jet (25) to be sucked into the cylinder.

Ex. 1012, 67; Ex. 1003, ¶222. The pilot jet is part of the idle fuel circuit. *Supra* §VII.E.6.e.



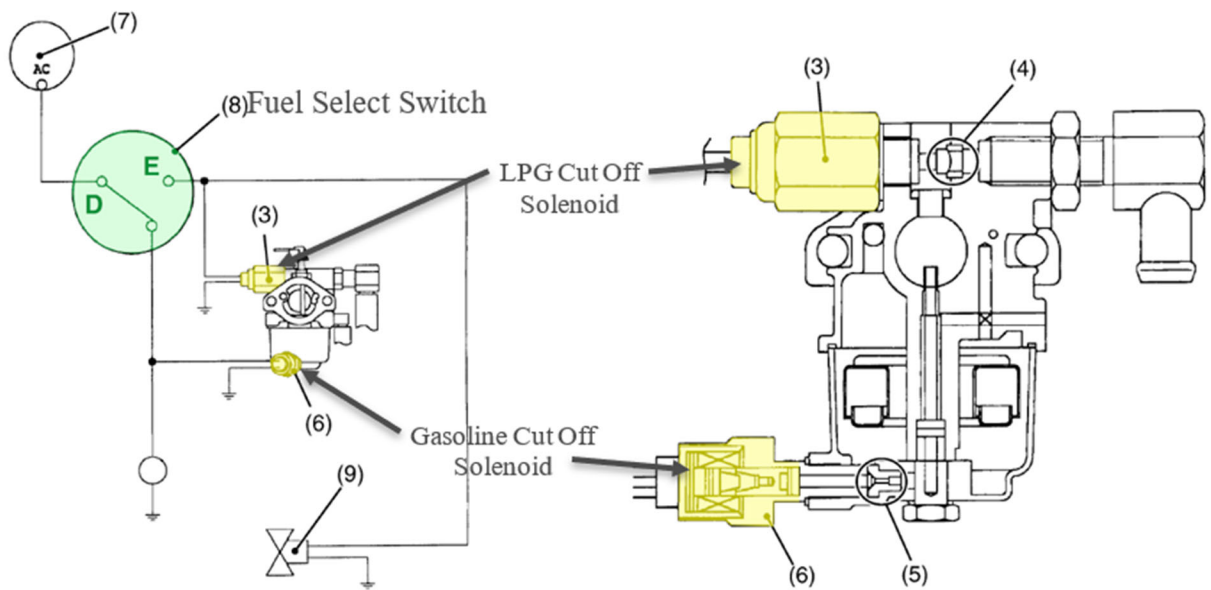
Ex. 1012, 67 (annotated).

Because the carburetor cutoff solenoid (the Gasoline Cutoff Solenoid) is upstream of both the main jet and the pilot jet, it selectively controls fuel flow through the main fuel circuit and the idle fuel circuit. Ex. 1012, 67; Ex. 1003, ¶¶222-223.

7. Claim 19

Claim 19 depends from Claim 18, and further recites “wherein the carburetor cutoff solenoid is operatively coupled to a switch that changes operation of the engine from liquid fuel to gaseous fuel and from gaseous fuel to liquid fuel while the engine is running, and wherein the carburetor cutoff solenoid is closed to stop liquid fuel flow through the main fuel circuit and the idle fuel circuit when the switch changes operation of the engine from liquid fuel to gaseous fuel.”

The Workshop Manual discloses the carburetor cutoff solenoid (the Gasoline Cutoff Solenoid) is operatively coupled to a switch (the Fuel Select Switch) that changes operation of the engine from liquid fuel (gasoline) to gaseous fuel (LPG) and vice versa. Ex. 1012, 68; Ex. 1003, ¶225. The Workshop Manual illustrates the operation of the switch:



Ex. 1012, 68 (annotated); Ex. 1003, ¶225.

When the switch changes operation of the engine from liquid fuel to gaseous fuel, the carburetor cutoff solenoid (the Gasoline Cutoff Solenoid) stops liquid fuel flow through both the main fuel circuit and the idle fuel circuit (the “Slow System”). *Supra* §VII.E.6.g.

A POSA would have understood the switch could be toggled between gasoline and LPG positions to switch between fuel sources while the generator/engine is running via operation of the gasoline and LPG cut off solenoids. *Supra* §VII.E.3. This is confirmed by the Operator’s Manual. *Id.*

The Workshop Manual thus anticipates Claim 19 under §102, as further informed by the Operator’s Manual. In addition, Claim 19 is obvious in view of the

Workshop and Operator's Manuals, and Petitioners respectfully request that this argument be assessed under §103 as needed.

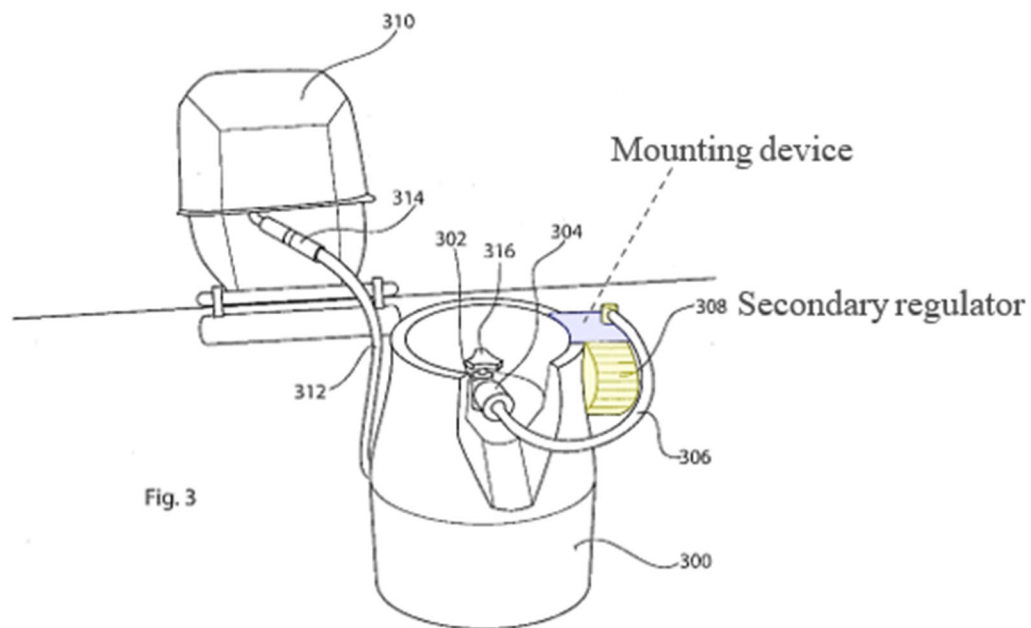
F. Ground 6: Claim 16 is obvious over The Workshop Manual in view of Parlatore

Claim 16 of the '120 Patent is obvious under 35 U.S.C. §103, as detailed below and in the declaration of Dr. Morse (*see* Ex. 1003, ¶¶230-233).

1. Claim 16

Claim 16 depends from Claim 12 and further recites “the pressurized fuel source comprises a pressurized fuel container located off-board the generator having a regulator mounting device to secure at least the secondary pressure regulator thereto.”

Parlature discloses LPG tank 300 located off-board its engine and a regulator mounting device to secure the secondary pressure regulator 308 to the LPG tank:



Ex. 1010, Fig. 3 (annotated); Ex. 1003, ¶¶232-233.

It would have been obvious to use Parlatore's off-board configuration with the DF-972 engine of the Workshop Manual for the same reasons discussed with respect to Parlatore's off-board configuration with Imamura's engine in a generator. *Supra* §VII.D.1.b. Parlatore shows that a POSA would have had a reasonable expectation of success using an off-board regulator system. Ex. 1010, ¶¶[0019]-[0022], Fig. 3; Ex. 1003, ¶233.

G. Ground 7: Claims 12-17 are obvious over Nakafushi in view of Jungmann and Parlatore

Claims 12-17 of the '120 Patent are obvious under 35 U.S.C. §103, as detailed below and in the declaration of Dr. Morse (*see* Ex. 1003, ¶¶234-295).

1. Claim 12

a. Element [12.0]

Nakafushi discloses a “gasoline/LPG combined engine configured to selectively use gasoline or LPG as a fuel.” Ex. 1005, ¶[0001].

