

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. 11,840,970

Issued: Dec. 12, 2023

Title: DUAL FUEL GENERATOR WITH REMOTE REGULATOR

Inter Partes Review No. IPR2025-01463

DECLARATION OF TIMOTHY L. MORSE, Ph.D., P.E.

U.S. Patent No. 11,840,970

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I. INTRODUCTION

1. I have been retained as an expert on behalf of Petitioners Harbor Freight Tools USA, Inc., Generac Power Systems, Inc., and MWE Investments, LLC (“Petitioners”) as an independent expert consultant in support of Petitioners’ request for *Inter Partes* Review No. IPR2025-01463 to review the challenged claims of U.S. Patent No. 11,840,970 (“the ’970 Patent,” EX1001), assigned to Champion Power Equipment, Inc. (“Patent Owner” or “Champion”). My opinions are set forth below.

2. My employer, Exponent, Inc., is being compensated for my time in connection with this *Inter Partes* Review at my standard consulting rate, but my compensation is not in any way tied to or affected by the outcome of this matter.

3. I have been asked to provide my opinions regarding whether Claims 1–52 of the ’970 Patent are invalid. Specifically, this report addresses the invalidity of Claims 1–52 (the “Challenged Claims”) of the ’970 Patent.

4. This report sets forth the opinions that I have formed based on the information available to me as of the date below. The opinions and facts set forth in this report are based upon my analysis of the ’970 Patent and its claims, the prior art, the state of the art at the time of the invention, as well as my knowledge and extensive experience in this field.

5. My analysis of the materials submitted in this proceeding is ongoing and I will continue to review any new material that is provided. This declaration is

indicative of only those opinions that I have formed to date. I reserve the right to amend, revise, and/or supplement my opinions stated herein based on any new information that may become available to me or my continuing analysis of the materials already provided.

6. I am not currently and have not at any time in the past been an employee of Petitioners. I have no financial interest in Petitioners outside of assisting Petitioners as an expert in this and any related matters.

II. QUALIFICATIONS AND EXPERIENCE

7. My qualifications for forming the opinions in this report are summarized here and explained in more detail in my curriculum vitae (“CV”), which I understand is being appended hereto.

8. As detailed in my CV, I have extensive experience in the design, development, and manufacture of multi-fuel internal combustion engines and generators, with a career spanning over fifteen years in this field. I have specific expertise in thermal and flow processes and have a good understanding of the relevant mechanical principles and constraints associated with the implementation of such processes into physical products and equipment, including internal combustion engines and generators. I have also engaged in extensive consulting work, specializing in failure analysis, failure prevention, and design risk assessment of power generation equipment and facilities, including power plants, fixed

emergency power generation, and portable generators. I have personally investigated the causes of failure of many different types of portable generators.

9. I earned my Bachelor of Engineering in Mechanical Engineering from the Cooper Union for the Advancement of Science and Art in 2003. I completed a Master of Science in Mechanical Engineering in 2007 and a Doctor of Philosophy in Mechanical Engineering in 2009, both from Cornell University. I am a licensed Professional Engineer in mechanical engineering in California, Florida, Kansas, Massachusetts, New Hampshire, New York, Pennsylvania, Rhode Island, and Vermont. I am also a Certified Fire and Explosion Investigator with the National Association of Fire Investigators.

10. I am a member of the National Fire Protection Association (NFPA) and serve on two code committees responsible for developing safety standards in the US. One of these committees is the NFPA Technical Committee on Vehicular Alternative Fuel Systems (VAF-AAA), responsible for NFPA 52: Vehicular Natural Gas Fuel Systems Code. NFPA 52 applies to vehicles and vehicle internal combustion engines that operate with natural gas. One of my functions as a member of this committee is to understand how safety considerations for more common gasoline powered vehicles apply to natural gas powered vehicles. The other committee I serve on is the NFPA Technical Committee on Liquefied Petroleum Gases (LPG-AAA), responsible for NFPA 58: Liquefied Petroleum Gas Code. NFPA 58 applies to the use

of LPG in a wide range of applications, including portable generators and portable generator fueling systems.

11. I have performed research and analysis for the Portable Generators Manufacturers Association (PGMA). This work has included evaluating the safety of portable generators, including the generation of carbon monoxide, which is a byproduct of combustion. This research work has been presented to the US Consumer Product Safety Commission (CPSC).

12. I am also an active contributor to the scholarly literature in my field, being a named author on over twenty publications. Most of my publications went through the peer review process, appearing in sources like the Journal of Fluid Mechanics and the Journal of Fluids and Structures. Broadly speaking, these publications relate to the design and safety of fluid and thermal systems, like how the valve closure time affects pressure in a fluid system. In addition to researching and writing on emerging safety issues, I have presented my work over twenty-five times to various audiences including practicing engineers, which has led me to appreciate how a less experienced engineer would perceive the prior art and approach the technical problems disclosed in the prior art.

13. I also have broader consulting experience in the development and design of thermal and flow processes, products, and equipment. My project experience includes turbines, compressors, valves, heat exchangers, boilers,

furnaces, refrigeration systems, piping systems, autoclaves, heat transfer systems, flammable liquids, cryogenic liquids, consumer products, and medical devices. This work has included analysis of HVAC systems, the engineering analysis of gas extraction facilities, and the investigation into failures of generators and heat exchangers, among other applications.

14. I am currently employed as a Principal Engineer at Exponent, Inc., a U.S.-based engineering and scientific consulting firm. Before joining Exponent, I was a researcher in the Fluid Dynamics Research Laboratories at Cornell University where I conducted research on the wakes of stationary and oscillating structures in a flow and particularly on how flow-induced vibration due to vortex shedding causes fatigue and failure of structures.

III. MATERIALS AND OTHER INFORMATION CONSIDERED

15. All the opinions contained in this declaration are based on the documents I have reviewed and my professional judgment, as well as my education, experience, and professional knowledge. I am not an attorney, and I am not offering any purely legal opinions in this declaration. In forming the opinions expressed in this declaration, I relied upon my education, knowledge, and experience in the relevant field of the art, and have considered the viewpoint of a person having ordinary skill in the relevant art. I have considered the materials referenced herein, including the '970 Patent (EX1001), the file history of the '970 Patent (excerpts at

EX1002), and the prior art references listed in the table below. Each of these documents is a type of document that an expert in my field would have reasonably relied upon when forming their opinion.

Exhibit No.	Description
1001	U.S Patent No. 11,840,970 to Sarder et al. (“the ’970 Patent”)
1002	File History for U.S. Patent No. 11,840,970 (“the ’970 File History”)
1004	DuroMax XP4400EH Operator’s Manual (“DuroMax”)
1005	U.S. Patent No. 5,718,265 to Elsdon (“Elsdon”)
1006	U.S. Patent No. 4,492,207 to Hallberg (“Hallberg”)
1007	Tri-Fuel YouTube Video (https://www.youtube.com/watch?v=DpknaAPTQ9U) (“Tri-Fuel Video”)
1008	Indian Patent No. 207333 (“Chaudhari”) (certified)
1009	<i>American Heritage Dictionary of the English Language</i> (3d ed. 1996) (excerpted)
1010	U.S. Patent Publication No. 2011/0100335 (“Parlatore”)
1011	Champion’s Claim Construction Brief in 23-cv-2371-PHX-DWL
1012	Declaration of David Raskin (dated May 7, 2025)
1013	https://www.youtube.com/watch?v=Ip7ckWAZ3xQ
1016	2-Stage Regulator Assembly (“2-Stage Assembly”) with WayBack Machine certification

Exhibit No.	Description
1017	LP-Gas Code Handbook, Eighth Edition, Lemoff, Theodore C., (2008) (excerpted) (“LP-Gas Handbook”)
1018	Champion’s Infringement Contentions with Respect to Petitioner Harbor Freight’s Model 70143 Generator
1021	U.S. Patent Pub. No. 2014/0239645 (“Jungmann”)
1022	U.S. Patent Pub. No. 2014/0202430 (“Monros”)
1023	U.S. Patent No. 5,172,723 (“Sturgis”)
1024	Weber Summit Gas Grill, Natural Gas Grill Owner’s Guide (dated February 28, 2011)
1025	Char-Broil Natural Gas Conversion Kit Model #4984619 (dated September 29, 2007)
1026	U.S. Patent No. 8,517,718 (“Deng”)

16. My opinions are additionally guided by my appreciation and understanding of how a POSA would have understood the claims of the ’970 Patent at the time of the earliest possible priority date of the patents, which I understand is June 12, 2015.

IV. SUMMARY OF OPINIONS

17. Based on my experience and expertise, it is my opinion that:

- a. Claims 1–52 recite nothing more than devices that were already known in the industry prior to the effective filing date of the ’970 Patent;

- b. Claims 1-5 and 34-37 are obvious over Chaudhari in view of Hallberg;
- c. Claims 12-14, 44, 48, and 50-51 are obvious over Chaudhari in view of Hallberg and Jungmann;
- d. Claims 8-11, 16-19, and 40-43 are obvious over Chaudhari in view of Hallberg, Jungmann, and Parlatore;
- e. Claims 7, 15, 20-27, 29-33, 39, 45-46, and 49 are obvious over Chaudhari in view of Hallberg, Jungmann, Parlatore, LP-Gas Handbook, Sturgis, and Tri-Fuel Video;
- f. Claims 1-6, 8-14, 16-19, 34-38, 40-44, 47-48, and 50-52 are obvious over DuroMax in view of Parlatore and Elsdon;
- g. Claims 7, 15, 20-33, 39, 45-46, and 49 are obvious over DuroMax in view of Parlatore, LP-Gas Handbook, Sturgis, Elsdon, and Tri-Fuel Video; and
- h. Claims 1-2, 12-14, 20-21, 34, 44-45, and 48 are obvious over Chaudhari in view of Monros and Jungmann.

V. UNDERSTANDING OF PATENT LAW

18. I am not an attorney. For purposes of this report, I have an understanding about certain aspects of the law that are relevant to my opinions, as described below.

A. Claim Construction

19. I understand that claim terms must be construed under the *Phillips* standard. Under that standard, words of a claim are given their plain and ordinary meaning as understood by a person of ordinary skill in the art (also “POSA”) at the time of invention, in light of the specification and prosecution history, unless those sources show an intent to depart from such meaning, as well as pertinent evidence extrinsic to the patent. For purposes of this declaration, I applied the plain and ordinary meaning of each term as would have been understood by a person of ordinary skill in art at the time of the alleged invention unless explicitly stated otherwise.

B. Section 112(f)

20. I have been told 35 U.S.C. §112(f) applies to claim terms that recite function without reciting sufficient structure for performing that function. This is referred to as “means-plus-function” claiming. A critical question in making this assessment is whether the claim term is used in common parlance or by persons of skill in the pertinent art to designate structure. Generic terms such as “mechanism,” “element,” “device,” and similar words are tantamount to using the word “means” because they typically do not connote sufficiently definite structure and therefore invoke §112(f).

21. I understand that when a claim term is subject to §112(f), the judge must identify the claimed function. Then, the judge must determine what structure, if any, disclosed in the specification corresponds to the claimed function. Structure disclosed in the specification qualifies as corresponding structure if the intrinsic evidence clearly links or associates that structure to the function recited in the claim.

22. I understand that if the specification fails to disclose adequate corresponding structure, the claim is invalid as indefinite.

C. Obviousness

23. I understand that a patent claim can be considered to have been obvious to person of ordinary skill in the art at the time the application was filed. This means that, even if all of the elements of a claim are not found in a single prior art reference, the claim is not patentable if the differences between the subject matter in the prior art and the subject matter in the claim would have been obvious to a person of ordinary skill in the art at the time the application was filed.

24. I further understand that a determination of whether a claim would have been obvious must consider several factors, including, among others:

- a. the level of ordinary skill in the art at the time the application was filed;
- b. the scope and content of the prior art; and

- c. what differences, if any, existed between the claimed invention and the prior art.

25. I understand that the teachings of two or more references may be combined in the same way as disclosed in the claims, if such a combination would have been obvious to a person of ordinary skill in the art. In determining whether a combination based on either a single reference or multiple references would have been obvious, it is appropriate to consider at least the following factors:

- a. whether the teachings of the prior art references disclose known concepts combined in familiar ways, which, when combined, would yield predictable results;
- b. whether a person of ordinary skill in the art could implement a predictable variation, and would see the benefit of doing so;
- c. whether the claimed elements represent one of a limited number of known design choices, and would have a reasonable expectation of success by a person of ordinary skill in the art;
- d. whether a person of ordinary skill in the art would have recognized a reason to combine known elements in the manner described in the claim;

- e. whether there is some teaching or suggestion in the prior art to make the modification or combination of elements claimed in the patent; and
- f. whether the innovation applies a known technique that had been used to improve a similar device or method in a similar way.

26. I understand that a person of ordinary skill in the art has ordinary creativity and is not an automaton.

27. I understand that in considering obviousness, it is important not to determine obviousness using the benefit of hindsight derived from the patent being considered, and I have not done that in regards to my opinions expressed herein.

28. I understand that certain factors—often called “secondary considerations”—may support or rebut an assertion of obviousness of a claim. I understand that such secondary considerations include, among other things, commercial success of the alleged invention, skepticism of those having ordinary skill in the art at the time of the alleged invention, unexpected results of the alleged invention, any long-felt but unsolved need in the art that was satisfied by the alleged invention, the failure of others to make the alleged invention, praise of the alleged invention by those having ordinary skill in the art, and copying of the alleged invention by others in the field. I further understand that there must be a nexus—a connection—between any such secondary considerations and the alleged

invention. I also understand that contemporaneous and independent invention by others is a secondary consideration tending to show obviousness.

D. Anticipation

29. I understand that a patent claim is invalid if it is anticipated by a single item of prior art. I understand that an anticipation analysis involves two steps. First, the patent claims are construed to ascertain their scope. Second, each construed asserted claim is compared to the prior art reference on an element-by-element basis. If the prior art reference discloses or contains each and every element of the claimed invention as arranged in the claim, either expressly or inherently, then it anticipates the claim.

30. I understand that anticipation by inherent disclosure is appropriate only when a prior art reference necessarily includes or discloses the unstated claim element. I also understand that the discovery of a new or previously unreported or unappreciated property of a prior art composition, or of a scientific explanation for how a prior art composition operates, does not make the prior art composition patentably new to the entity or person that discovered the new property or mode of operation. I further understand that there is no requirement that a POSA would have recognized the inherent disclosure at the time of the invention.

31. For anticipation by a prior art publication or document, I understand that the reference's description must enable a POSA to practice the claimed

invention without undue experimentation. I further understand that the following factors may be considered to determine whether any experimentation would have been undue:

- a. The quantity of experimentation necessary.
- b. The amount of direction or guidance presented.
- c. The presence or absence of working examples.
- d. The nature of the claimed invention.
- e. The state of the prior art.
- f. The relative skill of those in the art.
- g. The predictability or unpredictability of the art.
- h. The breadth of the claims.

VI. THE PERSON OF ORDINARY SKILL IN THE ART

32. I understand that there are multiple factors relevant to determining the level of ordinary skill in the pertinent art, including the educational level of active workers in the field at the time of the alleged invention, the sophistication of the technology, the type of problems encountered in the art, and the prior art solutions to those problems.

33. In determining the characteristics of a hypothetical person of ordinary skill in the art of the '970 Patent at the time of the claimed invention, I considered several things, including the type of problems encountered in this field, and the

rapidity with which innovations were made. I also considered the sophistication of the technology involved, and the educational background and experience of those actively working in the field, and the level of education that would be necessary to understand the '970 Patent. Finally, I placed myself back in the relevant period of time and considered the state of the art and the level of skill of the persons working in this field at that time.

34. It is my opinion that the subject matter of the '970 Patent focuses on the fuel-delivery system(s), such as a carburetor and/or gaseous fuel regulator, for a dual-fuel engine or generator. Based on the materials I have considered (including the prior art cited herein), my own knowledge and experience, and the level of skill required to design and build a dual-fuel carburetor, I have come to the conclusion that a person of ordinary skill in the art of the '970 Patent would hold a bachelor's-level or equivalent degree in mechanical engineering, physics, or related fields and have three years of work experience in combustion engines operating on various fuel sources such as liquid fuels and gaseous fuels. This hypothetical person would be capable of performing various design tasks and would understand the basic mechanical features and operation of carburetors, regulators, engines, and generators; this hypothetical person would also have an appreciation for carburetors, regulators, engines, and generators and issues and concerns faced by users/operators that use the same. There are also basic engineering principles that the person of

ordinary skill in the art would appreciate, as I discuss in Section VII below. I believe these understandings are demonstrated, for example, by the prior art I discuss herein. A person could also have qualified as a person of ordinary skill in the art with some combination of (1) more formal education (*e.g.*, an M.S. degree) and less technical experience or (2) less formal education and more technical or professional experience in the fields listed above. For example, a person having significant experience servicing or operating dual-fuel combustion engines, or incorporating such engines into finished products (*e.g.*, lawnmowers, lifts, floor cleaners, or the like), would qualify as a POSA.

35. Although my qualifications and experience exceed those of the hypothetical person having an ordinary level of skill in the art, my analysis and conclusions herein are from the perspective of a person of ordinary skill in the art as of June 12, 2015 (which I understand to be the earliest possible priority date for the claims of the '970 Patent), unless otherwise noted.

VII. STATE OF THE ART

A. Multi-Fuel Generators

36. The '970 Patent teaches that multi-fuel generators were known in the art at the time of the invention:

Certain generators are configured to operate as “dual fuel” generators, otherwise known as bi-fuel generators. These generators are driven by an internal combustion

engine that is configured to operate on a liquid fuel for a period of operation and an alternative fuel for another period of operation.

EX1001, 1:42-47.

37. Multi-fuel generators have been known in the art since at least 1999. *See generally* EX1008 (describing an engine, preferably coupled to a generator, configured to operate on gasoline or kerosene and LPG). Below is an image of a DuroMax dual-fuel generator that was on sale since at least 2012:



EX1004, 1 (DuroMax generator sold in the United States since at least 2012);

EX1012, ¶¶3-4, 17-20.

B. Dual-Stage Regulators

38. A pressure regulator is designed to control vapor pressure. EX1017, 118-119 (§5.8.1: “Propane appliances in buildings typically operate at 11 in. w.c. (2.7 kPa) (about 1/2 psi), so the vapor pressure of the propane in the container must be reduced to a much lower pressure for the appliance to operate safely.”). The same is true for outdoor appliances, such as portable generators and BBQ grills. These appliances rely on a propane tank for fuel where propane is stored as a liquid under a pressure of approximately 100 psi that must be reduced to a much lower pressure to operate properly.

39. As noted in the LP-Gas Handbook, the LP-Gas Code has definitions for the various types of regulators, including the first-stage regulators, second-stage regulators, two-stage regulator systems, and integral two-stage regulators (i.e., dual-stage) referenced in the '970 Patent:

3.3.64.2 First-Stage Regulator. A pressure regulator for LP-Gas vapor service designed to reduce pressure from the container to 10.0 psig (69 kPag) or less.

3.3.64.3 High-Pressure Regulator. A pressure regulator for LP-Gas liquid or vapor service designed to reduce pressure from the container to a lower pressure in excess of 1.0 psig (6.9 kPag).

3.3.64.4 Integral 2 psi Service Regulator. A pressure regulator for LP-Gas vapor service that combines a high-pressure regulator and a 2 psi service regulator into a single unit.

3.3.64.5 Integral Two-Stage Regulator. A pressure regulator for LP-Gas vapor service that combines a high-pressure regulator and a second-stage regulator into a single unit.

3.3.64.6 Line Pressure Regulator. A pressure regulator in accordance with the *Standard for Line Pressure Regulators*, ANSI Z-21.80/CSA 6.22, with no integral overpressure protection device for LP-Gas vapor service designed for installation inside a building to reduce a nominal 2 psig inlet pressure to 14 in. w.c. (4.0 kPa) or less.

3.3.64.7 Second-Stage Regulator. A pressure regulator for LP-Gas vapor service designed to reduce first-stage regulator outlet pressure to 14 in. w.c. (4.0 kPag) or less.

3.3.64.8 Single-Stage Regulator. A pressure regulator for LP-Gas vapor service designed to reduce pressure from the container to 1.0 psig (6.9 kPag) or less.

3.3.64.9 2 psi Regulator System. An LP-Gas vapor delivery system that combines a first-stage regulator, a 2 psi (14 kPag) service regulator, and a line pressure regulator(s).

3.3.64.10 2 psi Service Regulator. A pressure regulator for LP-Gas vapor service designed to reduce first-stage regulator outlet pressure to a nominal 2 psig (14 kPag).

3.3.64.11 Two-Stage Regulator System. An LP-Gas vapor delivery system that combines a first-stage regulator and a second-stage regulator(s), or utilizes a separate integral two-stage regulator.

EX1017, 40-41 (§3.3.64) (annotated).

40. As described in the LP-Gas Handbook, since 1995, two-stage pressure regulation systems have been required for most fixed propane installations in buildings. The regulators used in two-stage regulator systems are designed to reduce propane container pressure to an intermediate pressure of 10 psig (69 kPag), and then

further reduce pressure to 11 in. w.c. (2.7 kPag). This is accomplished with the use of two separate regulators (first- and second-stage), or with one single unit, an integral two-stage regulator.

EX1017, 118-119 (commentary regarding §5.8.1).

41. Although not strictly required for use outdoors, such as with generators and outdoor BBQ grills, using a two-stage pressure regulation system is advantageous because of its ability to maintain a constant outlet pressure, particularly as the inlet fuel pressure varies.

42. As the LP-Gas Handbook indicates, dual-stage regulators (i.e., integral two-stage regulators) were well-known at the time of the invention. *Id.* For example, off-the-self dual-stage regulators were generally available at least by 2008, as shown below:



EXHIBIT 3.12 *Integral Two-Stage Regulator. (Courtesy of Engineered Controls International, Inc.)*

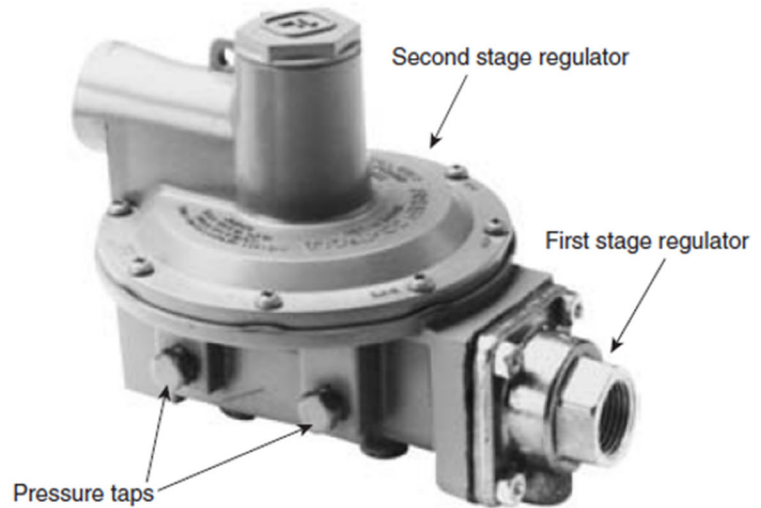


EXHIBIT 5.47 *Integral Two-Stage Regulator. (Courtesy of Fisher Controls Intl, LLC)*

EX1017, 41, 120 (published in 2008).



2-Stage Low Pressure Regulator Assembly

\$70.00 SKU: 106238

[Add to Cart](#)

Used for connecting commercial grade BBQ & Catering Grills requiring gas input in excess of 100,000 BTU's per hour to a propane tank via high volume green Type 1 tank connection. The green Type 1 allows a higher volume of gas to pass through the tank connection before going into bypass mode. *Standard Hose Length is 18" OAL [Learn More](#)

[Add to Wishlist](#) | [Add to Compare](#)



2-Stage Low Pressure Regulator Assembly with Stainless Steel Overbraid

\$90.00 SKU: 106221

[Add to Cart](#)

Stainless Steel Overbraided Two-Stage Regulator Assembly used for connecting commercial grade BBQ & Catering Grills requiring gas input in excess of 100,000 BTU's per hour to a propane tank via high volume green Type 1 tank connection. The green Type 1 allows a higher volume of gas to pass through the tank connection before going into bypass mode. The overbraid keeps small animals from damaging the hose. *Standard Hose Length is 18" OAL [Learn More](#)

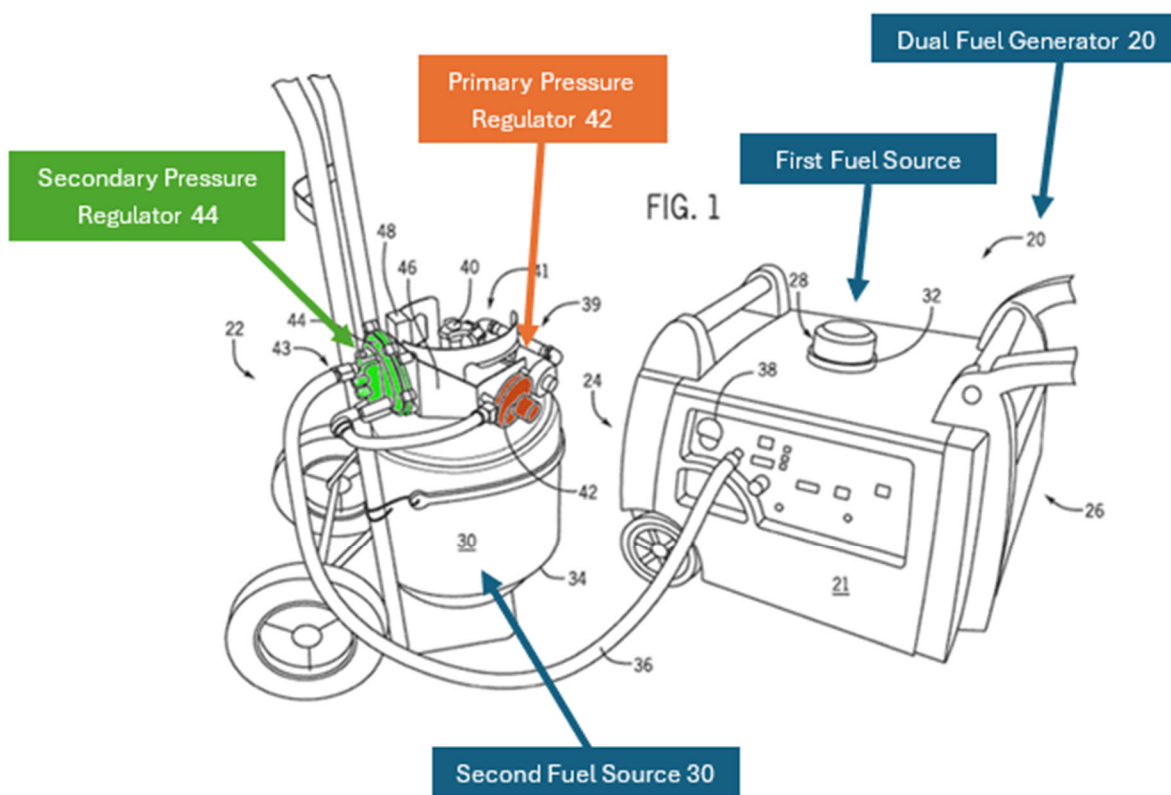
[Add to Wishlist](#) | [Add to Compare](#)

EX1016 (webpage from 2013).

VIII. SUMMARY OF THE '970 PATENT

A. The '970 Patent

43. The '970 Patent is directed to supplying liquid fuel and gaseous fuel to generators. EX1001, Abstract, 1:24-57. The '970 Patent acknowledges that multi-fuel generators typically run on liquid fuel (such as gasoline) and an alternative gaseous fuel (such as propane). *Id.*, 1:24-41. Figure 1 of the '970 Patent discloses a perspective view of a generator with such an engine, as shown below:



44. The '970 Patent teaches 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.*, 5:10-28. The '970 Patent further recognizes that the second regulator may be located on the generator or “off-board the generator to reduce size and cost of the generator.” *Id.*, 5:29-38.

B. Prosecution History

45. The '970 Patent is part of a family that includes at least 13 U.S. patents and/or pending applications.¹ The '970 Patent issued from U.S. Application No. 17/937,046, which was filed on September 30, 2022, and claims priority to prior applications, the earliest of which is U.S. Application No. 14/738,060, which was filed on June 12, 2015.

46. The Examiner relied on U.S. Patent Pub. No. 2011/0168133 (“Pursifull”), U.S. Patent Pub. No. 2007/0137591 (“Sugimoto”), and two websites

¹ Family members include U.S. Patent App. Nos. 15/285,215; 14/738,060; 14/925,441; 15/332,264; 16/783,455; 16/946,438; 16/358,822; 16/946,439; 16/191,503; 18/183,734; 18/443,487; and 19/026,996.

to reject the claims: GasHoseandRegulators.com;² and Nooutage.com.³ EX1002,70-75.

47. Patent Owner overcame the rejection by arguing there would have been no motivation to combine Pursifull (a multi-fuel internal combustion engine) and Sugimoto (a generator that operates on gaseous fuel) because they disclose different types of engines (fuel injection and carburetor, respectively) and different fuel types (liquid fuel and gaseous fuel, respectively). EX1002, 82-89, 109-111, 145.

IX. LEVEL OF ORDINARY SKILL IN THE ART

48. I understand that 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. I further understand that a POSA is a person of ordinary creativity and thus is able to make inferences from the art.

49. For purposes of this IPR, I apply the level of skill in the art as possessed by the POSA I described above.

² <https://web.archive.org/web/20140517093401/https://gashosesandregulators.com/> dated May 17, 2014.

³ <http://web.archive.org/web20061113112733/http://www.nooutage.com/40248.htm>, dated August 27, 2006.

X. CLAIM CONSTRUCTION

50. I understand 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.

51. I understand Petitioners propose the following claim constructions for certain claim terms. I understand Petitioners have not identified any other claim terms that need construction to address the issues raised by this petition but reserve the right to respond to any constructions offered by Patent Owner or the Board. I have not identified any additional claim terms that need construction for purposes of my opinions.

A. The Claimed “Fuel Lockout Apparatus”

52. Several claims of the '970 Patent recites “a fuel lockout apparatus,” which Petitioners assert is a means-plus-function claim term that covers the corresponding structure and equivalents thereof.

1. “Fuel Lockout Apparatus” Does Not Recite Any Structure and Therefore Invokes §112(f)

53. Petitioners argue that the term “fuel lockout apparatus” does not provide any structure corresponding to the function of providing fuel lockout and therefore invokes 35 U.S.C. §112(f).

54. As used in the '970 Patent, the phrase “fuel lockout apparatus” recites a function without providing any structure for performing that function. The phrase “fuel lockout apparatus” is not understood by POSAs to connote a specific structure. The claim merely replaces the term “means” with “apparatus.” The term “fuel lockout apparatus” has no independent meaning aside from “a means for providing fuel lockout.” In my opinion, the claim language fails to provide any structure for the “providing fuel lockout” function and, therefore, is subject to construction under §112(f).

2. The Corresponding Structure for “Fuel Lockout Apparatus”

55. My analysis of the specification indicates the '970 Patent describes a single embodiment of a “fuel lockout apparatus.” In that embodiment, the “fuel lockout apparatus 58” is a “flange” that “is rigidly coupled to the rotating handle [56].” EX1001, 7:12-24. The flange “extends radially outward from fuel valve handle 56” and “sweeps over” the LPG fuel hose coupling “as the fuel valve handle rotates.” *Id.* Based on the user selection, the flange “blocks off” or “uncovers” the “first end 50a of the quick-disconnect hose coupling when fuel valve handle 56 is rotated” between the first and second positions. *Id.*, 7:22-25.

56. Specifically, when the fuel lockout apparatus is in the first position (selecting gasoline), the flange provides a barrier that extends over the LPG supply

hose coupling 50a, preventing the user from coupling a LPG supply hose, thereby providing LPG fuel lockout. *Id.*, 7:64-8:11; Figures 2, 4A.

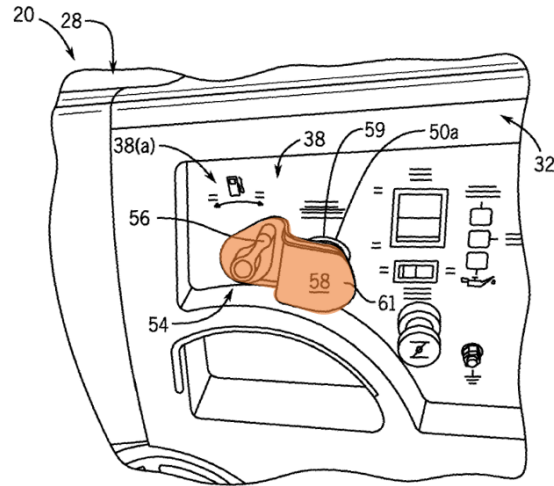


FIG. 2

Id., Figure 2 (annotated).