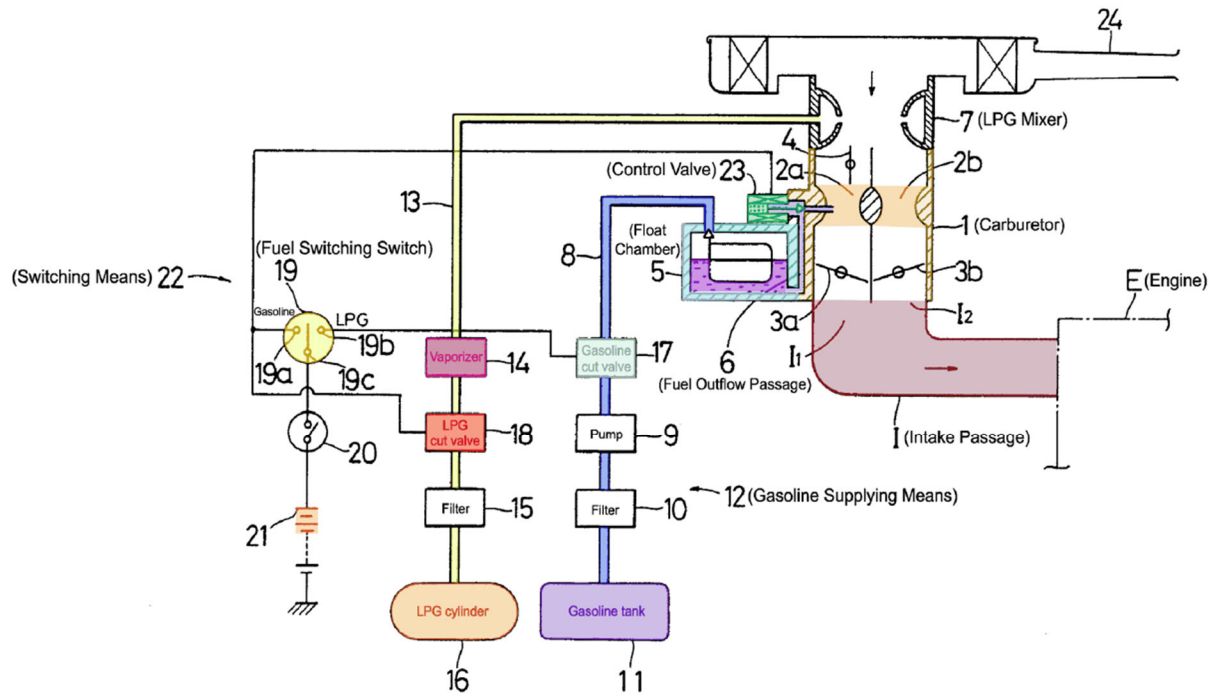
Jungmann discloses an engine with a gasoline or propane fuel-delivery system in a generator. Ex. 1011, ¶¶[0002], [0015]. In view of Jungmann, a POSA would have found it obvious to use Nakafushi's engine in a generator. Ex. 1003, ¶¶236-251. A POSA would have been motivated to do so and had a reasonable expectation of success for the same reasons explained above with respect to using Imamura's engine in a generator. *Supra* §VII.D.1.a.

b. Element [12.1]

Nakafushi's engine selectively uses gasoline or LPG as fuel. Ex. 1005, ¶[0001]. Nakafushi's "liquid fuel source" is gasoline tank 11, which supplies gasoline through supply passage 8 to carburetor 1, and on to the engine E through fuel outflow passage 6 and intake I. Ex. 1005, ¶¶[0010], [0012], Fig. 1; Ex. 1003, ¶253.

Nakafushi's "pressurized fuel source" is LPG cylinder 16, which supplies gaseous fuel through supply passage 13 to the carburetor 1, and from there to the engine E through intake I. Ex. 1005, ¶[0012], Fig. 1; Ex. 1003, ¶254. A POSA would have appreciated that LPG tanks such as Nakafushi's cylinder 16 store LPG under pressure, which is necessary given LPG's boiling point of approximately minus 40°C. Ex. 1003, ¶254; *see also* Ex. 1001, 1:53-54 (acknowledging that LPG "can be conveniently stored under pressure in a liquid state").

FIG. 1



Ex. 1005, Fig. 1 (annotated).

c. Element [12.2]

Jungmann discloses an alternator driven by an internal combustion engine.

Ex. 1011, ¶[0002]; *supra* §VII.D.1.a. As discussed, a POSA would have found it obvious to combine the alternator from Jungmann with the dual-fuel engine in Nakafushi to create a generator. *Supra* §§VII.G.1.a, VII.D.1.a.

d. Element [12.3]

Nakafushi discloses vaporizer 14 for vaporizing the LPG prior to delivery to the carburetor. Ex. 1005, ¶¶[0012]-[0013]. Such vaporizers regulate the pressure of

the gas being delivered to the engine. Ex. 1003, ¶¶258-259. Thus, Nakafushi's vaporizer 14 constitutes the claimed "fuel regulator system." *Id.*

Moreover, even though Nakafushi's vaporizer is not expressly described as such, LPG vaporizers were well-known in the art to comprise dual-stage pressure regulators. *Id.* For example, Parlato teaches providing fuel to an engine by vaporizing LPG in a first regulator 304, followed by flow through a second regulator 308 for "metering the flow of the propane vapor from the second regulator to an engine." Ex. 1010, ¶¶[0005]-[0006], [0014], [0016], [0018], [0020]-[0022], Figs. 1-3; Ex. 1003, ¶¶261-263. In this way, the first regulator acts as the main step-down pressure regulator, while the second acts as the flow meter to the engine. Ex. 1010, ¶¶[0016]-[0017]; Ex. 1003, ¶¶261-263.

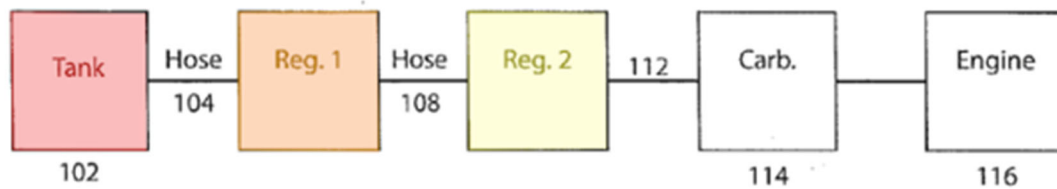


Fig. 1

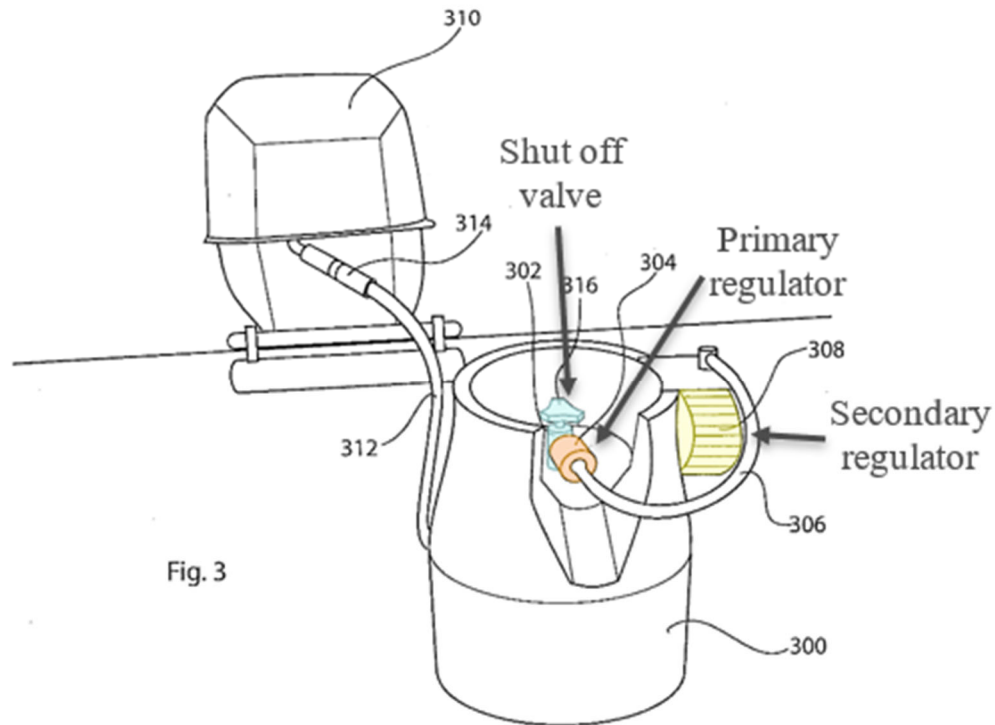


Fig. 3

Ex. 1010, Figs. 1, 3 (annotated).

Parlatore further discloses that the primary and secondary regulators may be combined as a single, two-stage, regulator to feed the vaporized propane into the carburetor. *Id.*, ¶[0018]; Fig. 2 (two-stage regulator 202).

Parlatore teaches that its system advantageously avoids freezing of traditional (single-stage) regulators/vaporizers without relying on a heat-control circuit from the engine. *Id.*, ¶¶[0004], [0022]; Ex. 1003, ¶¶261-264.

Jungmann also discloses a fuel regulator system, comprising pressure regulator 28. Ex. 1011, ¶[0017]; *supra* §VII.D.1.b.

To the extent not sufficiently disclosed by Nakafushi or Jungmann, it would have been obvious to a POSA to incorporate Parlature's two-stage regulator system (either as two separate regulators, or as a combined two-stage regulator) to regulate the LPG gas pressure supplied to Nakafushi's engine. Ex. 1003, ¶266.

i. Motivation/Expectation of Success

A POSA would have been motivated to utilize Parlature's regulator system with Nakafushi's engine for several reasons. First, Nakafushi discloses vaporizer 14 along the LPG supply line. Ex. 1005, ¶¶[0012]-[0013]; Fig. 1. According to Parlature (Ex. 1010, ¶[0004]), if Nakafushi's vaporizer had only a single stage, it could freeze due to the endothermic nature of vaporizing a liquid under pressure in typical conditions. Ex. 1003, ¶269. While this may be prevented by routing a source of heat to the vaporizer, such as from the engine cooling system (*see, e.g.*, Ex. 1010, ¶[0022]), such systems are more costly to design and build and more complicated to operate. Ex. 1003, ¶270.