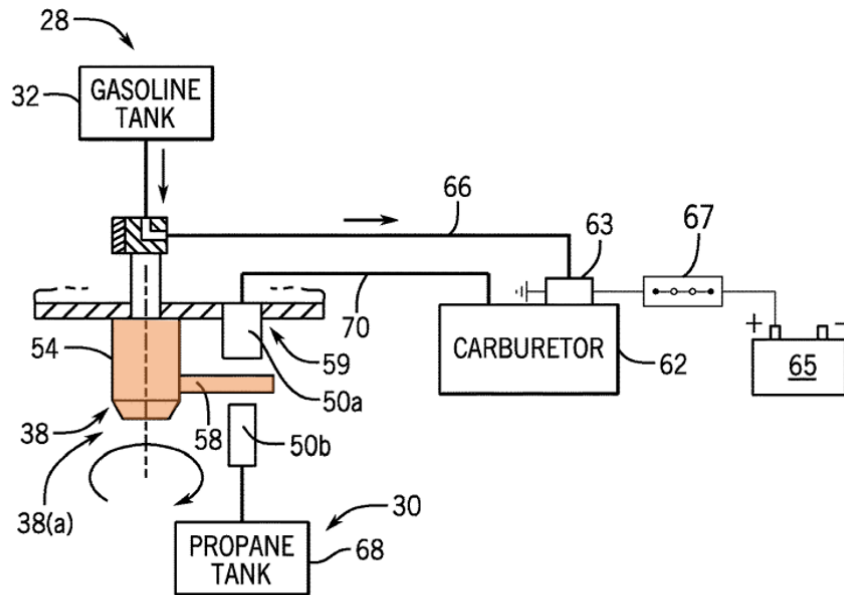
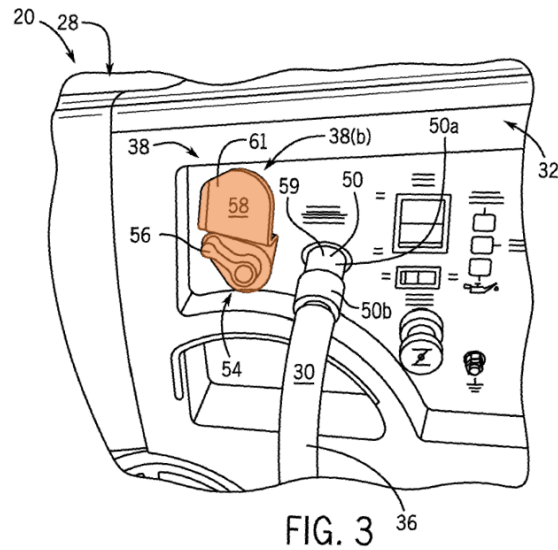


FIG. 4A

Id., Figure 4A (annotated).

57. When the fuel lockout apparatus is in the second position (selecting LPG), the fuel lockout apparatus prevents the user from selecting gasoline until the LPG supply hose is removed, thereby providing gasoline fuel lockout. *Id.*, 8:11-23; Figures 3, 4B.



Id., Figure 3 (annotated).

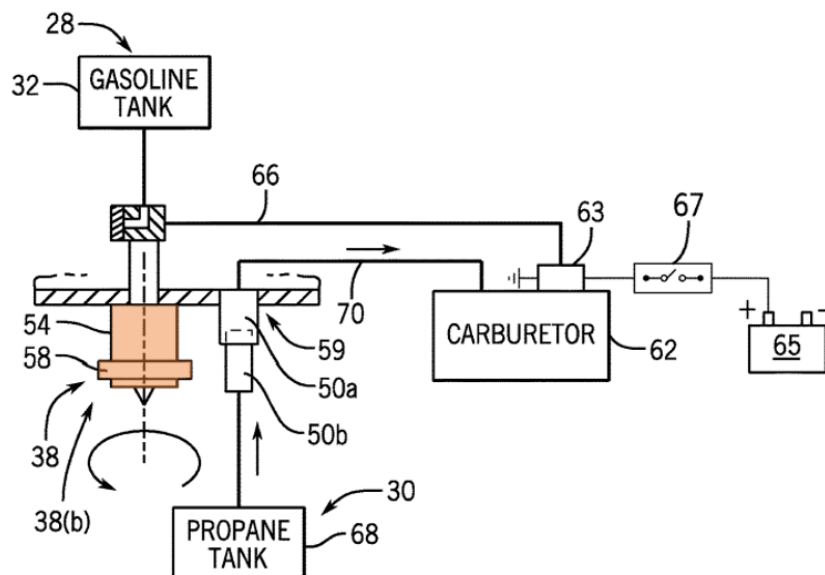


FIG. 4B

Id., Figure 4B (annotated)

58. The flange that extends radially outward from the valve handle and rotates with the valve handle over the LPG fuel hose coupling provides both the gasoline and LPG lockout functionality. Thus, the proper structure corresponding to the “providing fuel lockout” functionality is items: 58 and 61 in Figures 2-3, and 58 in Figures 4A-4B. This structure is described in the ’970 Patent in at least the following portions of the specification: 5:50-6:10; 6:24-45; 6:56-7:31; 8:1-14; 8:63-9:11.

B. The Claimed Terms “Prevent...Coupling” and “Permit...to Couple”

59. Claim 3 of the ’970 Patent recites:

a fuel lockout apparatus coupled to the mechanical fuel valve; and
wherein when the mechanical fuel valve is in the first position, the fuel lockout apparatus communicates the liquid fuel source to the dual fuel generator and *prevents* the pressurized fuel source *from coupling* to the dual fuel generator, and
actuation of the mechanical fuel valve to the second position causes the fuel lockout apparatus to *permit* the pressurized fuel source *to couple* to the dual fuel generator, and interrupts the liquid fuel source communication with the dual fuel generator.

(Emphasis added); *see also* EX1001, Claims 4, 25-26, 35-36 & 50.

60. The terms “coupling” and “to couple” refer to physically connecting or attaching two items. EX1009, 4. As it was with the term “fuel lockout apparatus,” the specification of the ’970 Patent is the best guide for ascertaining what a POSA would have understood the terms “prevent ... coupling” and “permit ... to couple” to mean.

61. The specification of the ’970 Patent discloses only one way in which the fuel lockout apparatus “prevent[s] ... coupling” of the pressurized fuel source to the pressurized fuel line: the “flange” (item 61) of the fuel lockout apparatus “block[s] fuel inlet 59 to prevent coupling the first end 50a and second end 50b of

the quick-disconnect hose coupling together.” EX1001, 8:55-57; *see also id.*, 6:45-57, 7:3-11. Figures 2 and 4A illustrate this:

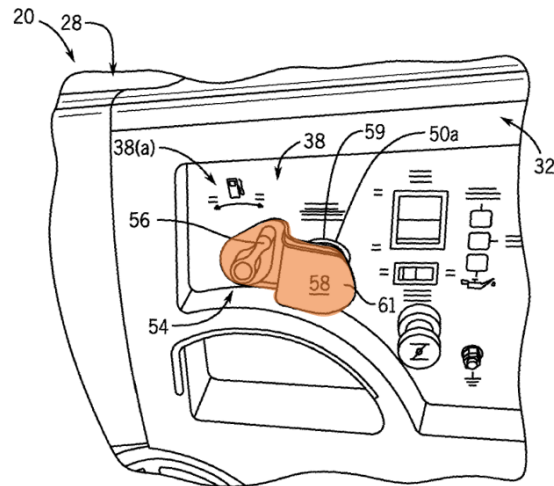


FIG. 2

Id., Figure 2 (annotated).

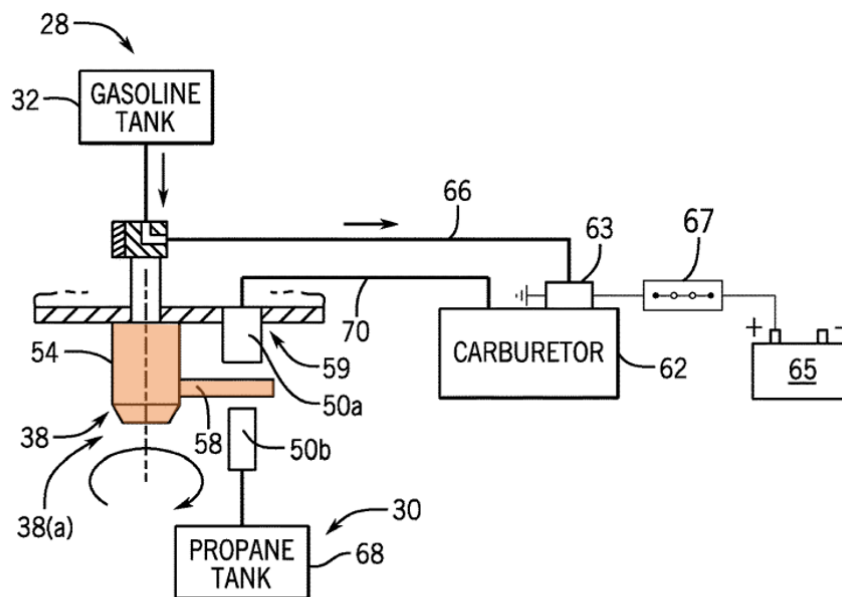
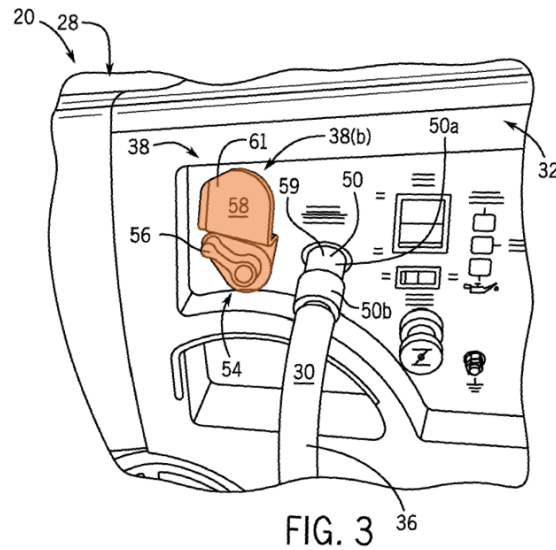


FIG. 4A

Id., Figure 4A (annotated).

62. The specification of the '970 Patent also discloses only one way in which the fuel lockout apparatus “permits” the pressurized fuel source “to couple” to the pressurized fuel line: “fuel lockout apparatus 58 unblock[s] fuel inlet 59 to permit attaching first end 50a and second end 50b together.” *Id.*, 8:58-60; Figures 3, 4B; *see also id.*, 7:25-34, 9:31-41. Figures 3 and 4B illustrate this:



Id., Figure 3 (annotated).

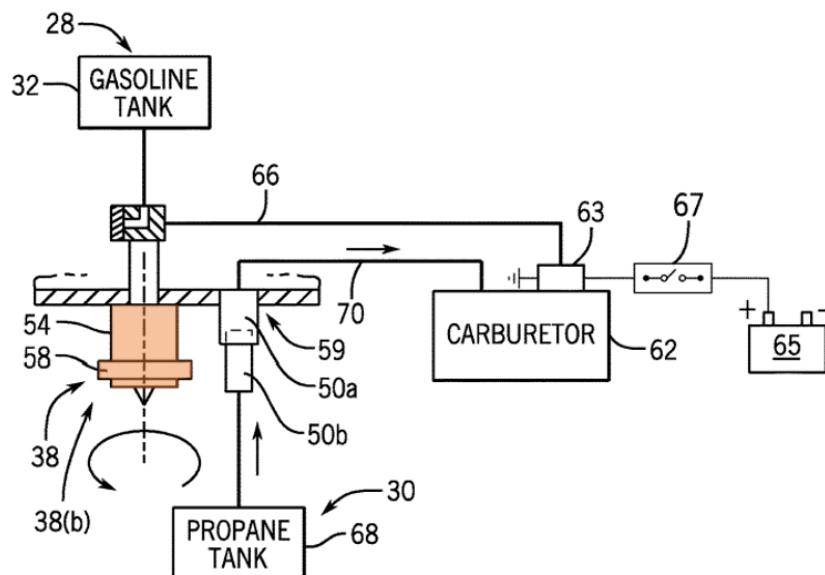


FIG. 4B

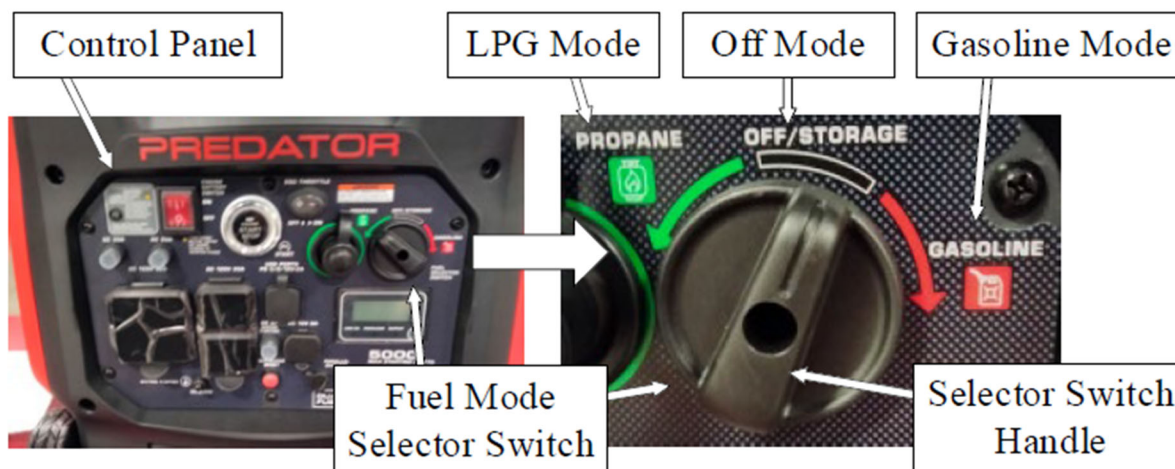
Id., Figure 4B (annotated).

63. Therefore, a POSA would have understood the terms “prevent ... coupling” and “permit ... to couple” to mean “prevent ... attaching” and “permit ... to attach,” respectively, consistent with how these terms are used in the specification of the '970 Patent.

C. Patent Owner’s Proposed Construction and Application of “Fuel Lockout Apparatus”

64. It is my understanding that Patent Owner proposes “plain and ordinary meaning” for the term “fuel lockout apparatus.” EX1011, 21-22. It is also my understanding that Patent Owner alleges that a “fuel lockout apparatus” can include a “selector switch coupled to the gasoline and carburetor valves, the gear assembly coupled to the LPG valve, or a combination of the selector switch and the gear

assembly may be considered the claimed a fuel lockout apparatus coupled to a mechanical fuel valve.” EX1018 at1 6; *see also id.*, 8.⁴ By “selector switch,” Patent Owner is referring to the selector knob that switches operation from LPG to gasoline and vice versa:



Id.,4.

65. In other words, Patent Owner alleges that an apparatus that merely *controls* another apparatus (such as the selector switch and gear assembly controlling the LPG valve) is a “fuel lockout apparatus.” Although I disagree with Patent Owner’s proposed construction and application for the reasons explained above, it is my opinion that the claims of the ’970 Patent reciting a “fuel lockout apparatus”

⁴ EX1018 is Champion’s infringement contentions for related U.S. Patent No.

10,221,780 (“the ’780 Patent”), which has claim language similar to claims of the ’970 Patent, such as Claims 3, 25, and 35 (see, e.g., ’780 Patent, Claims 1 and 8).