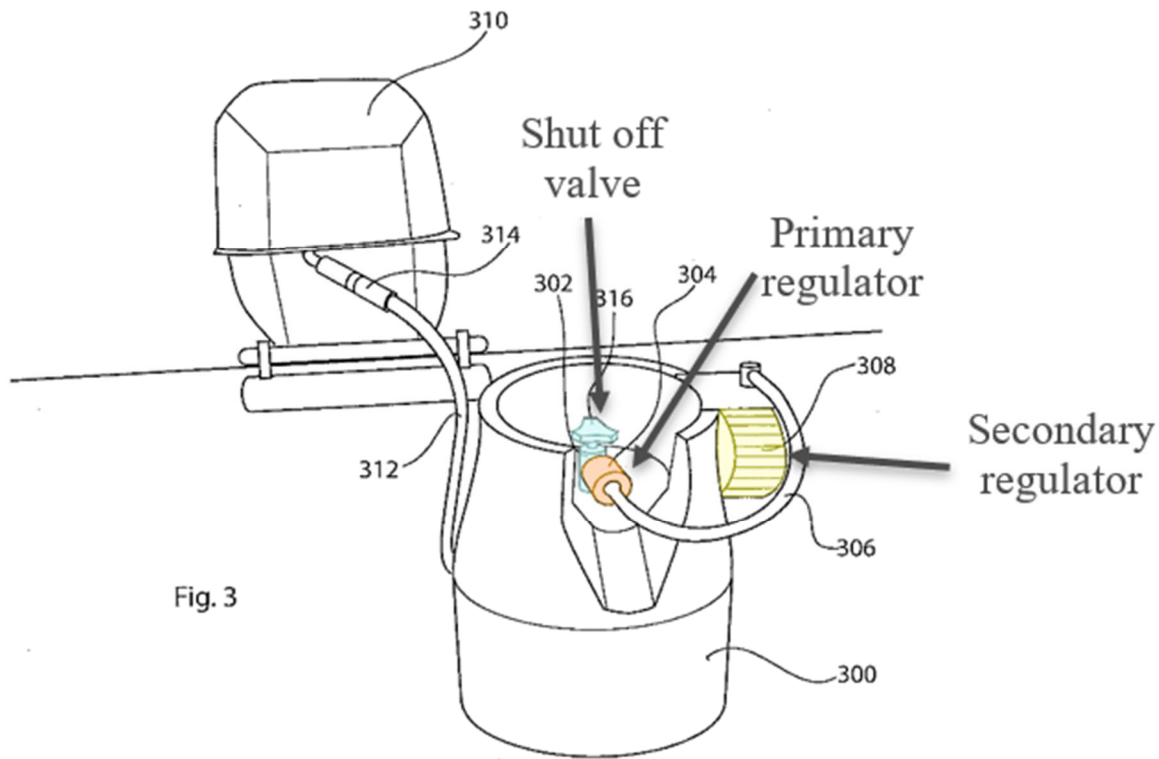
Parlature's two-stage regulator system solves this problem by partially reducing the pressure in the first regulator, and then further reducing the pressure in the second-stage regulator to more precisely control delivery to the engine. *Id.*, ¶271; Ex. 1010, ¶¶[0005]-[0006], [0014], [0016]-[0017]. Thus, a POSA would

have been motivated to utilize Parlatore's regulator system to avoid regulator freezing and/or the need for a heat source, while maintaining better reliability and more precise control over LPG fuel delivery to the engine. Ex. 1003, ¶272.

A POSA would have reasonably expected success in implementing Parlatore's two-stage regulator system for use in a generator because Parlatore expressly states that its regulator system can be implemented in generators. Ex. 1010, ¶[0019]; Ex. 1003, ¶273. This would have involved nothing more than replacing Nakafushi's vaporizer 14 with Parlatore's first and second regulators, or its dual-stage regulator, to achieve the same function of vaporizing the LPG and providing it to the engine at the desired pressure. Ex. 1003, ¶273.

e. Element [12.4]

Parlatore discloses a primary regulator 304 coupled to service valve 316 of the pressurized propane tank 300. Ex. 1010, ¶¶[0020]-[0023], Fig. 3; Ex. 1003, ¶275. Regulator 304 regulates the propane to a reduced pressure. Ex. 1010, ¶[0016]; *see also* ¶[0020] ("primary regulator 304, as described previously [as primary regulator 106]"); Ex. 1003, ¶275. Parlatore's Figure 3 shows an exemplary embodiment:

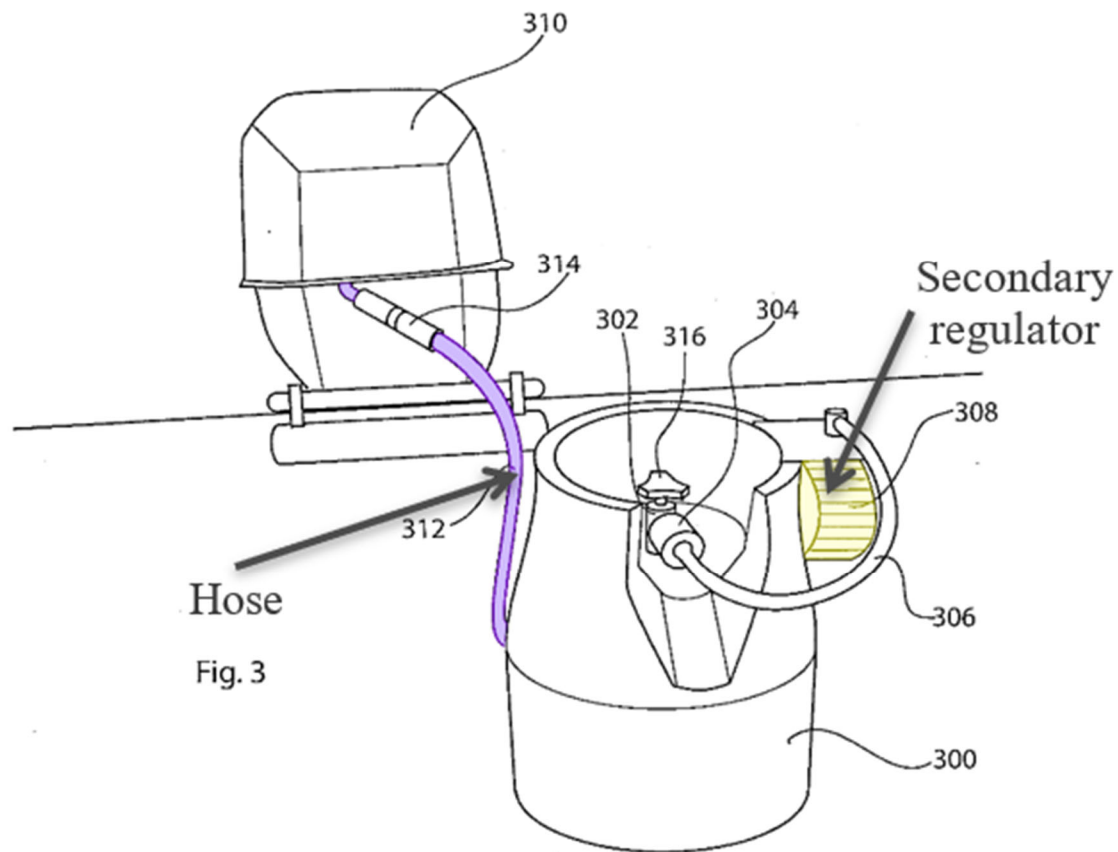


Ex. 1003, ¶275. Parlature's two-stage regulator 202 also comprises a primary, first-stage regulator coupled to the LPG tank. Ex. 1010, ¶¶[0019]-[0021], Fig. 2.

Parlature's fuel regulator system would have been obvious to use with Nakafushi's engine as discussed. *Supra* §§VII.G.1.d, VII.D.1.b. Similarly, it would have been obvious to use Parlature's LPG tank 300 along with its service valve 316 with Nakafushi's engine given that such LPG tanks having service valves were well-known and ubiquitous. Ex. 1003, ¶276. This would have involved nothing more than using Parlature's LPG tank configuration as the LPG fuel source for Nakafushi, with each performing their intended function without any unexpected results. *Id.*

f. Element [12.5]

Parlatore discloses secondary pressure regulator 308, coupled to the primary pressure regulator 304, for regulating the propane to a low pressure for feeding to the carburetor through hose 312. Ex. 1010, ¶[0020], Fig. 3; *see also id.*, ¶¶[0005]-[0006], [0016]-[0017]; Ex. 1003, ¶278. Parlatore's two-stage regulator 202 also comprises a secondary, second-stage regulator for the same purpose. Ex. 1010, ¶¶[0019]-[0021]. Parlatore's regulator system, including its secondary regulator as described above, would have been obvious to provide gaseous LPG fuel to Nakafushi's engine at the desired pressure via a gaseous fuel line, i.e., where Parlatore's hose 312 replicates Nakafushi's gaseous fuel passage 13, as seen in Figure 3:



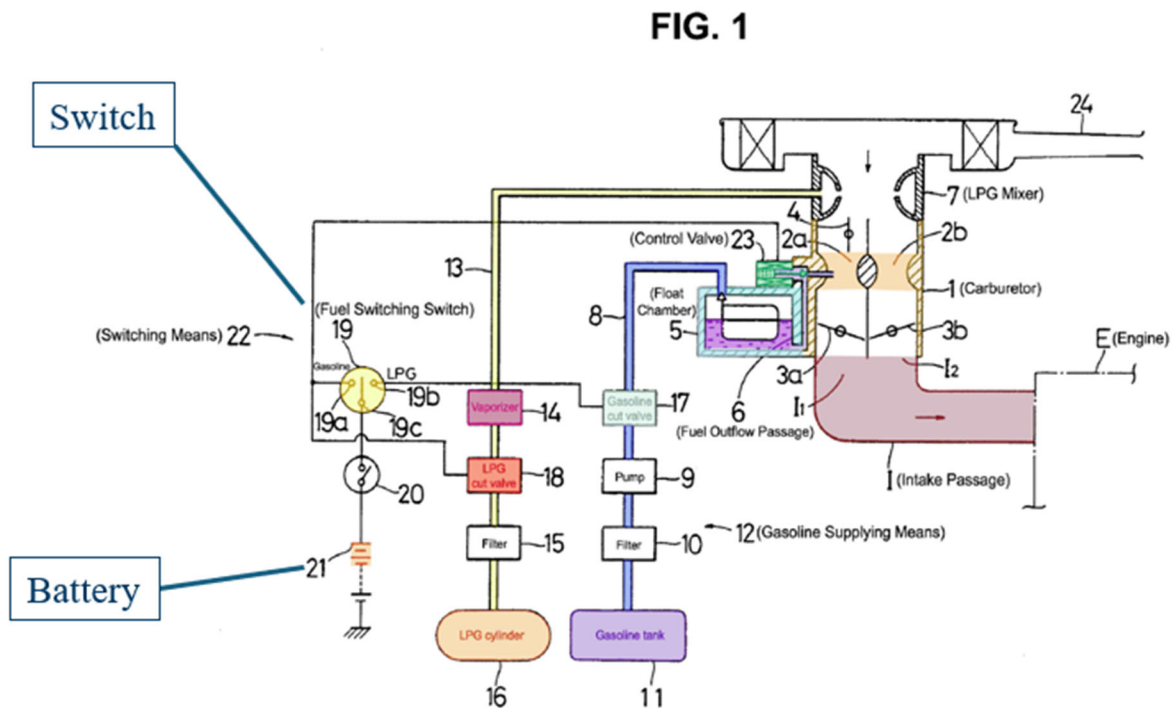
Supra §§VII.G.1.d, VII.D.1.b; Ex. 1003, ¶278.

2. Claim 13

Nakafushi discloses an electro-mechanical valve system coupled to an engine that controls liquid and pressurized gas fuel flow via operation of an electrical switch (fuel switch 19) that is powered by battery 21. Ex. 1005, ¶¶[0013]-[0014], Fig. 1; Ex. 1003, ¶280. Fuel switch 19 selectively connects or disconnects the valves (i.e., gasoline cut valve 17, LPG cut valve 18, and control valve 23) to/from the battery, thereby actuating the valves to their open or closed

positions to control liquid and gas fuel flow. Ex. 1005, ¶¶[0013]-[0014], Fig. 1; Ex. 1003, ¶281.

These elements are shown in Figure 1 below:



Id., Fig. 1 (annotated).

Because these valves are mechanical valves that open and close the fuel paths in response to electrical signals powered by a battery pursuant to switch 19, a POSA would have understood them to constitute an electro-mechanical valve system with an electrical switch. Ex. 1003, ¶¶280-281.

3. Claim 14

Nakafushi discloses fuel switch 19 that controls valve 23, the LPG cut valve 18 and gasoline cut valve 17 to prevent fuel flow from the liquid fuel source and

the gaseous fuel source simultaneously. Ex. 1005, ¶¶[0013]-[0014], Fig. 1; Ex. 1003, ¶283. Specifically, the switch simultaneously opens control valve 23 and gasoline cut valve 17, and closes the LPG valve 18 during gasoline operation, and vice versa for LPG operation. Ex. 1005, ¶¶[0013]-[0014], Fig. 1; Ex. 1003, ¶284. This simultaneous operation of control valves 17, 18 and 23 prevents both fuels from entering the carburetor simultaneously, but allows for switching between the fuel sources while the engine is running (i.e., switching while the generator is running). Ex. 1005, ¶¶[0013]-[0014]; Ex. 1003, ¶285.

Specifically, when Nakafushi's switch 19 is switched to the gasoline contact point 19a side, a cut signal is sent to the LPG cut valve 18 (the "gaseous cutoff") causing it to close (stopping the flow of LPG to the engine); simultaneously, a cut signal is sent to control valve 23 causing it to open and the lack of a cut signal causes gasoline cut valve 17 to open, thus allowing the flow of gasoline to the engine. Ex. 1005, ¶¶[0013]-[0014]; Ex. 1003, ¶286. In contrast, when fuel switch 19 is switched to the LPG contact point 19b side, the reverse occurs where a cut signal is sent to the gasoline cut valve 17 and the lack of a cut signal causes control valve 23 to close to stop gasoline flow; simultaneously, the lack of a cut signal causes LPG cut valve 18 to open. *Id.* Figure 1 shows the gasoline cut valve 17, LPG cut valve 18 and the control valve 23 are on the same circuit, such that the

switching of switch 19 will “simultaneously” actuate all three valves to their respective open or closed positions. Ex. 1005, Fig. 1; Ex. 1003, ¶286.

Nakafushi also discloses the claimed switching “while the generator is running,” teaching that:

[A]n object of the present invention is, in a gasoline-LPG combined engine comprising a carburetor equipped with a float chamber, to enable *switching between a gasoline engine operation and an LPG engine operation during the operation of the engine.*

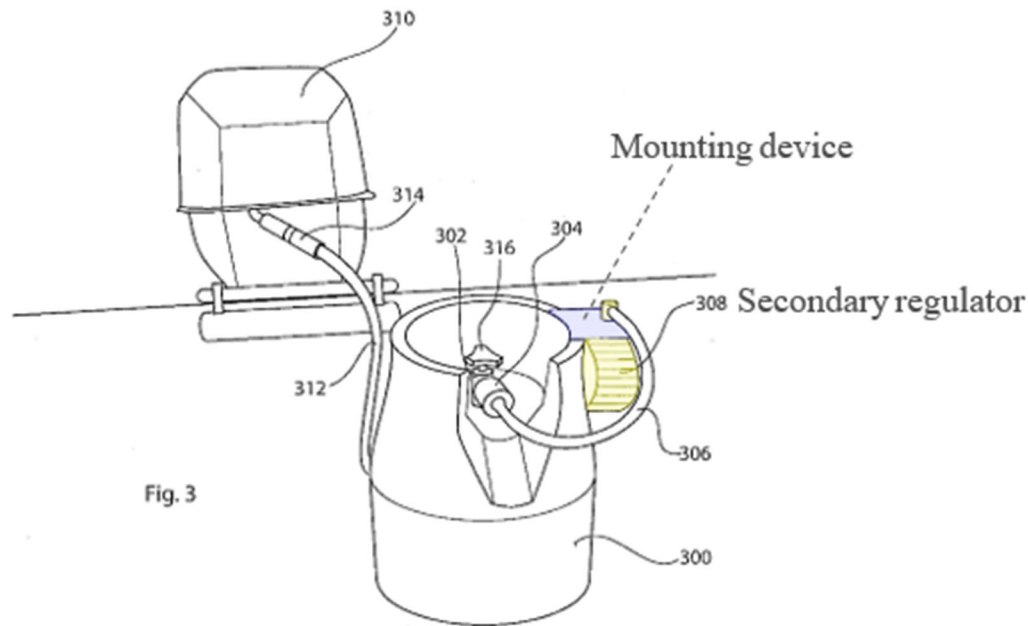
Id., ¶[0005] (emphasis added); *see also id.*, ¶¶[0008], [0016].

4. Claim 15

Nakafushi discloses the elements of this claim. *Supra* §VII.G.3. A POSA would have understood that because the same switch 19 operates all three valves (gasoline cut valve 17, LPG cut valve 18, and control valve 23) to change between liquid and gaseous fuels, simultaneous flow from the liquid and gaseous fuel sources is prevented, because when one fuel line is opened the other is simultaneously closed, and vice versa. Ex. 1003, ¶289.

5. Claim 16

Parlatore discloses LPG tank 300 located off-board its engine and a regulator mounting device to secure the secondary pressure regulator 308 to the LPG tank:



Ex. 1010, Fig. 3 (annotated); Ex. 1003, ¶¶291-292.

It would have been obvious to use this off-board configuration when using Parlature's regulator system with Nakafushi's engine in a generator for the same reasons discussed with respect to using Imamura's engine in a generator. *Supra* §VII.D.1.b. Parlature shows that a POSA would have had a reasonable expectation of success using an off-board regulator system. Ex. 1010, ¶¶[0019]-[0022], Fig. 3; Ex. 1003., ¶293.

6. Claim 17

Parlature discloses this element: "the regulator arrangement of the primary regulator 106 and the secondary regulator 110 may be such that they are combined as a single, two-stage, regulator 202." Ex. 1010, ¶[0018], Fig. 2.

H. Ground 8: Claims 18-19 are obvious over Nakafushi in view of Kirk and Olmr

Claims 18-19 of the '120 Patent are obvious under 35 U.S.C. §103, as detailed below and in the declaration of Dr. Morse (*see* Ex. 1003, ¶¶296-353).