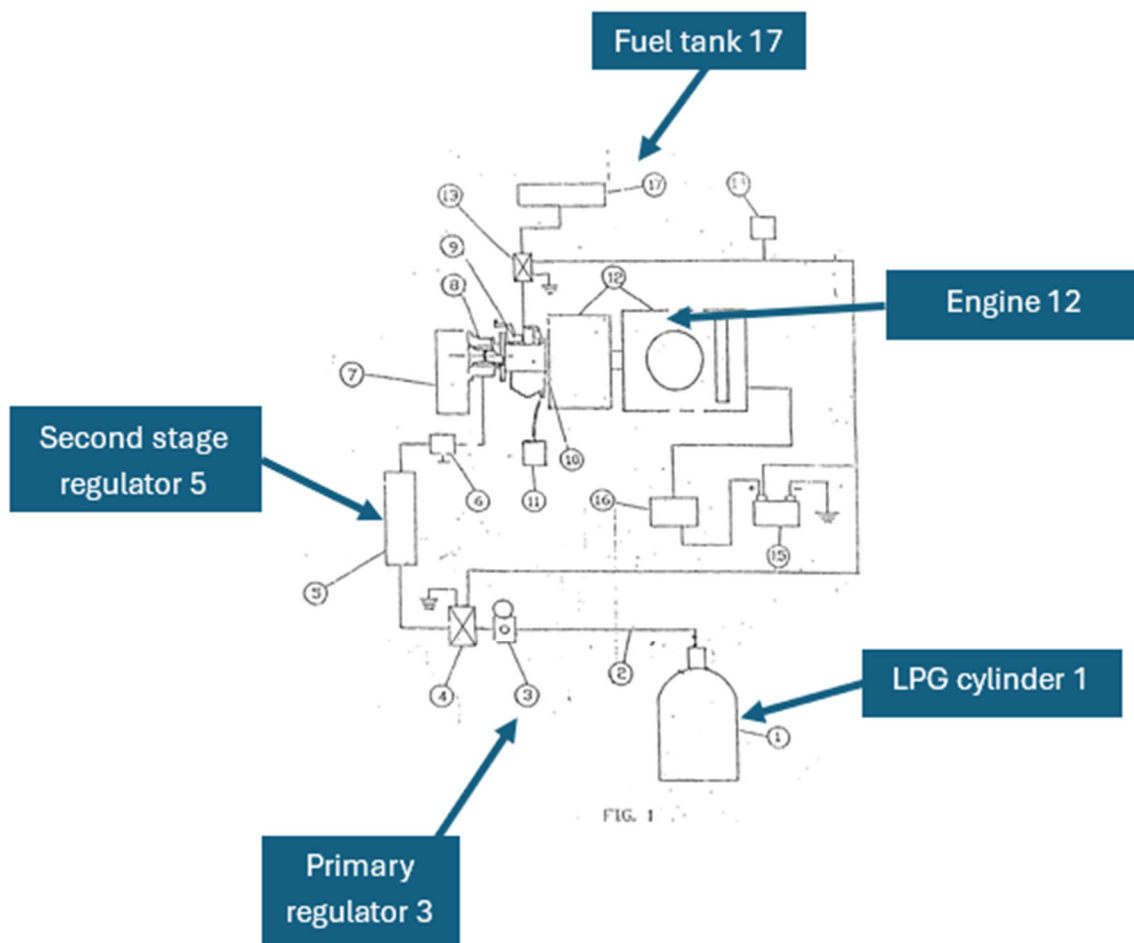
are invalid as obvious under §103 even under Patent Owner’s proposed construction/application based on the combination of Chaudhari and Hallberg (along with other references), as explained in Grounds 1-4, below.

XI. OVERVIEW OF THE ASSERTED PRIOR ART

A. Indian Patent No. 207333 (“Chaudhari”)

66. Chaudhari (EX1008) discloses “a system for supplying Liquified Petroleum Gas (LPG) to bi-fuel stationary engines in response to the load and speed of the engine, such engines preferably being coupled to a portable generator.” EX1008, 4. In the embodiment discussed, Chaudhari discloses a LPG delivery system connected to a generator that operates using gasoline or kerosene. *Id.*

67. The LPG delivery system includes a primary regulator 3 and a second stage regulator 5 to reduce the pressure of the LPG in two stages before delivery to the generator. *Id.*, 7.



Id., Figure 1 (annotated).

68. The LPG delivery system and the regulators are “off-board” the generator because it is an improved “Add-On” system for existing engines and generators. *Id.*, 4-5.

B. DuroMax XP4400EH Operator’s Manual (“DuroMax”)

69. DuroMax (EX1004) discloses the XP4400EH dual fuel generator—a dual fuel generator that runs alternatively on gasoline or LPG.

70. The generator includes a mechanical fuel shutoff valve having a valve handle.

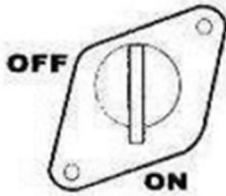


Figure 6 - fuel valve in the "on" position

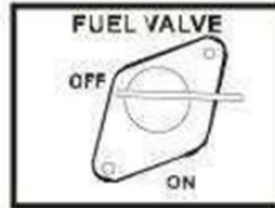


Figure A - Fuel Valve in the "OFF" position

EX1004, 11-12.

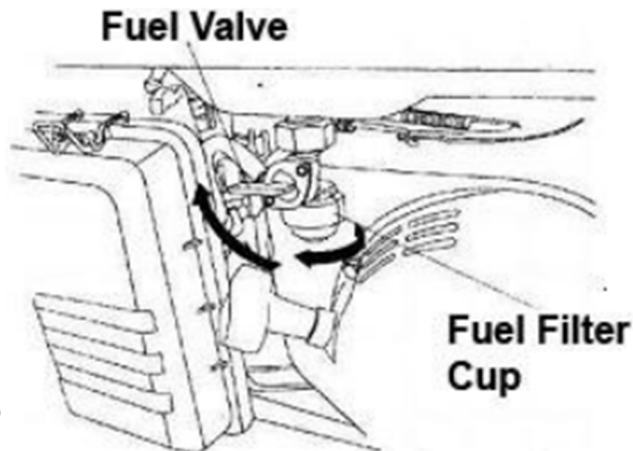
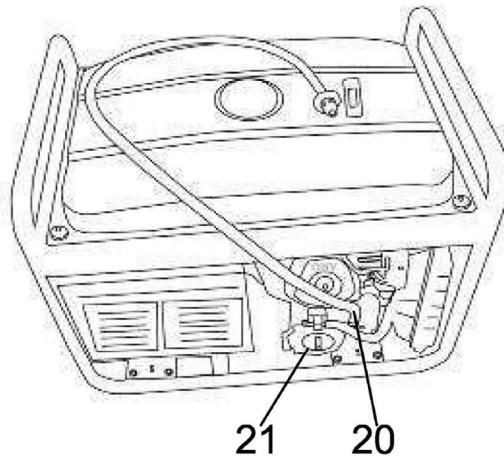


Figure 19 -Removing the Fuel Filter Cup

Id., 20.

71. The generator also includes a LPG fuel inlet.



20. Hose connector- Connect liquid propane gas to generator.

Id., 7-8.

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

72. Parlatore (EX1010) is directed to a fuel delivery system that includes a propane tank, a first regulator coupled to the tank, and a second regulator connected to the first regulator, as depicted in Parlatore’s Figures 1 and 3:

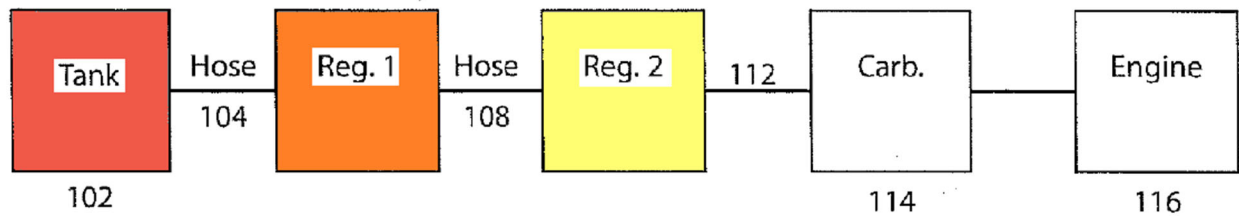


Fig. 1

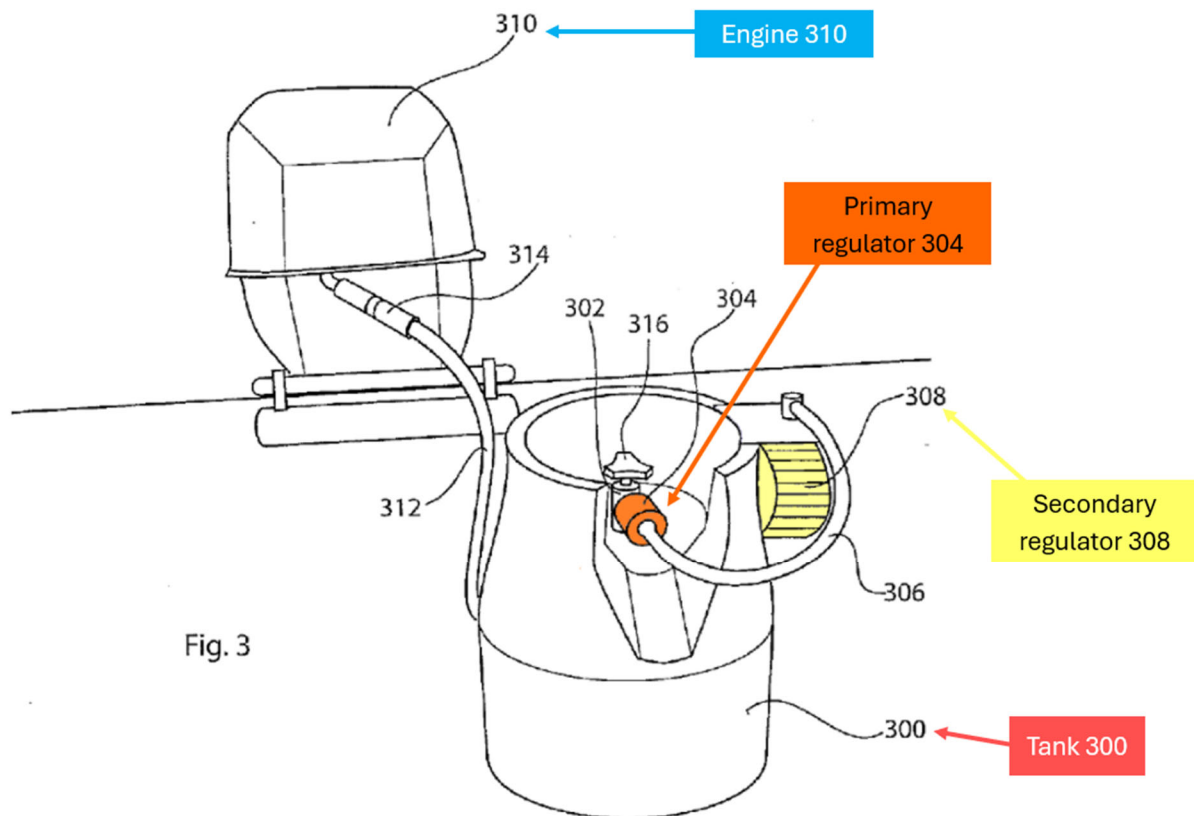


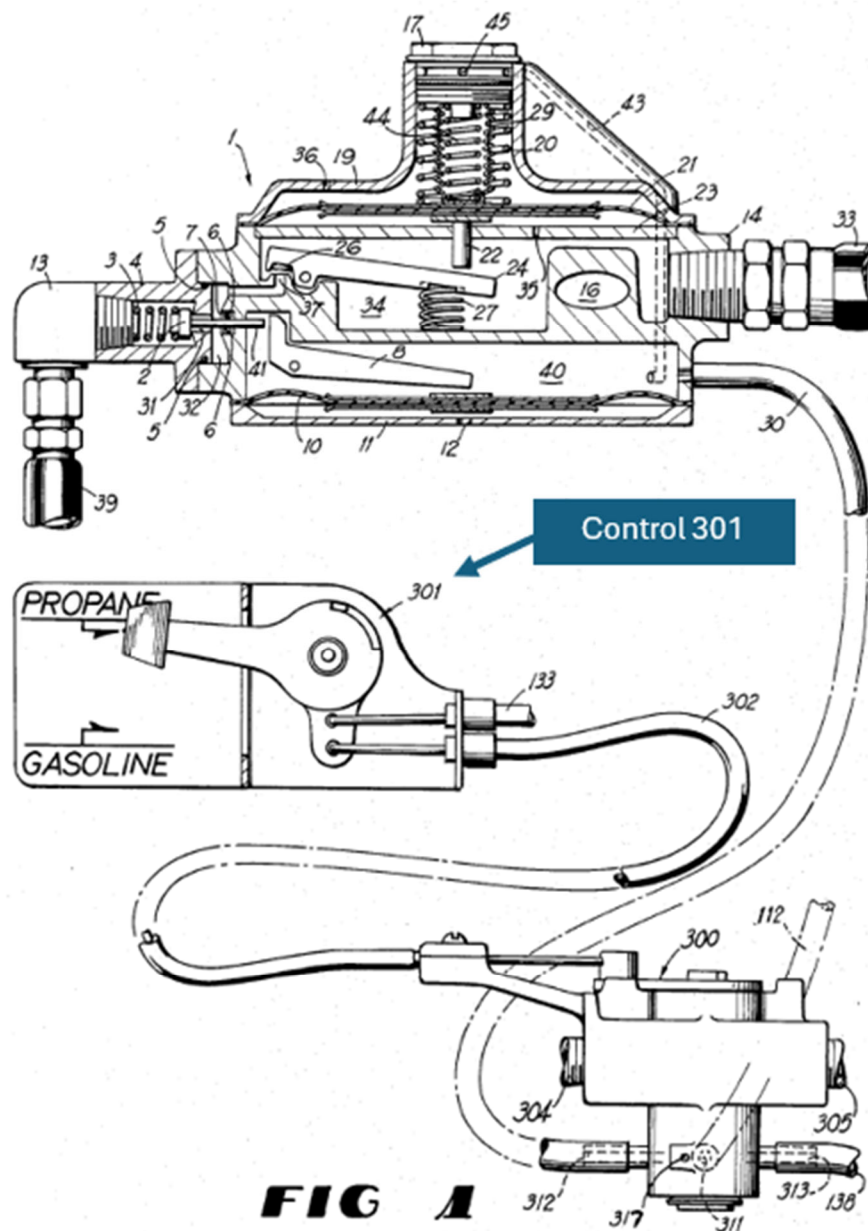
Fig. 3

EX1010, ¶¶[0005]-[0006], Figures 1, 3 (annotated).

73. Parlatore thus discloses the use of primary and secondary pressure regulators, positioned at/near the LPG tank and remote from the engine/generator, to regulate propane delivery to an engine/generator.

D. U.S. Patent No. 4,492,207 (“Hallberg”)

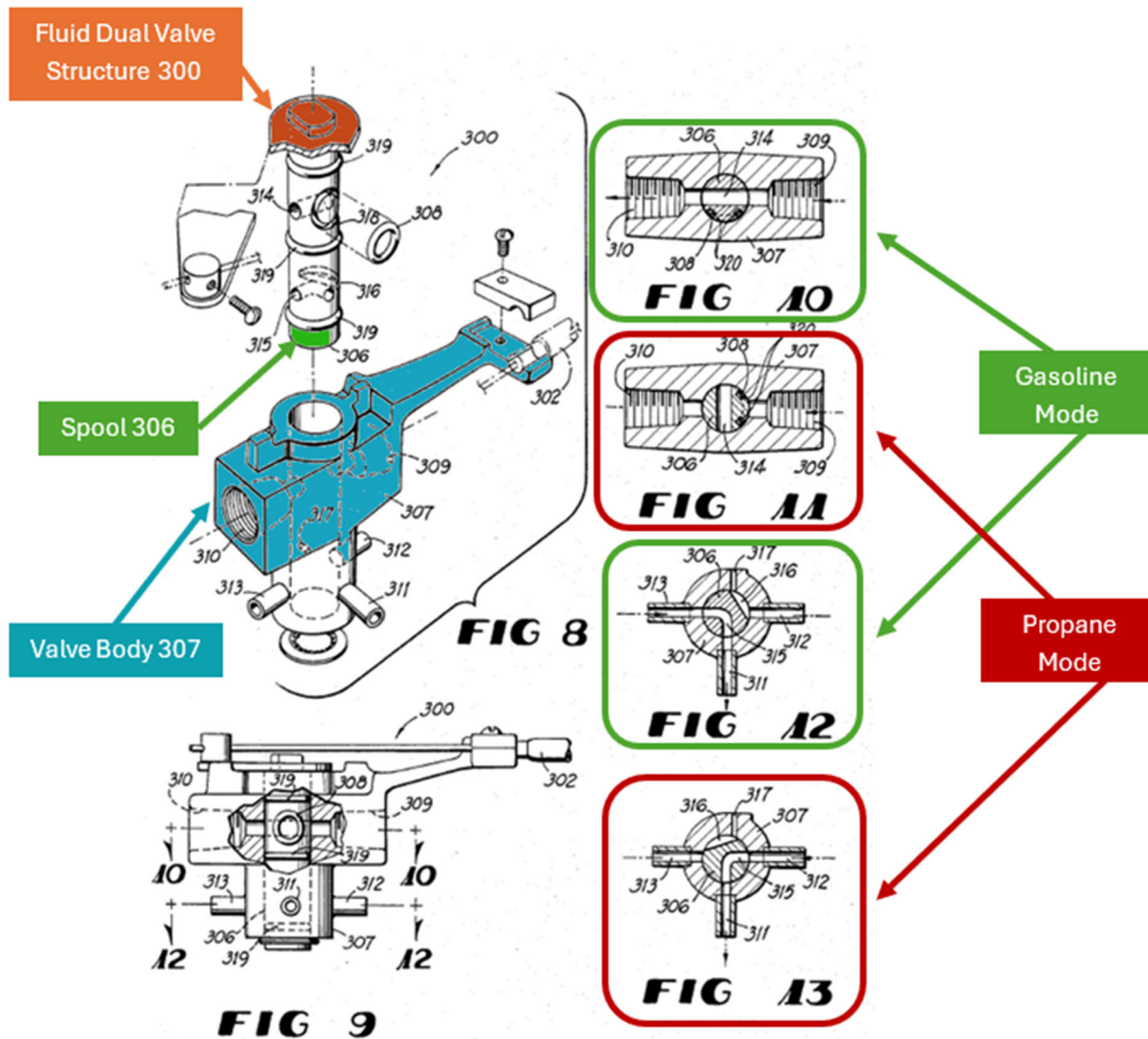
74. Hallberg (EX1006) discloses a dual fuel system for use with internal combustion engines. EX1006, Abstract. The fuel to be utilized is selected by positioning control 301 in one of two positions, either “gasoline” or “propane.” *Id.*, 7:27-29, Figure 1.