1. Claim 18

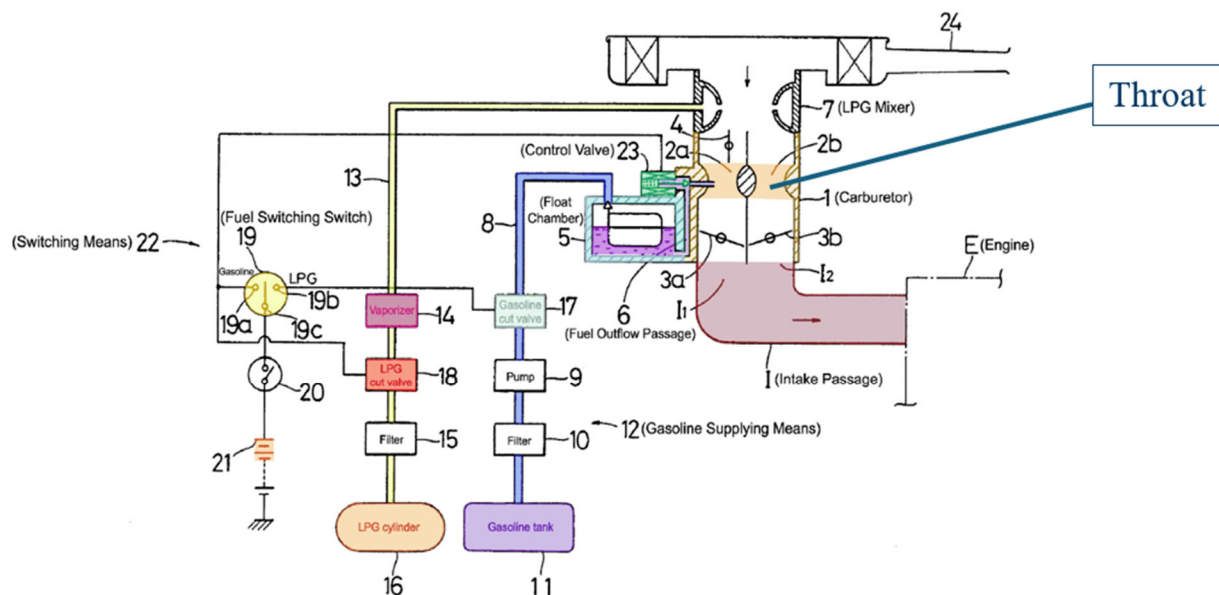
a. Element [18.0]

Nakafushi discloses a carburetor 1 for use in a “gasoline/LPG combined engine configured to selectively use gasoline or LPG as a fuel.” Ex. 1005, ¶¶[0001], [0010], Fig. 1.

b. Element [18.1]

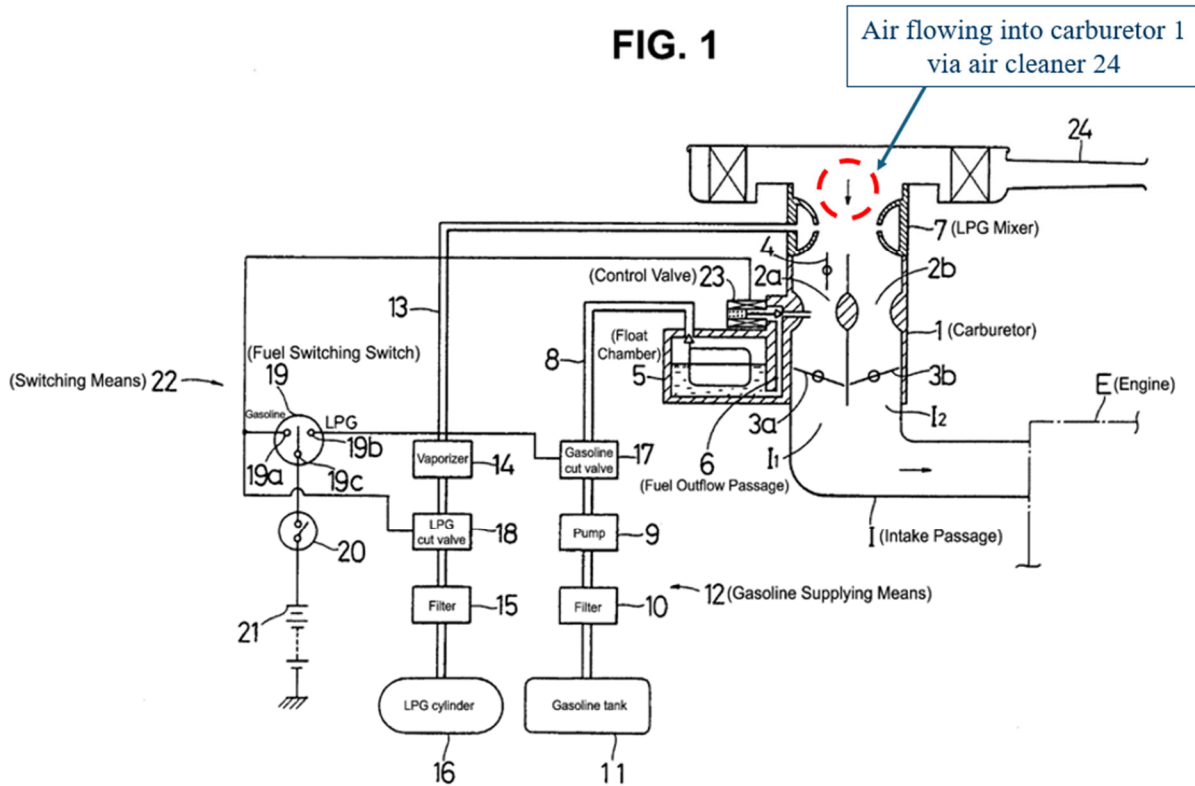
Nakafushi discloses a throat of the carburetor 1 in which fuel and air are mixed:

FIG. 1



Ex. 1005, Fig. 1 (annotated); Ex. 1003, ¶300.

Nakafushi discloses air flowing into carburetor 1 through air cleaner 24 to mix with gasoline or LPG in venturi portions 2a and 2b, as seen in Figure 1:



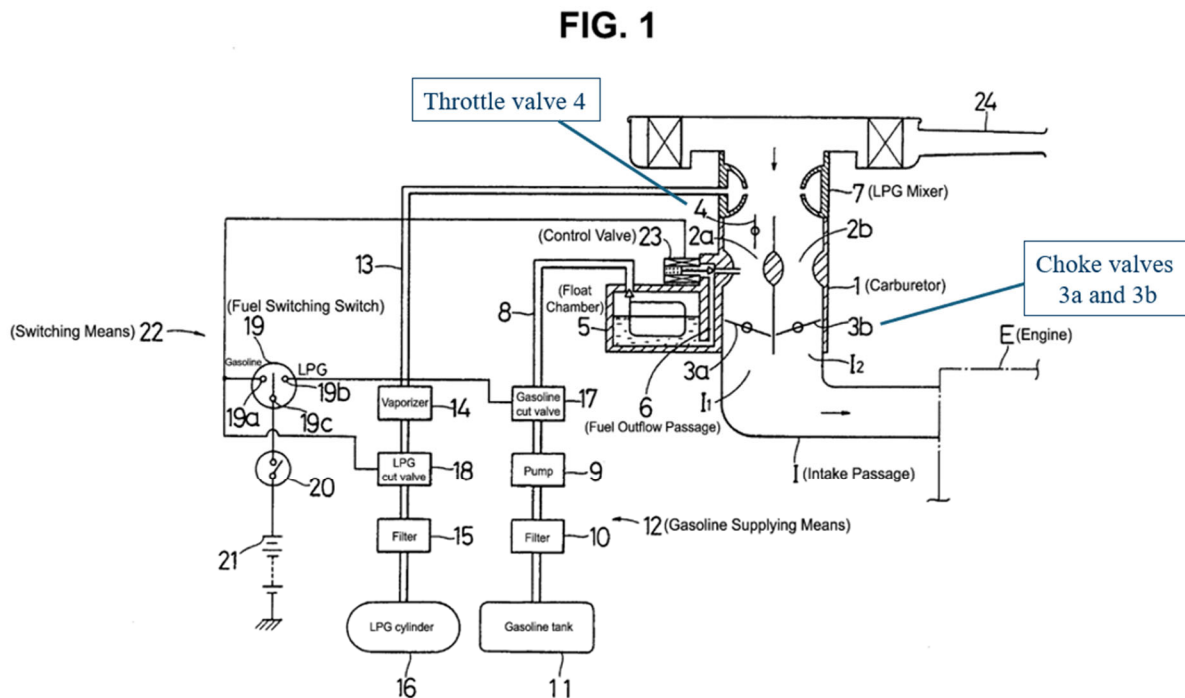
Id., Fig. 1 (annotated), ¶[0015]; Ex. 1003, ¶301. Nakafushi discloses “the float chamber 5 is communicated with the Venturi portions 2a and 2b of the carburetor 1 via a fuel outflow passage 6 having a small diameter, so that the gasoline in the float chamber 5 is sucked into the Venturi portions 2a and 2b and atomized and supplied during the operation of the engine E.” *Id.*, ¶[0010]. Nakafushi further states “5 denotes a float chamber in which gasoline is stored....” *Id.*

A POSA would have understood that engines such as Nakafushi’s operated by mixing fuel (either gasoline or LPG in Nakafushi’s case) with air prior to

combustion in the engine, as confirmed by Nakafushi's numerous references to the "air-fuel ratio" with regard to gasoline (and/or LPG) being mixed with air. *Id.*, ¶¶[0004]-[0005], [0008], [0016]; Ex. 1003, ¶302. A POSA thus would have recognized Nakafushi's disclosure of a throat in which fuel and air are mixed in throat to provide an air-fuel mixture for the multi-fuel internal combustion engine. Ex. 1003, ¶303.

c. Element [18.2]

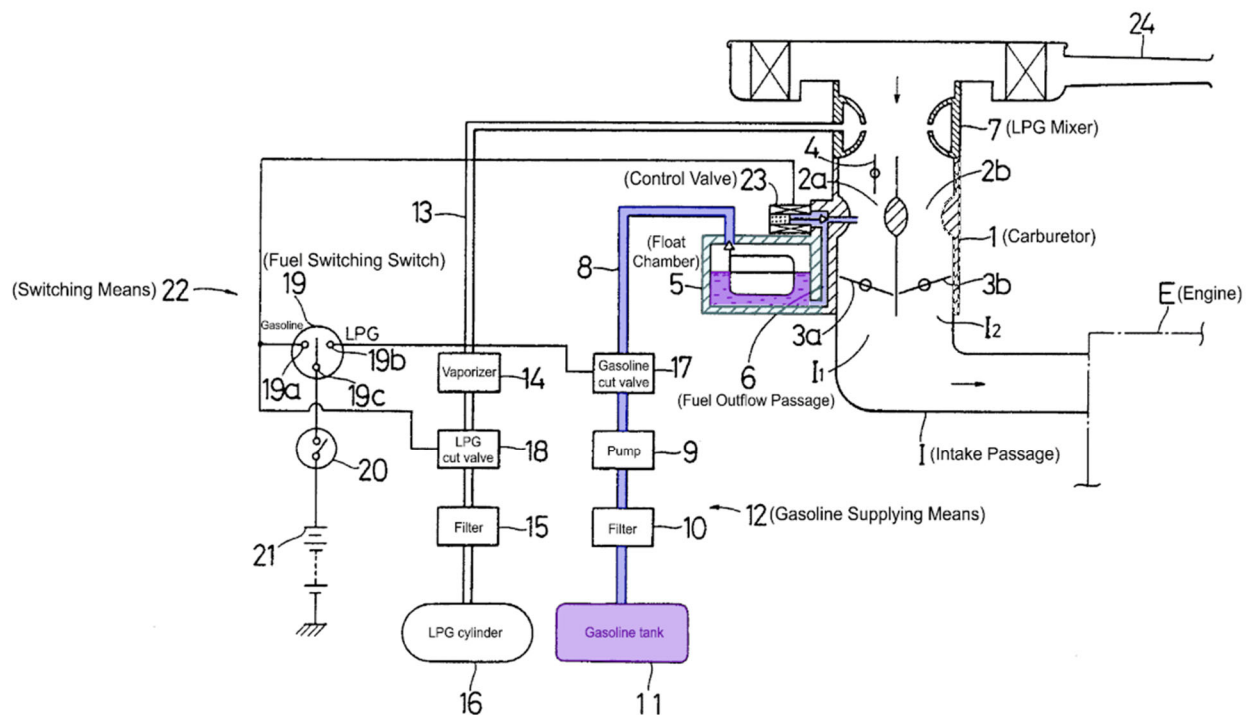
Nakafushi discloses throttle valves 3a and 3b and a choke valve 4 to provide a choke and throttle for the engine. Ex. 1005, ¶[0010]; Ex. 1003, ¶305.



Id., Fig. 1 (annotated).

d. Element [18.3]

Nakafushi discloses “the float chamber 5 is communicated with the Venturi portions 2a and 2b of the carburetor 1 via a fuel outflow passage 6 having a small diameter, so that the gasoline in the float chamber 5 is sucked into the Venturi portions 2a and 2b and atomized and supplied during the operation of the engine E.” *Id.*, ¶[0010].

FIG. 1

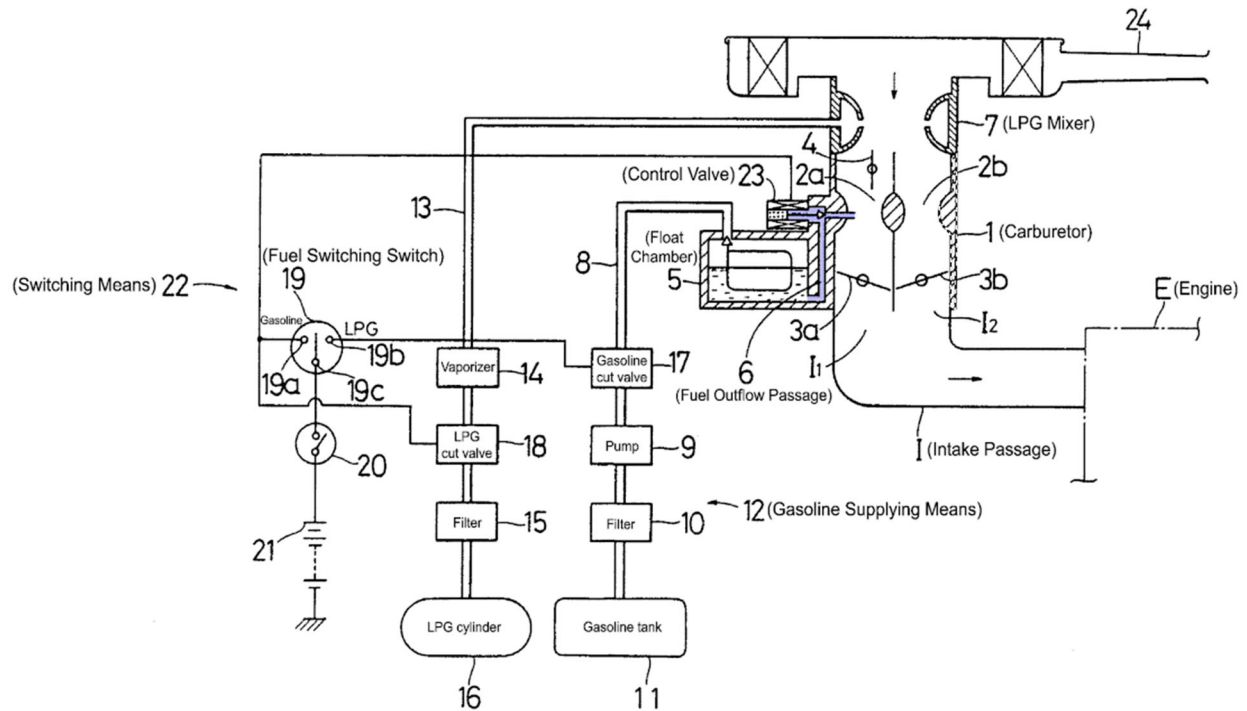
Ex. 1005, Fig. 1 (annotated).

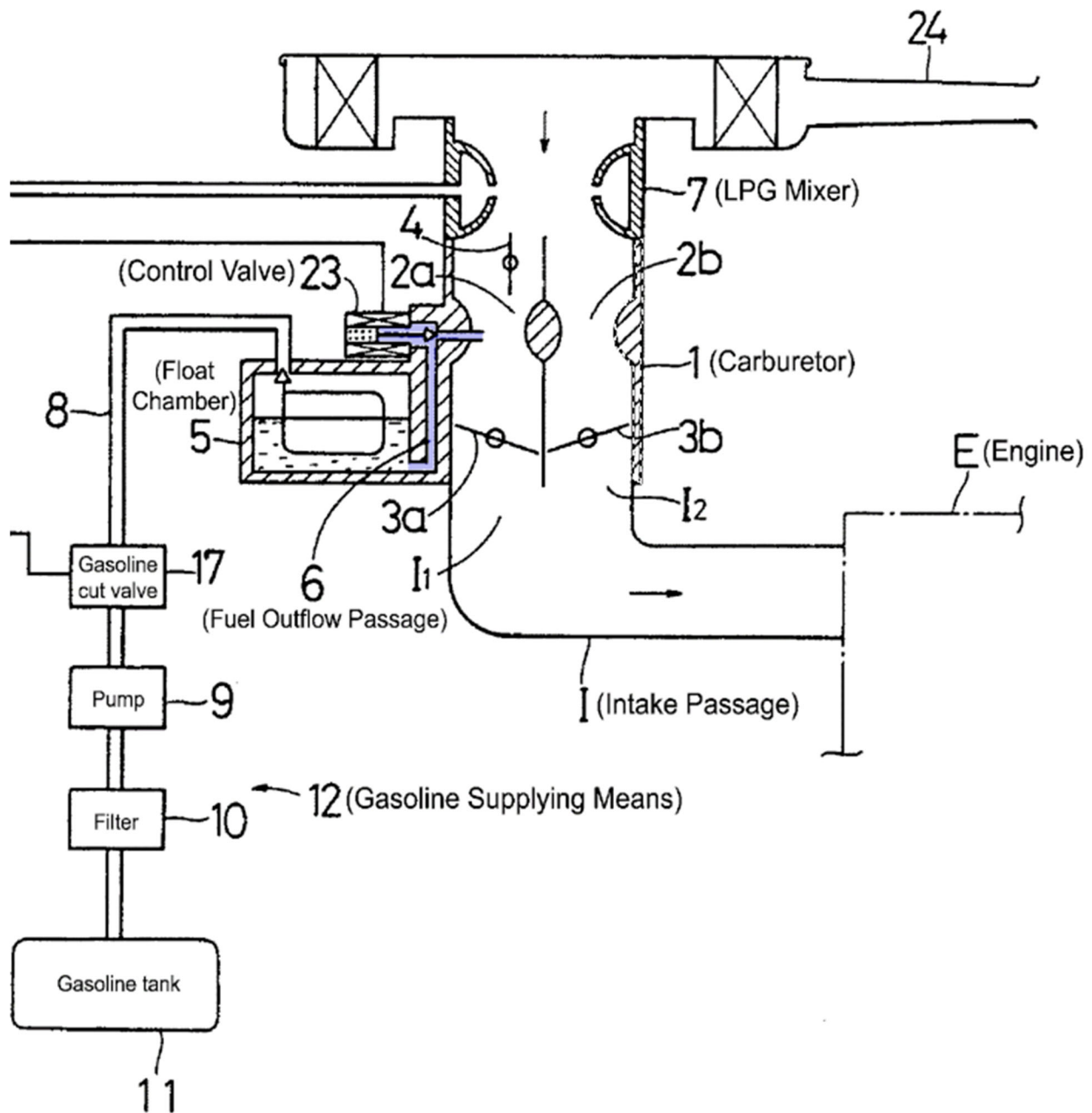
Nakafushi further states “5 denotes a float chamber in which gasoline is stored....” *Id.* Thus, Nakafushi’s float chamber 5 is a “float bowl,” which holds gasoline. Ex. 1003, ¶¶307-308.

e. Element [18.4]

Nakafushi discloses fuel outflow passage 6 positioned downstream from the float chamber 5 to the throat of the carburetor. *Id.*, ¶[0010], Fig. 1; Ex. 1003, ¶310.