Id.

75. Positioning of control 301 to the “gasoline” mode acts through control cable 302 to rotate spool 306 within valve body 307. *Id.*, 7:30-38. Simultaneously, gasoline from gasoline supply line 304 is supplied to the carburetor 110 through engine gasoline line 305, which lines communicate through tunnel 314 (as shown in Figure 10) connecting liquid inlet opening 309 and liquid outlet opening 310 in fluid dual valve 300. In this mode, the carburetor functions normally. *Id.*, 7:38-44.

76. When the “propane” mode of control 301 is selected, spool 306 is rotated within valve body 307 by control cable 302 such that O-ring 308 on the face of spool 306 forms a seal between spool 306 and valve body 307 around liquid inlet opening 309 (as shown in Figure 11) thereby prohibiting flow of gasoline to carburetor 110. *Id.*, 8:3-10.



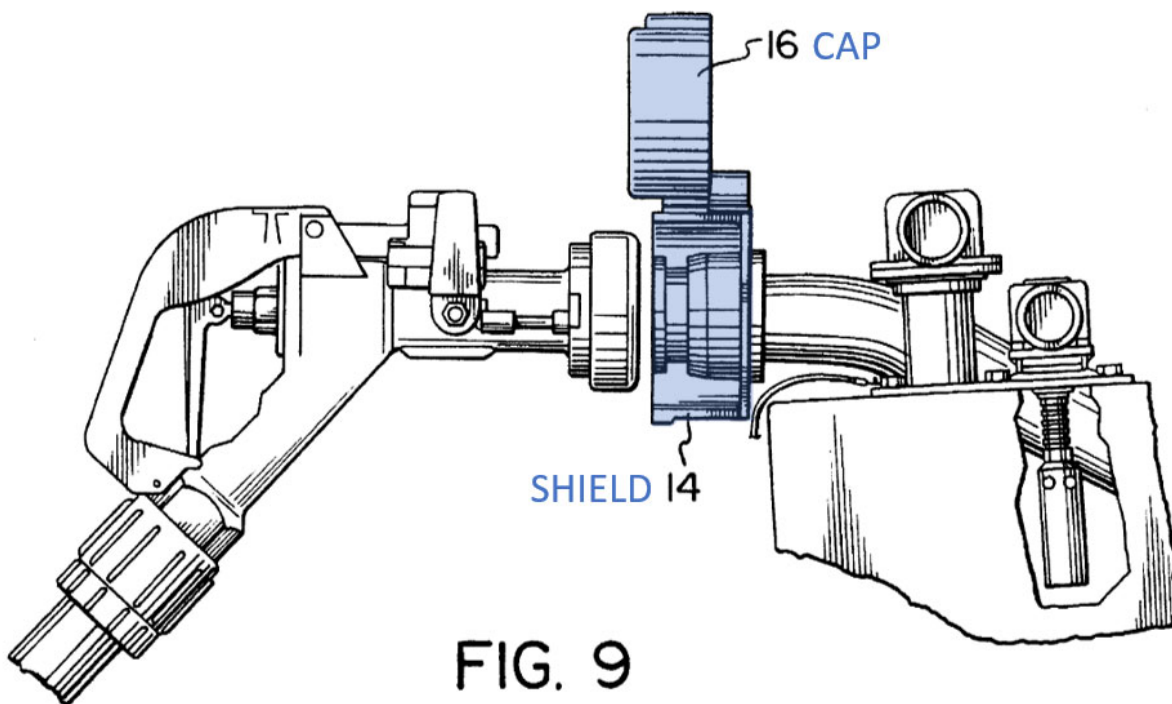
Id., Figures 8 – 13 (annotated).

77. When the engine is started, a vacuum, communicated to the engine intake manifold pressure chamber 40 via lines 112 and 30, creates a reduced pressure on the upper side of the liquid inlet diaphragm 10. *Id.*, 8:31-36. Atmospheric pressure on the opposite side of diaphragm 10 urges it upward against the liquid inlet lever 8, the opposite end of which drives inlet valve shaft 41 against bias spring 3 and opens

liquid inlet valve 2. *Id.*, 8:36-40. Upon opening valve 2, propane flows through inlet valve orifice 31 into liquified fuel passage 32 and onto the mixer 100. *Id.*, 8:40-60. When valve 2 is closed, valve 2 and related structures provide a “lock-off” of propane. *Id.*, 7:64-68.

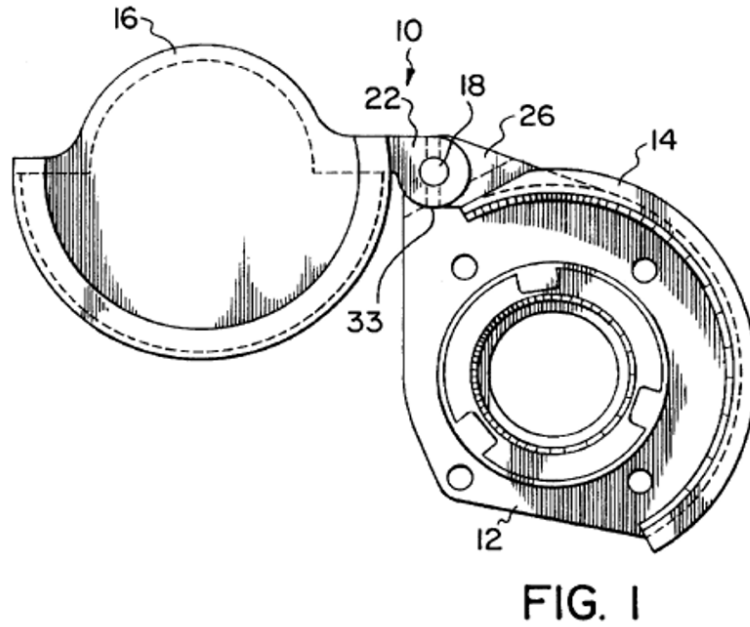
E. U.S. Patent No. 5,718,265 (“Elsdon”)

78. Elsdon (EX1005) discloses a fluid conduit coupler 12 assembly having cap 16 and shield 14 that is used for “flammable or other hazardous fluids, such as fuel” EX1005, 1:10-13, 3:3-4, Figure 9.

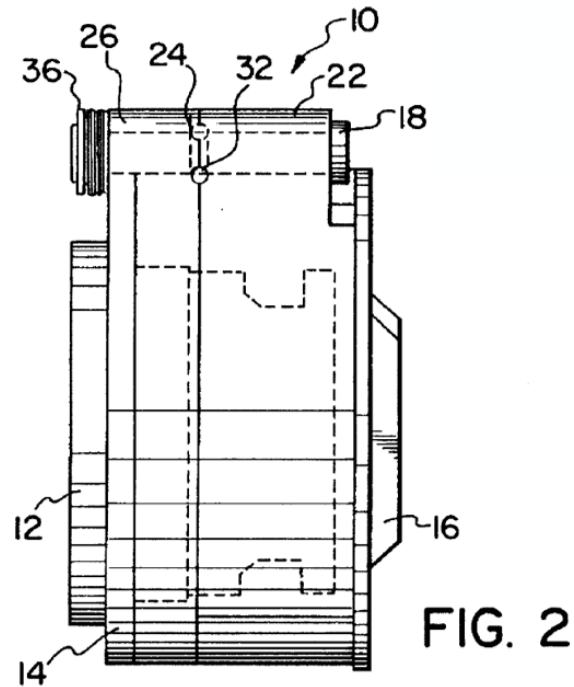


Id., Figure 9 (annotated).

79. Cap 16 is connected via hinge to shield 14 and is readily moveable between an open position (Figure 9 above and Figure 1 below) and a closed position (Figure 2 below) in which cap 16 is positioned over the coupler 12 to prevent coupling with a fuel hose. *Id.*, 3:4-11.



Id., Figure 1.



Id., Figure 2.

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

80. Jungmann (EX1021) 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). EX1021, Abstract, ¶¶[0002], [0015].

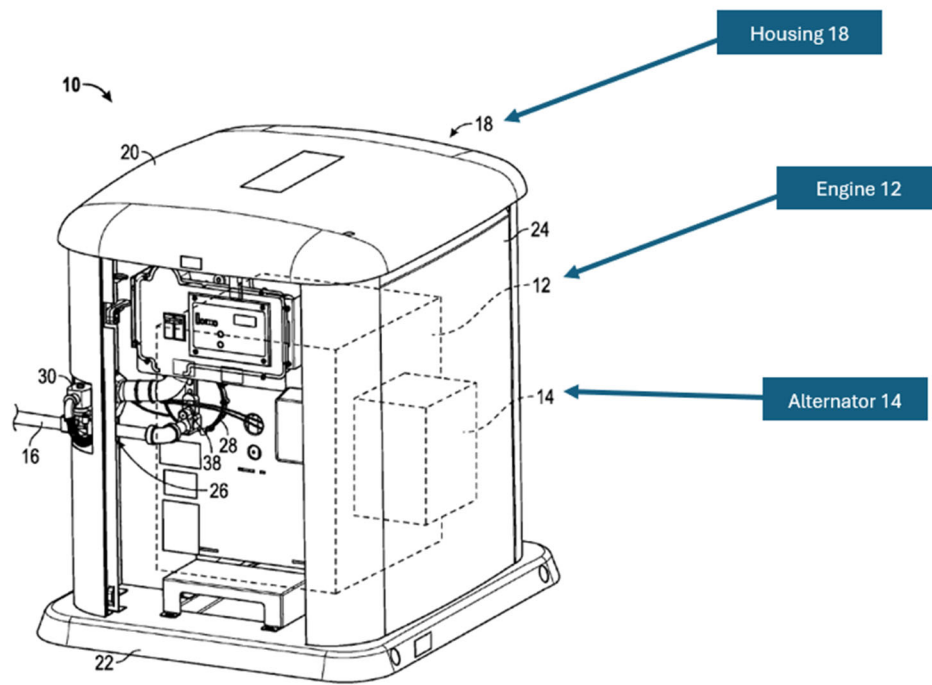


FIG. 1

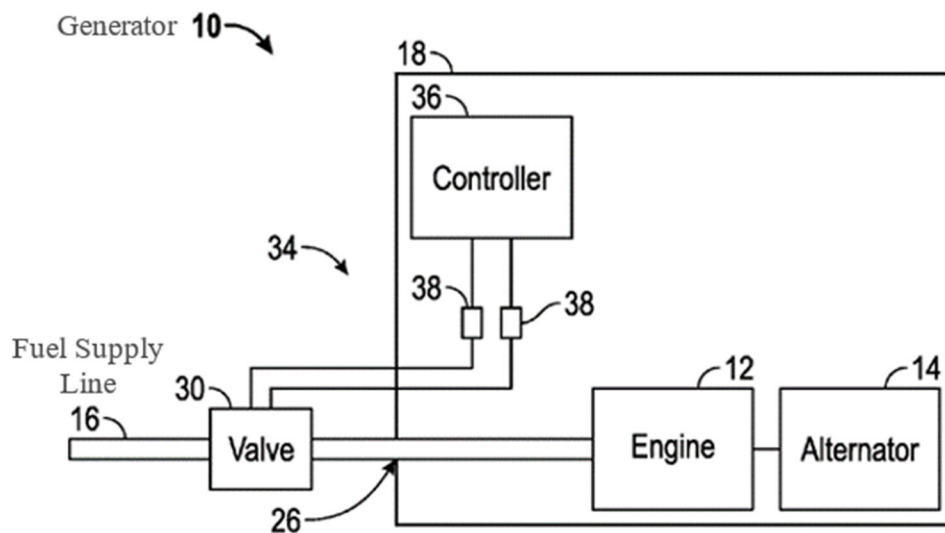


FIG. 3

Id., Figure 1 (annotated), Figure 3.

G. LP-Gas Handbook

81. LP-Gas Handbook (EX1017) is the Eighth Edition in its series. EX1017. It is a commentary on the 2008 edition of NFPA® 58, *Liquefied Petroleum Gas Code*, (“LP-Gas Code”) and includes the full text of the code. *Id.*

82. I have been familiar with the LP-Gas Code and the various editions of the LP-Gas Handbook since at least 2008 through my work as a mechanical engineer at Exponent, Inc. The LP-Gas Code has been adopted as law in all 50 states. <https://www.nfpa.org/product/nfpa-58-handbook/p0058hb>. Although I do not know whether all 50 states had adopted the LP-Gas Code prior to the earliest priority date of the '970 Patent (June 12, 2015), through my work at Exponent, I know that it has been widely adopted throughout the United States prior to this date, and I am not aware of any state that had not adopted the LP-Gas Code as of 2015.

83. The LP-Gas Code and the LP-Gas Handbook are well known to contractors, inspectors, engineers who work with LPG, and LPG appliance/equipment manufacturers, and have been known by individuals in these professions long before the earliest priority date of the '970 Patent (June 12, 2015).

84. Exponent has had a copy of the 2008 edition of the LP-Gas Handbook since at least 2014. In 2014 and earlier, it would have been easy for professionals like me to obtain a copy of the LP-Gas Handbook from NFPA, as well as other retail sources and libraries.

85. In the “Definitions” Chapter 3, LP-Gas Handbook provides commentary on the definition for “Quick Connectors”:

3.3.62 Quick Connectors. Fittings used to connect hose assemblies to piping and valves without the use of tools.

Quick connectors are used to connect transfer hose to piping and valves for loading and unloading cargo tank vehicles or railroad tank cars. They can also be used as connectors on swivel-type transfer piping. Quick connectors are also used in other LP-Gas systems, such as those used for engine fuel refueling and cylinder filling, connecting cylinders to gas-fired barbecue grills, and connecting gas systems between two sections of mobile homes.

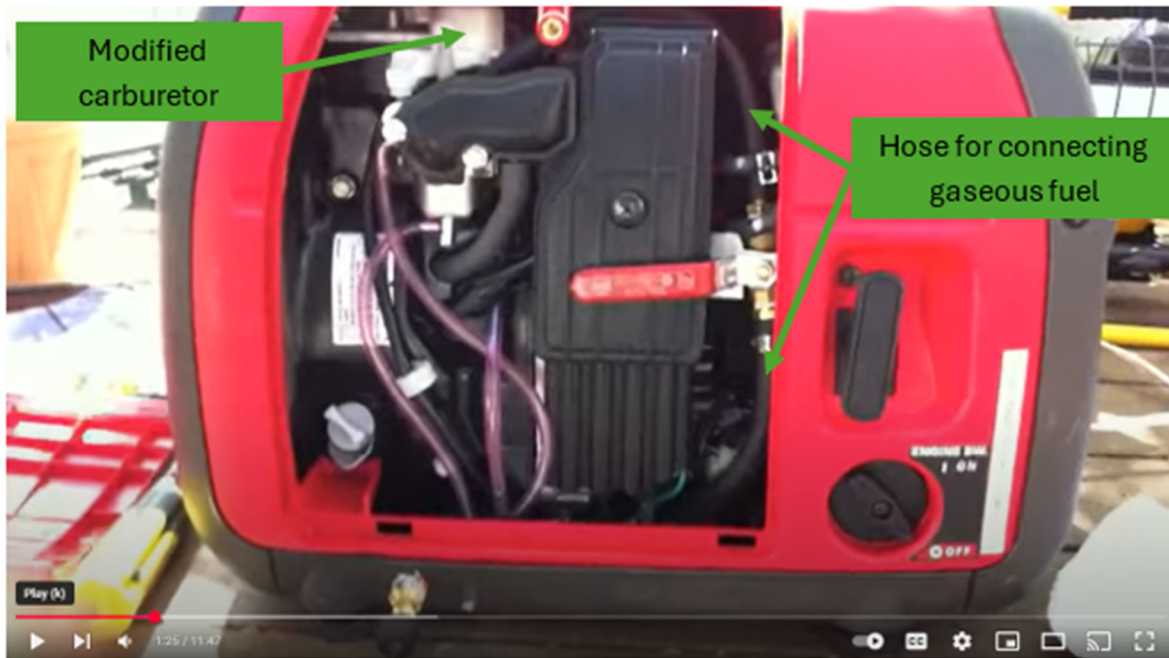
Id., 40. This is consistent with my understanding of quick connectors. They were well known and widely used before the June 12, 2015, earliest priority date of the '970 Patent.