FIG. 1





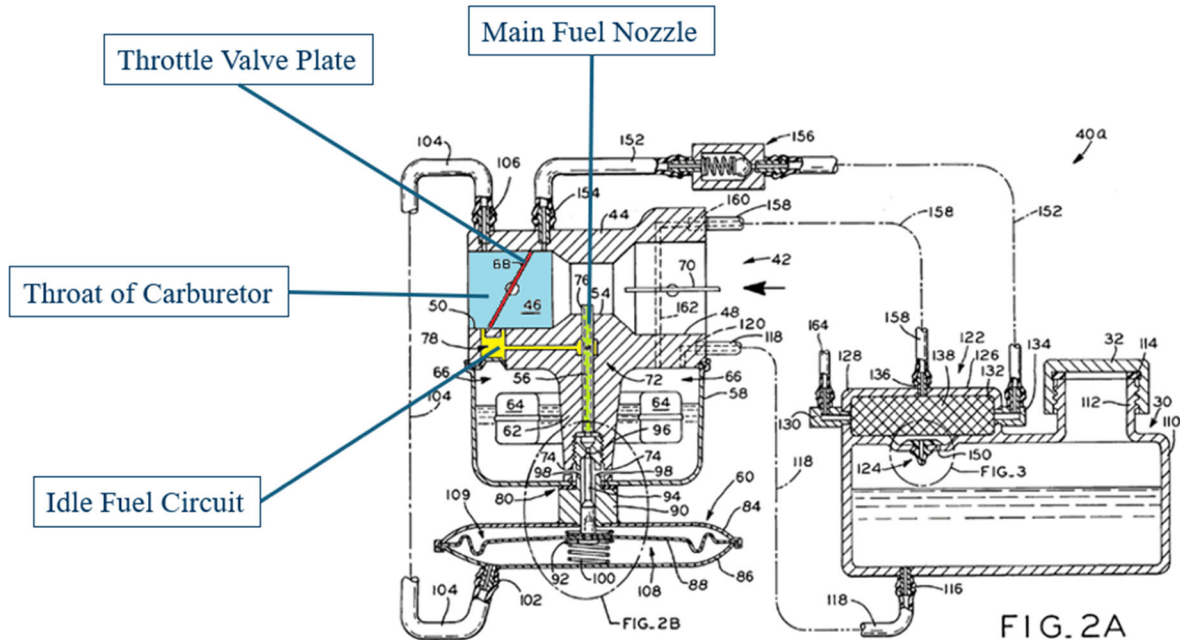
Id., Fig. 1 (annotated).

The fuel outflow passage 6 is a “main fuel circuit” for purposes of Element [18.4] because it is positioned downstream from the float bowl and extends from the float bowl to the throat. *Id.*, ¶[0010], Fig. 1; Ex. 1003, ¶311.

f. Element [18.5]

It would have been obvious to a POSA to include an idle fuel circuit in the Nakafushi engine because it was common to include an idle fuel circuit in the carburetor of an internal combustion engine at the time of the invention. Ex. 1003, ¶313.

Kirk discloses an idle fuel circuit that provides a flow path to the throat of a carburetor downstream of the throttle to run the engine at idle. Ex. 1025, 6:36-46, Fig. 2A; Ex. 1003, ¶314. Specifically, Kirk discloses an idle fuel circuit 78 that extends from the main fuel nozzle 76 and opens into the throat 46 of the carburetor 42. *Id.* The idle fuel circuit 78 provides a flow path to the throat downstream of the throttle (throttle valve plate 68) “to provide idling fuel to throat 46 of carburetor 42 when throttle valve plate 68 is in a closed position.” *Id.*, 6:42-46; Fig. 2A; Ex. 1003, ¶314.



Ex. 1025, Fig. 2A (annotated).

It would have been obvious to incorporate the idle fuel circuit 78 of Kirk into the carburetor 1 of Nakafushi to supply gasoline during engine idle, downstream of throttle valves 3a and 3b. Ex. 1003, ¶¶314-16.

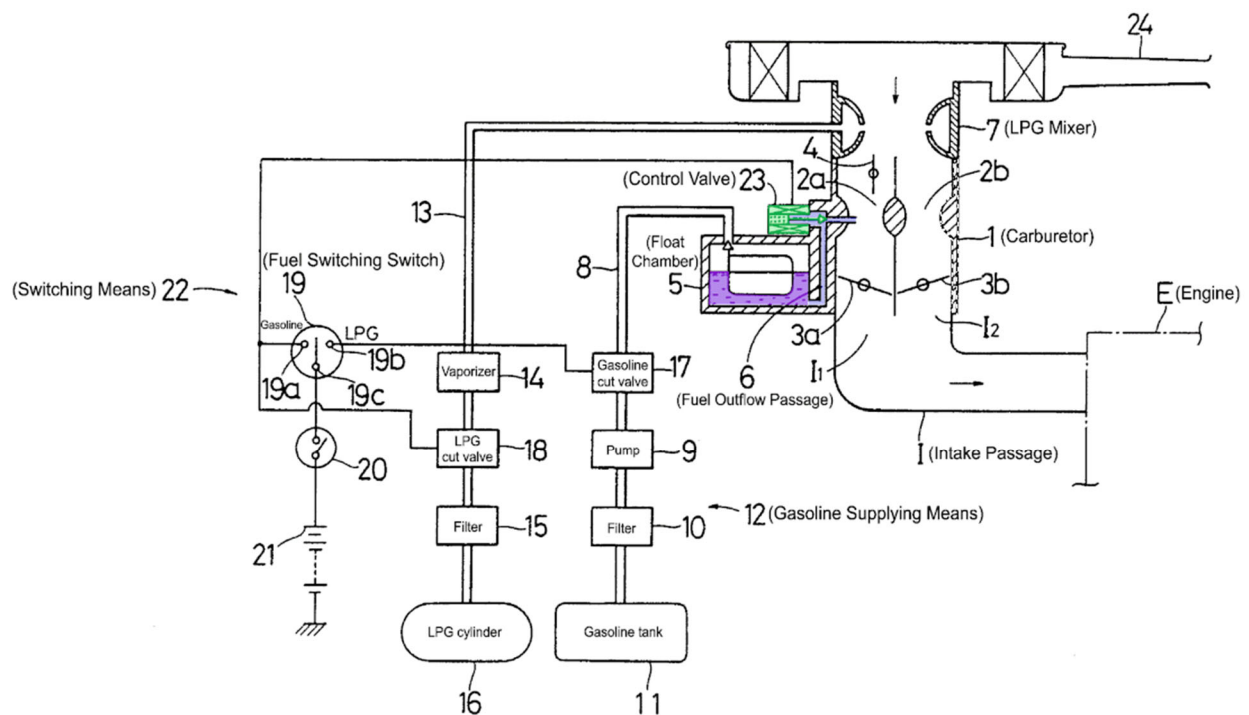
i. Motivation/Expectation of Success

A POSA would have been motivated to include an idle fuel circuit in the Nakafushi engine to provide an appropriate air-fuel mixture when the engine is running at low speeds, when the throttle is closed or only partially open. Ex. 1003, ¶317.

A POSA would have had a reasonable expectation of success because idle fuel circuits similar to those disclosed in Kirk were commonly used in internal combustion engines at the time of the invention. Ex. 1003, ¶318.

g. Element [18.6]

Nakafushi discloses control valve 23 (Ex. 1005, ¶[0014], Fig. 1), which is a “carburetor cutoff” for purposes of Element [18.6]. Ex. 1003, ¶320. Specifically, Nakafushi explains that “a control valve 23 configured to open and close the fuel outflow passage 6 is disposed so as to intervene in the fuel outflow passage 6.” Ex. 1005, ¶[0014]. Nakafushi’s fuel outflow passage 6 connects the float chamber 5 to the carburetor’s venturi portions 2a and 2b, which is the main fuel circuit. *Id.*, ¶[0010], Fig. 1; Ex. 1003, ¶320.

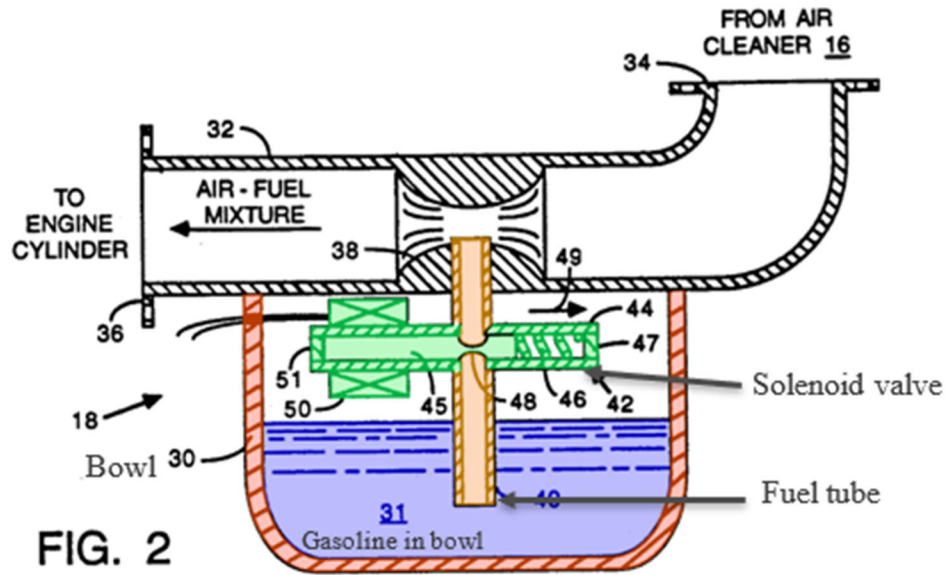
FIG. 1

Id., Fig. 1 (annotated).