H. Tri-Fuel YouTube Video (“Tri-Fuel Video”)

86. The Tri-Fuel Video (EX1007) is a YouTube video entitled “Honda Generator Tri-Fuel, EU2000i Triple-Fuel” that was posted by the profile “Mark ‘Mark1Jordon1’ Kash” on October 2, 2011.

87. The TriFuel Video discloses a Honda generator modified to operate on multiple different fuels. The video shows a modified carburetor for use in the Honda generator so that propane or natural gas can be used to fuel the generator as alternatives to gasoline. The man in the video explains that a hole can be drilled in the carburetor and a hose attached to connect propane and/or natural gas fuel

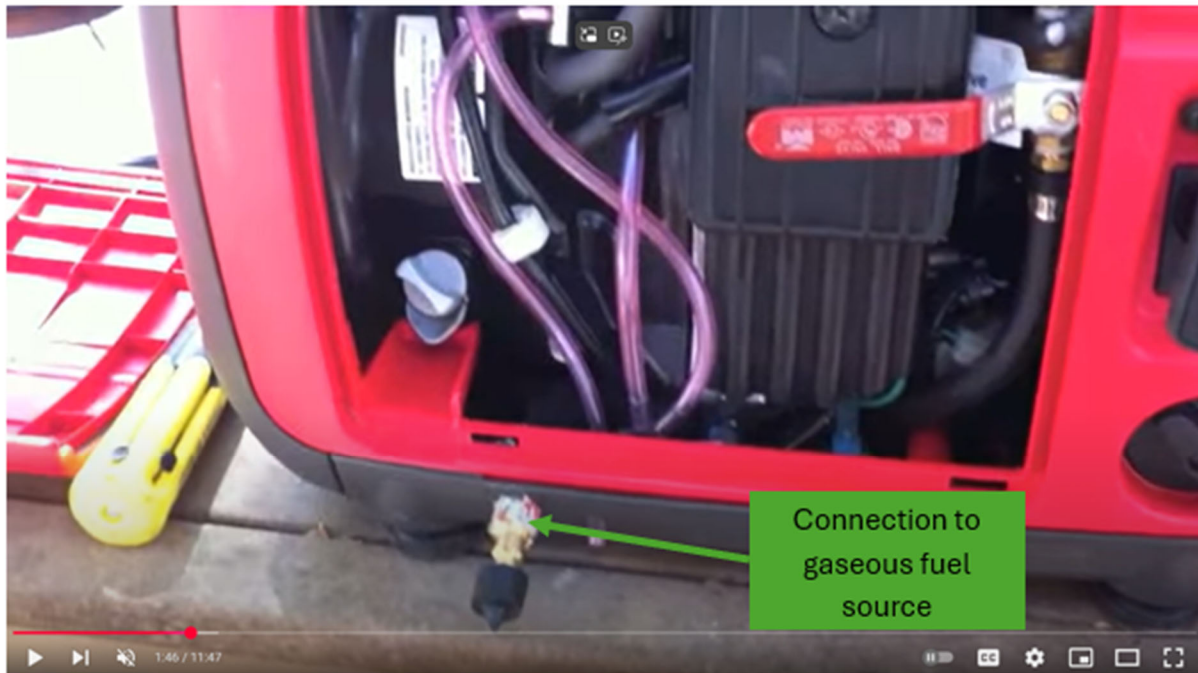
sources to alternatively power the generator. EX1007, 0:36–2:00.⁵



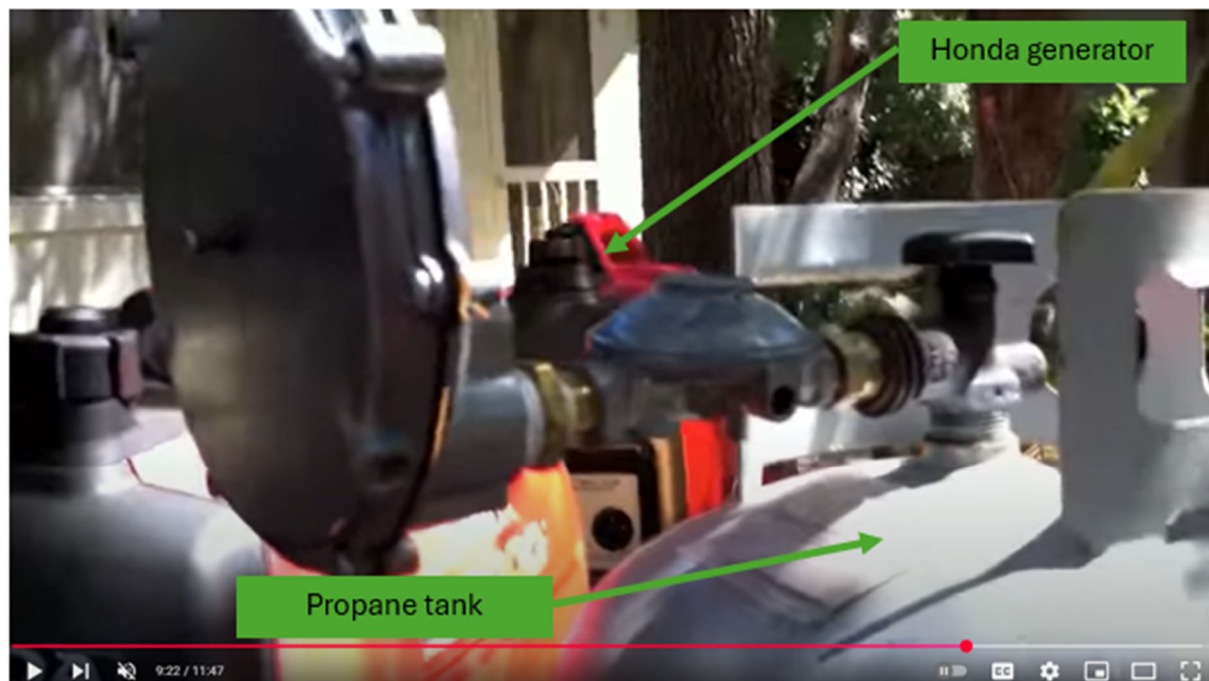
Id., 1:25 (annotations added).

⁵ Citations to the Tri-Fuel Video refer to the time stamp in the video.

Id., 1:46 (annotation added).



88. The Tri-Fuel Video further shows that a propane tank and attached regulators are located remotely from the Honda generator, as shown in the screenshot below:



Id., 9:18.

89. The Tri-Fuel Video further explains that two regulators are attached to the propane tank (i.e., located remotely from the generator) to reduce the pressure of the propane in two stages. The first regulator changes “the high pressure of the gas to about $\frac{1}{2}$ psi” and the second regulator further reduces the pressure to -0.5 water column (meaning 0.5 inches of water column below atmospheric pressure). *Id.*, 2:00-3:26.



Id., 3:06.

90. The video then shows a user connecting the propane tank to the Honda generator through a hose.

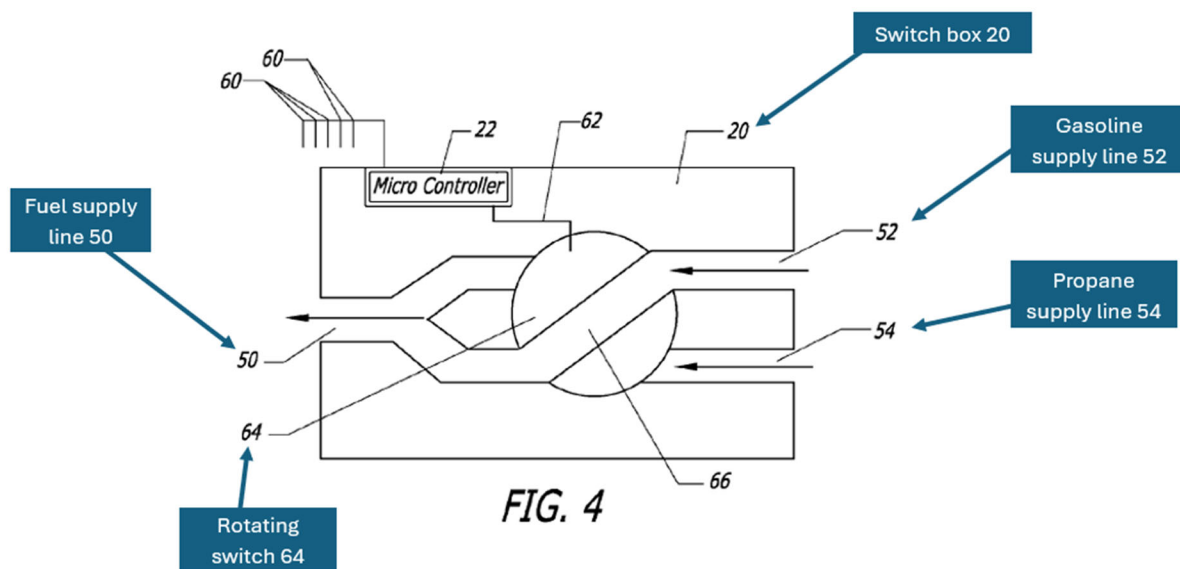


Id., 3:38 (annotated).

91. Thus, the Tri-Fuel Video shows a generator that has been modified to operate on multiple fuel sources by attaching a separate propane tank to a generator, with primary and secondary pressure regulators located at and attached directly to the propane tank (i.e., “off-board” the generator) to manage the pressure of the propane gas delivered to the generator engine.

I. U.S. Patent Pub. No. 2014/0202430 (“Monros”)

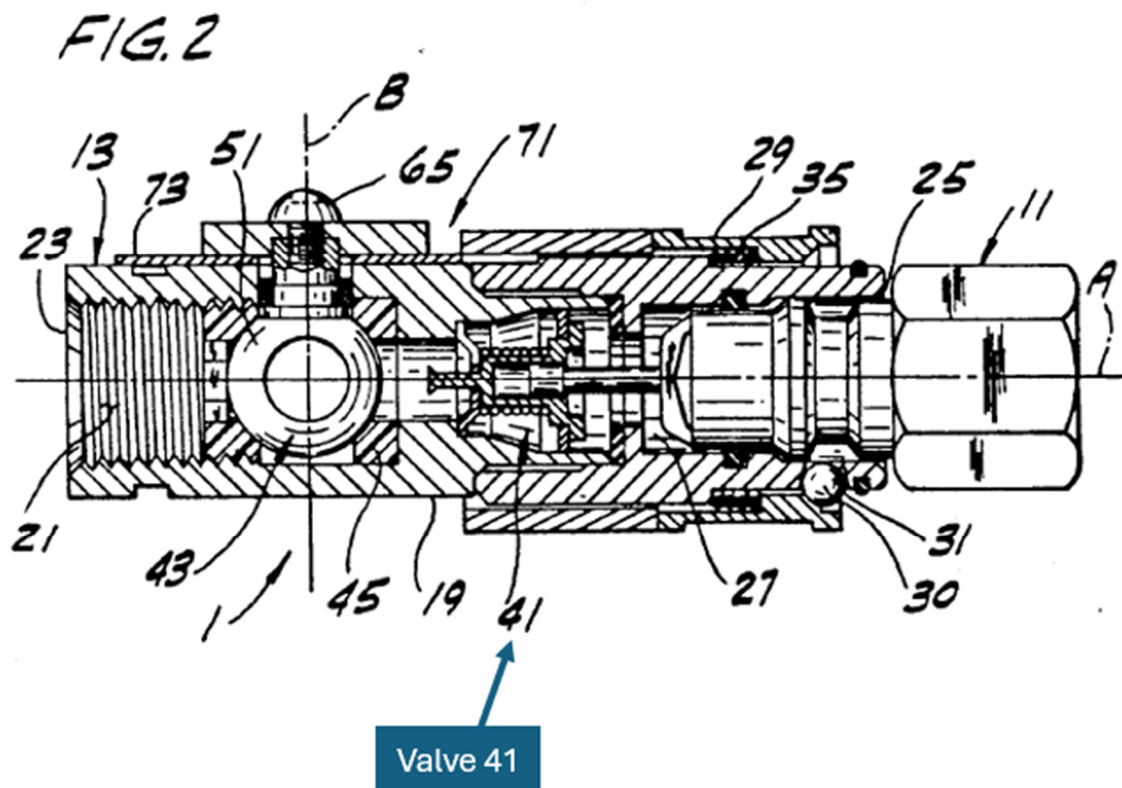
92. Monros discloses a switch box 20 for selectively controlling the flow of gasoline or propane to an engine, actuatable between a first position and second position by rotation. EX1022, ¶¶[0025], [0027]. The switch box is shown in Monros’ Figure 4:



EX1022, Figure 4 (annotated).

J. U.S. Patent No. 5,172,723 (“Sturgis”)

93. Sturgis discloses a quick-connect coupling for a gas supply line (such as natural gas or LPG) with an integral valve 41. EX1023, 1:5-9, 2:5-25, 4:6-13, 5:32-52, Figures 2, 2A & 2B.



EX1023, Figure 2 (annotated).

XII. THE CHALLENGED CLAIMS ARE UNPATENTABLE

94. In my opinion, the cited prior art references, alone or in combination, disclose the limitations of the Challenged Claims. Grounds 1-7 are directed to the apparatus collectively addressing Claims 1-52.

A. Ground 1: Claims 1-5 and 34-37 are obvious over Chaudhari in view of Hallberg

95. In my opinion, Claims 1-5 and 34-37 of the '970 Patent are obvious under §103, for at least the reasons described below.

96. Of these claims, Claims 3-5 and 35-37 are obvious under Patent Owner's proposed constructions (*see* §X).

1. Claim 1

a. Element [1.0]

97. Element [1.0] recites “a dual fuel generator and fuel delivery system.”

98. Chaudhari discloses a LPG fuel delivery system for use with a generator: “the present invention relates to a system for supplying Liquefied Petroleum Gas (LPG) to bi-fuel stationary engines in response to the load and speed of the engine, such engines preferably being coupled to a portable generator.” EX1008, 4.

99. Chaudhari describes using this LPG supply system with a generator that runs on gasoline or kerosene stored in a tank 17. EX1008, 7, Figure 1. Therefore, Chaudhari discloses a dual fuel generator, configured to alternatively run on LPG and gasoline or kerosene. *Id.*

cylinder) when connected to the fuel supply system. *Id.*, 7. The LPG is supplied through a gaseous fuel line, including high pressure line 2. *Id.* The LPG source is pressurized as noted by Chaudhari's claim 1 ("a fuel cylinder for storing a predetermined quantity of Liquefied Petroleum Gas under pressure") and because Chaudhari discloses the use of pressure regulators 3 and 5 to reduce the pressure of LPG from the cylinder via a *high pressure* line 2. *Id.*, 7, 11. The generator also operates on liquid fuel (kerosene or gasoline), which is supplied from a tank 17 through a liquid fuel line. EX1008, 7, Figure 1.

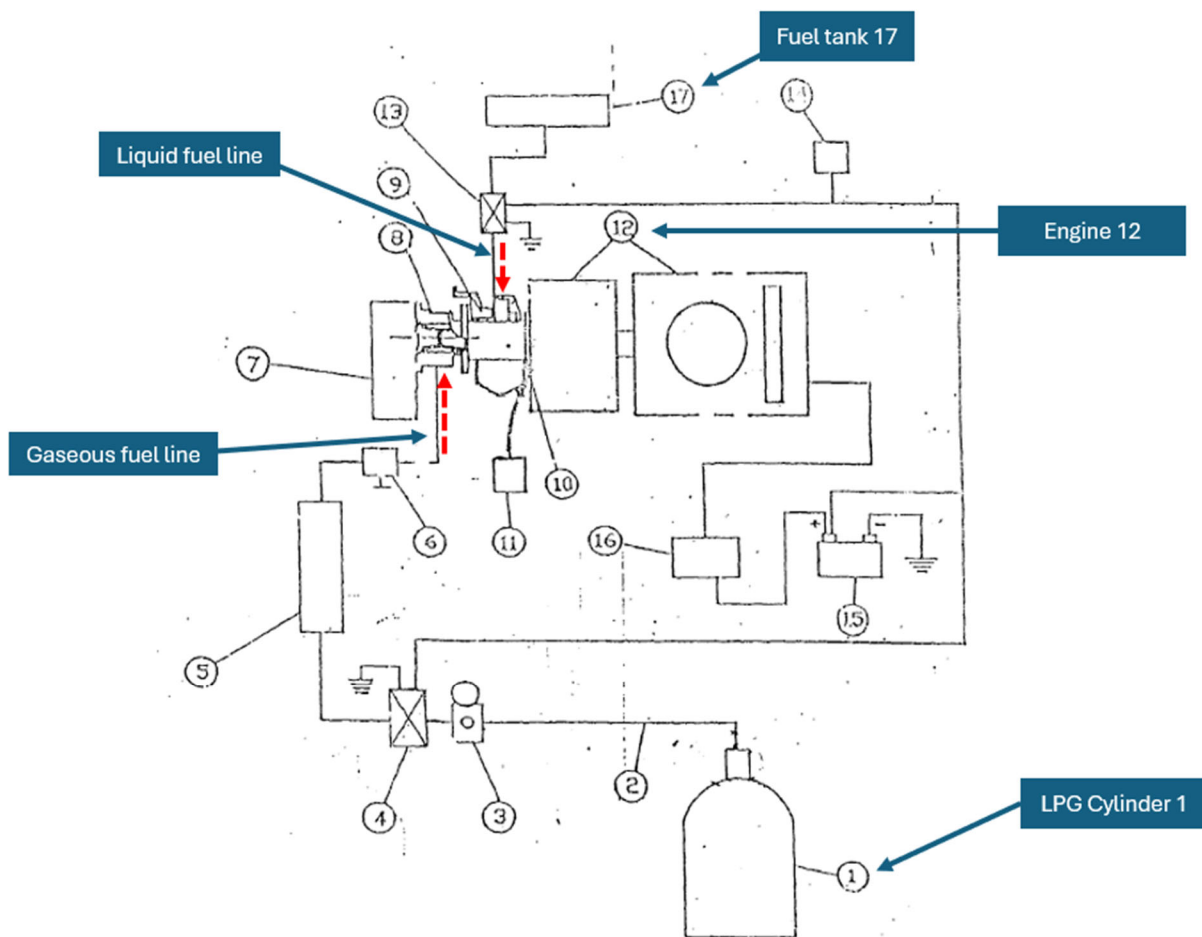


FIG. 1

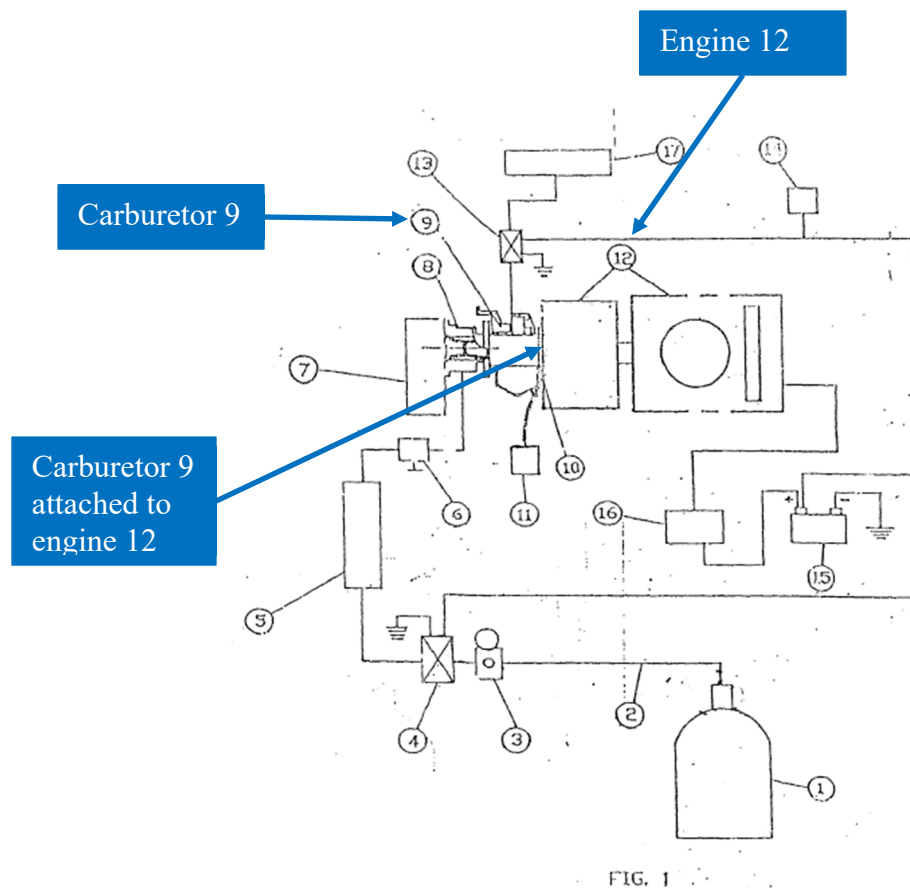
Id., Figure 1 (annotated).

102. As confirmed by the '970 Patent (EX1001, 4:45-46), gasoline is liquid fuel and LPG is a gaseous fuel. *See also* EX1001, 1:47-50.

c. Element [1.2]

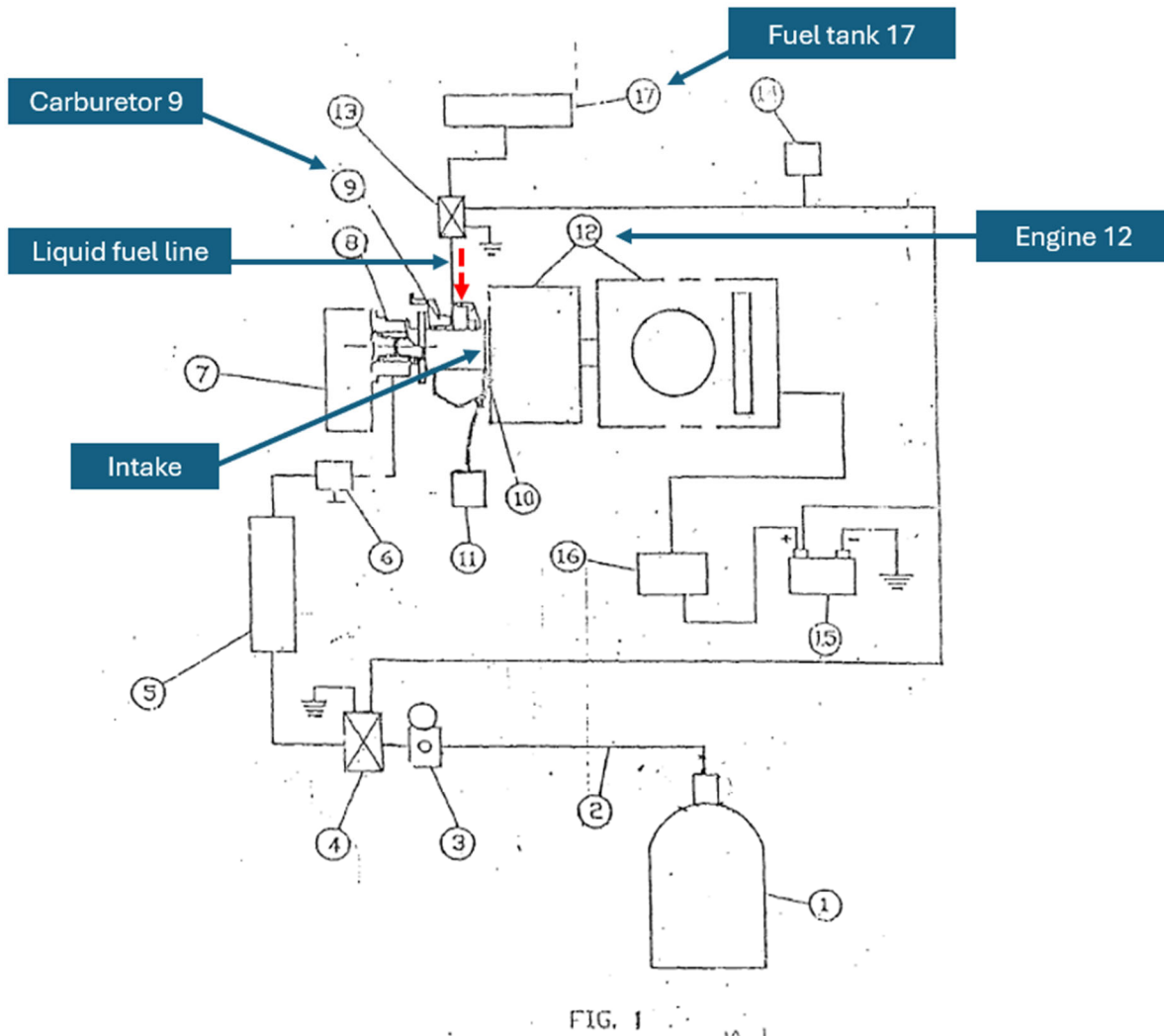
103. Element [1.2] recites “a carburetor attached to an intake of the engine to mix air and fuel and connect the liquid fuel line to the intake.”

104. Chaudhari discloses carburetor 9 attached to the intake of engine 12 (EX1008, 7):



Id., Figure 1.

105. The carburetor 9 connects the liquid fuel line to the intake:



EX1008, Figure 1.

106. Chaudhari discloses a gas-air mixer 8 “supplies air-fuel mixture through a carburetor (9).” *Id.*, 7. Chaudhari also discloses:

The pumping action of the running engine (12) causes vacuum pressure in the intake system of engine. Due to this pumping action, air starts flowing through the venturi of gas air mixer (8) resulting in a pressure drop across the

venturi throat. In response to the pressure drop at the throat, the second stage regulator (5) meters required quantity of gas, for mixing with air at desired air-fuel ratio in the gas air mixer (8). This mixture of air & fuel enters engine for combustion to deliver the required power output.

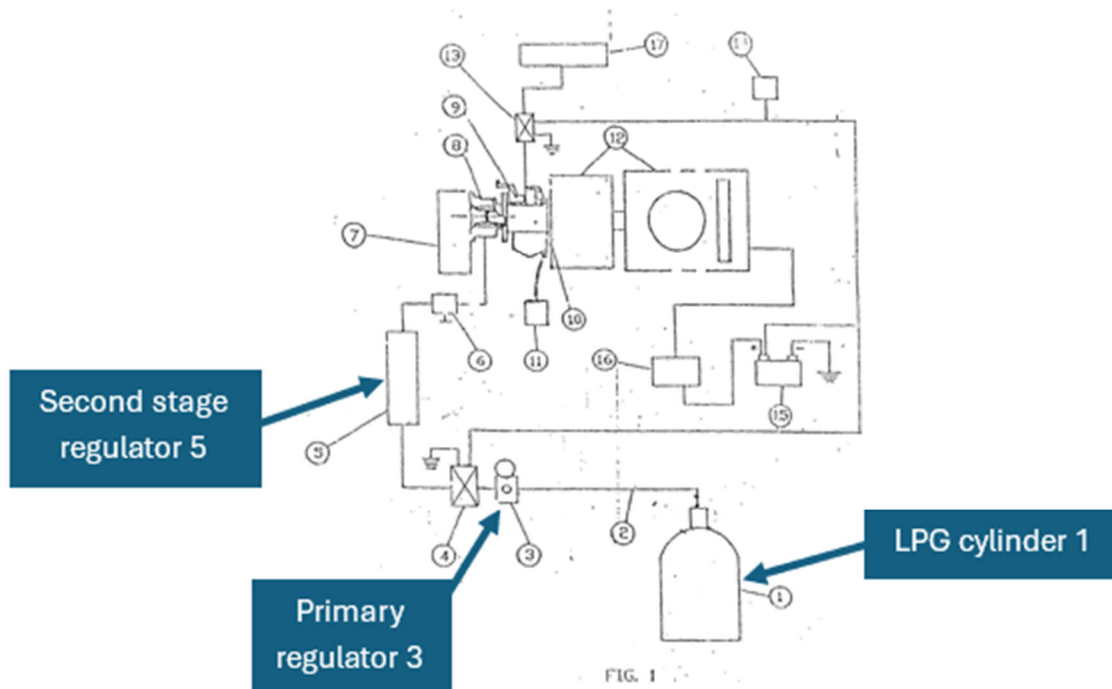
Id., 8.

107. A POSA would have understood that engines such as Chaudhari's operated by mixing fuel (either LPG or kerosene/gasoline in Chaudhari's case) with air prior to combustion in the engine, as confirmed by Chaudhari's numerous references to the gas-air mixer that supplies the air-fuel mixture through the carburetor to the engine. *Id.*, 7-8. A POSA would have thus recognized Chaudhari's disclosure of a dual-fuel engine as one that mixes air with the liquid fuel (i.e., kerosine or gasoline) in carburetor 9, which is attached to the intake for delivery to the engine.

d. Element [1.3]

108. Element [1.3] recites "a fuel regulator system located off board the dual fuel generator, the fuel regulator system comprising."

109. Chaudhari discloses a fuel regulator system located off-board the dual fuel generator. EX1008, 4-5 (describing the fuel delivery system as an improved "Add-On" system), Figure 1. Chaudhari discloses a primary regulator 3 and second stage regulator 5. *Id.*, 7-8, Figure 1.



Id., Figure 1 (annotated).

e. Element [1.4]

110. Element [1.4] recites “a primary pressure regulator coupled to a service valve of the pressurized fuel source and configured to regulate the fuel supplied from the pressurized fuel source to a reduced pressure.”

111. Chaudhari discloses primary regulator 3 that regulates LPG supplied from the LPG cylinder via a high pressure tube 2 to a reduced pressure in a first stage. *Id.*, 7, Figure 1. Chaudhari discloses the primary regulator 3 is coupled to a service valve, which is a needle valve mounted on the LPG cylinder 1. EX1008, 7.

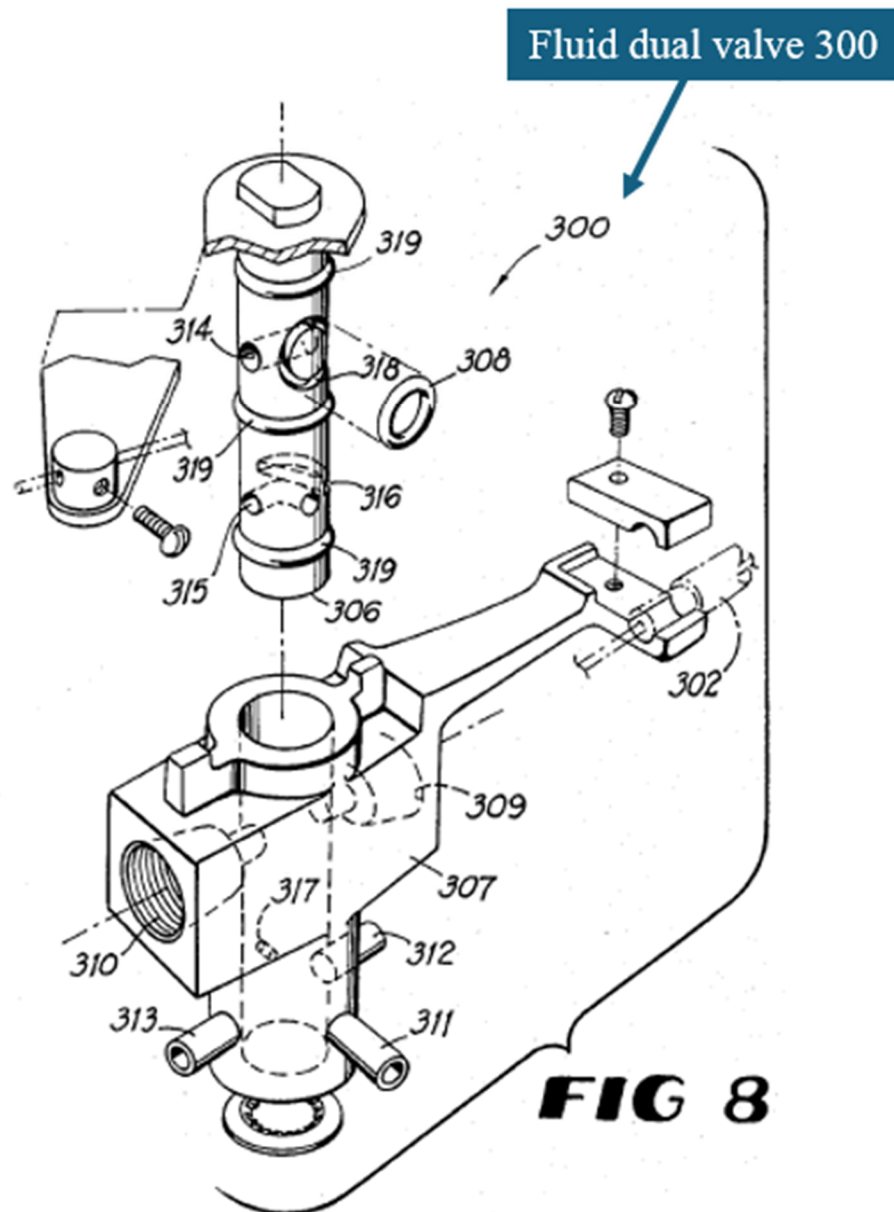
f. Element [1.5]

112. Element [1.5] recites “a secondary pressure regulator coupled to the primary pressure regulator and configured 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 dual fuel generator.”