Combined with the idle fuel circuit of Kirk, the control valve 23 would also control fuel flow to the idle fuel circuit, similar to the configuration of Kirk. *Id.*, 6:36-50; Fig. 2A; Ex. 1003, ¶¶320-321. Kirk discloses a shutoff valve 80 that controls the flow of gasoline from the float bowl 58 to fuel circuit 72. *Id.* The idle fuel circuit 78 branches off from fuel circuit 72, thus Kirk's shutoff valve 80 selectively controls fuel flow through the main fuel circuit and the idle fuel circuit. *Id.*, 6:36-50; Fig. 2A; Ex. 1003, ¶321. Using this same configuration in Nakafushi's engine, the idle fuel circuit would branch off from the main fuel circuit (fuel outflow passage 6), and control valve 23 would therefore selectively control fuel flow through the main fuel circuit and the idle fuel circuit. *Id.*; Ex. 1005, Fig. 1; Ex. 1003, ¶321.

While Nakafushi does not use the word "solenoid" to describe its control valve 23, a POSA would have understood valve 23 to be a solenoid valve, driven by action of an electric circuit, such that Nakafushi alone satisfies this element. Ex. 1003, ¶¶322-330.

To the extent Nakafushi does not disclose a "solenoid," it would have been obvious to a POSA to use a solenoid in view of Olmr. *Id.*, ¶¶331-342. Olmr discloses a gasoline engine having solenoid valve 42 in a float bowl 30 that cuts off the flow of gasoline to the venturi 38 when the operator closes the kill switch. Ex. 1007, 2:30-68, 4:11-27; Ex. 1003, ¶328.



Id., Fig. 2 (annotated); Ex. 1003, ¶¶328-329. Thus, Olmr's valve 42 is a carburetor cutoff solenoid coupled to the float bowl 30 in the carburetor that opens and closes a liquid fuel path to the engine via venturi 38. Ex. 1003, ¶330.

A POSA would have found it obvious to utilize a solenoid such as that disclosed by Olmr for Nakafushi's control valve 23, as discussed below.

i. Motivation/Expectation of Success

Nakafushi and Olmr both relate to gasoline engines and both seek to prevent the flow of gasoline from the float bowl to the engine intake upon cessation of gasoline operation of the engine. Ex. 1003, ¶¶332-338. In Nakafushi, control valve 23 cuts the gasoline flow from float chamber 5 when the operation of the engine is switched from gasoline to LPG. Ex. 1003, ¶339. Nakafushi does not expressly identify the type of valve that is used, but Olmr expressly teaches using a solenoid

(valve 42) for this same purpose. Ex. 1007, 2:30-56; *see also id.*, 1:33-36, Fig. 2; Ex. 1003, ¶342. Olmr thus teaches an express example—a solenoid valve—for accomplishing the same function taught by Nakafushi, i.e., cutting gasoline flow to the venturi when needed. It would have thus been a simple substitution to incorporate Olmr’s expressly-identified solenoid valve to accomplish the same function in Nakafushi. Ex. 1003, ¶¶340-342.

A POSA would have reasonably expected success in using Olmr’s solenoid valve 42 as Nakafushi’s control valve 23. At the time of the invention, the use of solenoid valves to cut off/control the flow of fuel was ubiquitous, with Olmr being just one example. Ex. 1003, ¶¶343-344.

Furthermore, Nakafushi discloses a simple electrical circuit to open and close its control valve 23 (Ex. 1005, ¶¶[0013]-[0014], Fig. 1), which a POSA would have recognized as being suitable to energize a solenoid valve, such as Olmr’s solenoid valve 43, to open or close the fuel pathway. Ex. 1003, ¶¶345-346. Indeed, Olmr teaches an essentially identical electrical circuit for operating its solenoid valve. Ex. 1007, 2:57-4:27, Figs. 2-3; Ex. 1003, ¶347. A POSA would have therefore reasonably expected that Olmr’s solenoid valve could be successfully implemented to serve as Nakafushi’s control valve 23 to accomplish the desired function of cutting off the supply of gasoline from Nakafushi’s float chamber 5 to the intake of the engine. Ex. 1003, ¶¶347-349.

2. Claim 19

Nakafushi discloses that control valve 23 (the carburetor cutoff solenoid when combined with Olmr) is operatively coupled to the switch 19 that changes operation of the engine from liquid fuel to gaseous fuel and from gaseous fuel while the engine is running. *Supra* §§VII.G.2, VII.G.3. Combined with the idle fuel circuit of Kirk, the control valve 23 would stop liquid fuel flow through both the main fuel circuit disclosed in Nakafushi and the idle fuel circuit when the switch 19 changes operation of the engine from liquid fuel to gaseous fuel. *Supra* §VII.H.1.g; Ex. 1003, ¶¶352-353.

VIII. MANDATORY NOTICES AND FEES

A. Real Parties-In-Interest

In addition to Petitioners, Harbor Freight Holdings, Inc., Generac Holdings Inc., MWE Equipment Sales, LLC are listed as potential real-parties-in-interest.

B. Related Matters

The '120 Patent is or has been involved in several pending litigations.

Patent Owner has asserted the '120 Patent and related 10,221,780 ('780 Patent), 10,393,034 ('034 Patent), 10,697,398 ('398 Patent), 11,143,145 ('145 Patent), 11,492,985 ('985 Patent), 11,530,654 ('654 Patent), 11,840,970 ('970 Patent), and 11,905,895 ('895 Patent), as well as other non-family member patents, in *Champion Power Equipment Inc. v. Firman Power Equipment Inc.*, 23-cv-02371-DWL (D. Ariz.).

U.S. Patent No. 11,143,120

Patent Owner has asserted the '120 Patent and related '780 Patent, '398 Patent, '145 Patent, '985 Patent, '654 Patent, '970 Patent, and '895 Patent, as well as other non-family member patents, in *Champion Power Equipment Inc. v. Generac Power Systems Inc.*, 24-cv-01281-LA (E.D. Wis.).

Petitioner Harbor Freight has filed a declaratory judgment action alleging non-infringement of the '120 Patent and related '654 Patent, '985 Patent, '780 Patent, '398 Patent, '034 Patent, '145 Patent, '970 Patent, and '895 Patent, as well as other non-family member patents, in *Harbor Freight Tools USA, Inc. v. Champion Power Equipment, Inc.*, 24-cv-08722-SVW-AS (C.D. Cal.).

Patent Owner has asserted the '120 Patent and related '780 Patent, '398 Patent, '034 Patent, '145 Patent, '985 Patent, '654 Patent, '970 Patent, and '895 Patent, as well as other non-family member patents in *Champion Power Equipment Inc. v. Harbor Freight Tools USA Inc.*, 24-cv-01302-PP (E.D. Wis.). This case was dismissed on April 29, 2025, in favor of the earlier filed action in C.D. California cited above.

Patent Owner has asserted the '120 Patent and related '780 Patent, '034 Patent, '398 Patent, '145 Patent, '985 Patent, and '895 Patent, as well as other non-family member patents, in *Champion Power Equipment Inc. v. Westinghouse Elec. Corp. et al.* in the United States District Court of Nevada, Civil Action No. 2:25-cv-00844.

C. Counsel and Service Information

Pursuant to 37 C.F.R. §42.8(b)(3) and 42.10(a), Petitioner provides the following counsel and service information. Pursuant to 37 C.F.R. §42.10(b), a Power of Attorney for each Petitioner accompanies this Petition.

LEAD COUNSEL	BACK-UP COUNSEL
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Petitioner consents to electronic service directed to the following email address:

HarborFreight-Champion-IPRs@foley.com

D. Payment of Fees

The Office is authorized to charge fees for this Petition to Deposit Account No. 190741. Any additional fees that might be due are also authorized.

IX. CONCLUSION

Trial should be instituted and the Challenged Claims cancelled.

Date: June 23, 2025

Respectfully submitted,

By: /Kimberly K. Dodd/

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**CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMITATION,
TYPEFACE REQUIREMENTS, AND TYPE STYLE REQUIREMENTS**

1. This Petition complies with the type-volume limitation of 14,000 words, comprising 13,983 words, as counted using the Microsoft Word software that was used to prepare this paper, excluding the parts exempted by 37 C.F.R. § 42.24(a).

2. This Petition complies with the general format requirements of 37 C.F.R. § 42.6(a) and has been prepared using Microsoft® Word in 14-point Times New Roman.

Date: June 23, 2025

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that on June 23, 2025, true and correct copies of the foregoing document and supporting materials were served in its entirety on the Patent Owner at the following address of record listed on the USPTO's Patent Center via FedEx Overnight:

26629 - ZIOLKOWSKI PATENT SOLUTIONS GROUP, SC (ZPS)
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Courtesy copies of the same documents were served electronically on Patent Owner's litigation counsel by email at the following address:

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U.S. Patent No. 11,143,120

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