113. Chaudhari discloses second stage regulator 5 that regulates LPG from primary regulator 3 down to a desired pressure in a second stage for supply through the gaseous fuel line (the line connecting the second stage regulator to the engine) to operate the generator. *Id.*, 7, Figure 1. As seen in Figure 1, second stage regulator 5 is coupled to primary regulator 3 by way of the gaseous fuel line and LPG solenoid valve 4:

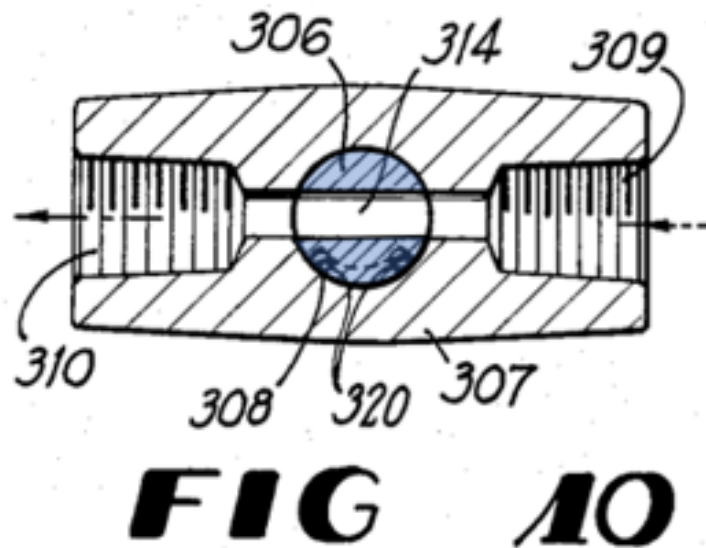
116. It would have been obvious to replace Chaudhari's electronic valves with a mechanical system, such as that taught by Hallberg.

117. Hallberg discloses a mechanical fuel valve as shown in Figure 8 below (“[i]n the figures...300 is the fluid dual valve structure.” EX1006, 7:5-7).



Id., Figure 8 (annotated).

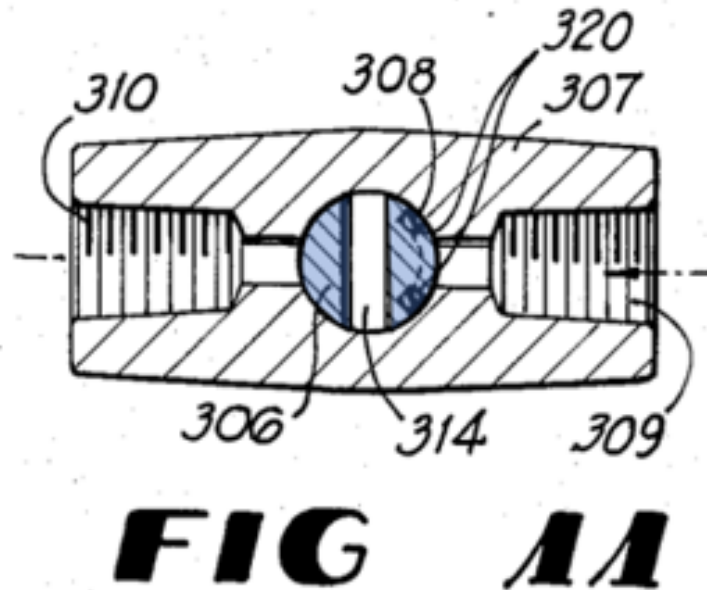
118. Positioning of control 301 in “gasoline” mode acts through control cable 302 to rotate spool 306 within valve body 307 such that gasoline from gasoline supply line 304 is supplied to the carburetor 110 and the flow of propane is locked out. EX1006, 7:27-44. As shown in Figure 10 below, when the mechanical fuel valve is in gasoline mode, liquid inlet opening 309 and liquid outlet opening 310 communicate through tunnel 314. *Id.* A POSA would have thus understood that the mechanical fuel valve is actuatable to a first position to selectively control fuel flow to the dual fuel engine from a first fuel source through a first fuel line.



EX1006, Figure 10 (annotated).

119. As shown in Figure 11 (below) when “propane” mode of control 301 is selected, spool 306 is rotated within valve body 307 by control cable 302 such that O-ring 308 on the face of spool 306 forms a seal between spool 306 and valve body

307 around liquid inlet opening 309. EX1006, 8:3-10. Forming a seal between the spool 306 and valve body 307 prohibits the flow of gasoline to carburetor 110. *Id.*



Id., Figure 11 (annotated).

120. As shown in Figure 13 (below), during “propane” mode operation, duct 315 within spool 306 is simultaneously aligned to communicate with vacuum inlet port 311 and first vacuum outlet port 312. EX1006, 8:23-26, Figure 13. Communicating vacuum inlet port 311 with the first vacuum outlet port 312 connects converter vacuum line 30 (shown in Figure 1) to the intake manifold 111, via intake manifold line 112. *Id.*, 8:26-30.

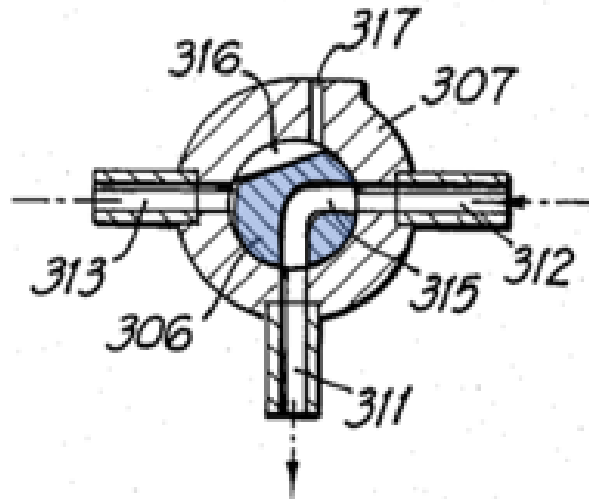


FIG 13

Id., Figure 13 (annotated).

121. When the engine is started, a vacuum is created in line 30, urging diaphragm 10 upward against liquid inlet lever 8. EX1006, 8:31-38. Actuating inlet lever 8 drives inlet valve shaft 41 against bias spring 3 which opens liquid inlet valve 2 allowing propane to flow through the propane fuel line to the engine. *Id.*, 8:38-42.

122. A POSA would have therefore understood that Hallberg teaches a mechanical fuel valve actuatable between a first position (e.g., gasoline) and a second position (e.g., propane) to selectively control fuel flow to the dual fuel engine from the liquid fuel source through the liquid fuel line and a pressurized fuel source fuel source through the gaseous fuel line as recited in Element [1.6].

123. It would have been obvious to a POSA to combine Hallberg's mechanical fuel valve with Chaudhari's dual fuel generator.

124. Combined with Chaudhari, the mechanical fuel valve 300 of Hallberg would selectively control the flow of fuel to Chaudhari's dual-fuel generator.

i. Motivation to Combine

125. A POSA would have been motivated to combine Hallberg's mechanical fuel valve with Chaudhari's dual-fuel generator. The electronic fuel selection system of Chaudhari, with its electronic selector switch 14 and two solenoid valves 4 and 13, presents multiple potential points of failure. A POSA would recognize that a mechanical valve, as taught by Hallberg, offers a more robust and reliable solution not prone to electrical failures such as coil burnout or wiring issues. Mechanical valves are less susceptible to the vibrations and environmental conditions common to generator operation, a key consideration for emergency power equipment like generators.

126. By incorporating valve 300 of Hallberg, the electronic control system of Chaudhari could be eliminated, resulting in the consolidation of parts that makes the generator easier to manufacture, assemble, and troubleshoot.

ii. Expectation of Success

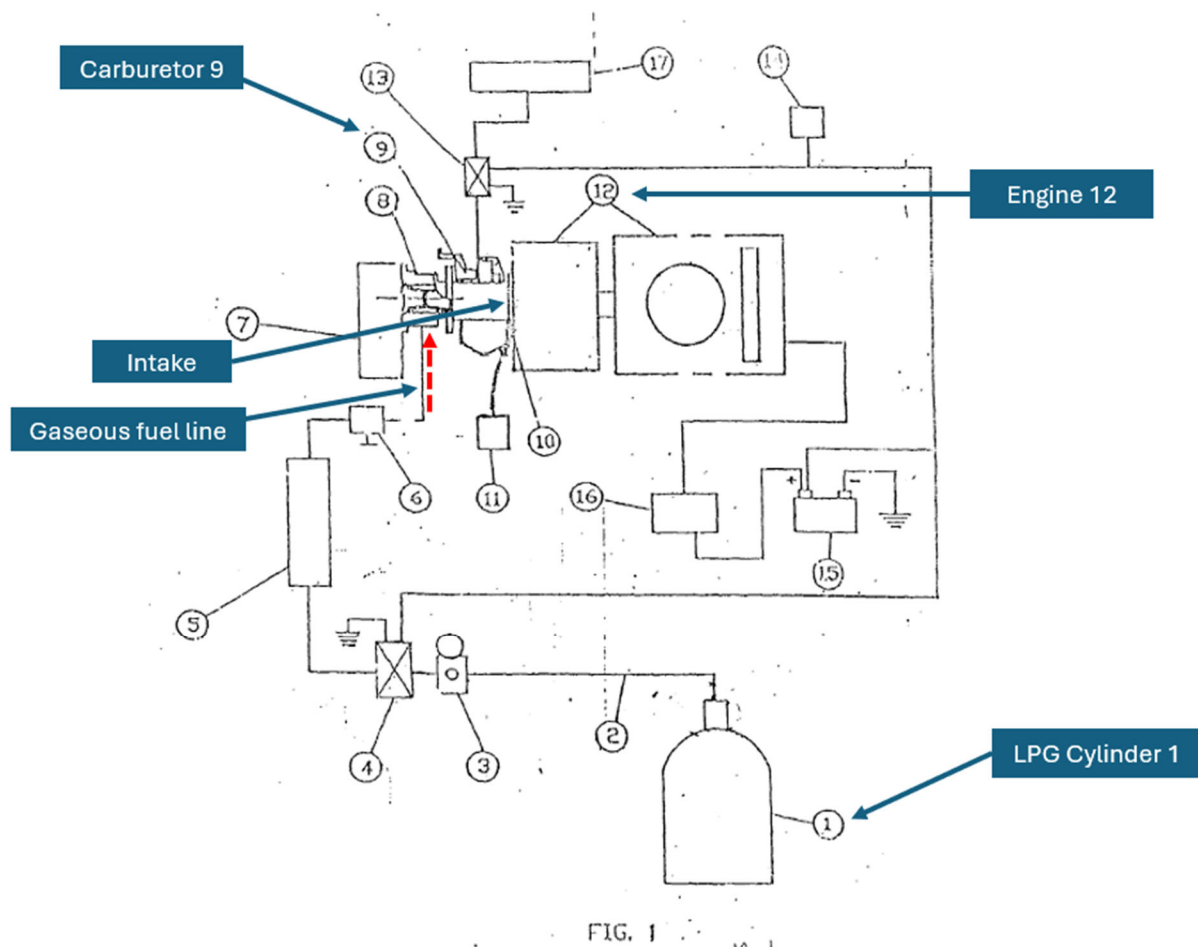
127. A POSA would have had a reasonable expectation of success in combining Hallberg's mechanical fuel valve with Chaudhari's dual fuel generator. Both systems perform the same core function—selectively directing fuel from two sources to the engine. Further, mechanical fuel valves were well-known and widely

used in fuel delivery systems, meaning a POSA would have no doubt that this combination would maintain the generator's ability to select between fuel sources.

2. Claim 2

128. Claim 2 depends from Claim 1, and further requires “wherein the carburetor connects the gaseous fuel line to the intake.”

129. Chaudhari discloses carburetor 9 that connects the gaseous fuel line to the intake by way of gas-air mixer 8 (EX1008, 7):



EX1008, Figure 1.

3. Claim 3

130. As discussed above (*see above* §X.C), it is my understanding that Patent Owner proposes “plain and ordinary meaning” for the term “fuel lockout apparatus” and alleges that a “fuel lockout apparatus” can include a “selector switch coupled to the gasoline and carburetor valves, the gear assembly coupled to the LPG valve, or a combination of the selector switch and the gear assembly may be considered the claimed a fuel lockout apparatus coupled to a mechanical fuel valve.” EX1018, 16; *see also id.*, 8. Although I disagree with Plaintiff’s proposed construction and application, assuming Plaintiff’s proposed construction and application of “fuel lockout apparatus” are correct, it is my opinion that Claim 3 is obvious for at least the reasons described below. I apply this same understanding and assumption to the other claims in this Ground that recite a “fuel lockout apparatus.”

131. Claim 3 depends from Claim 1.

a. Element [3.1]

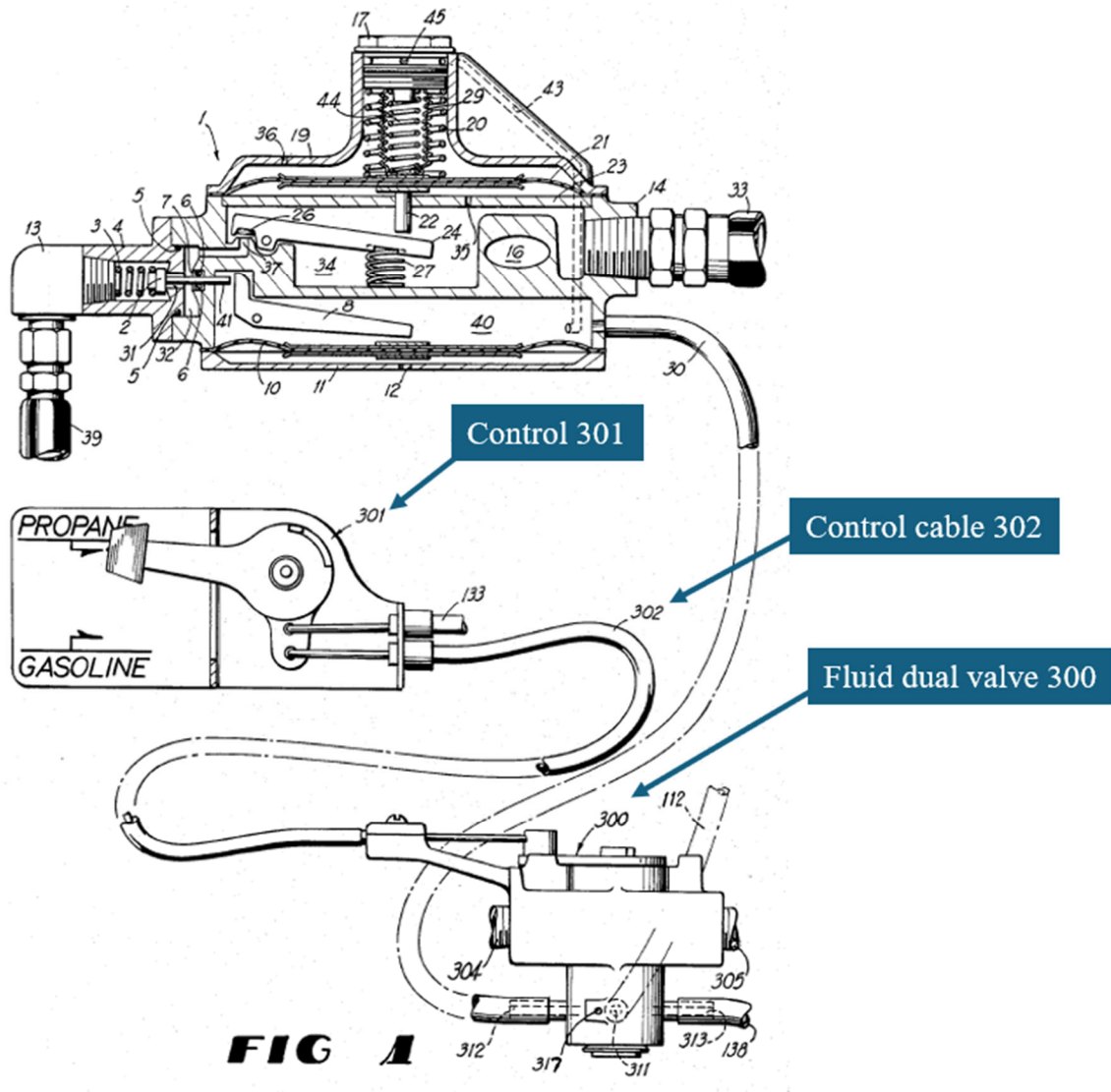
132. Element [3.1] recites “a fuel lockout apparatus coupled to the mechanical fuel valve.”

133. As discussed (*see* §XII.A.1.g), the Chaudhari-Hallberg combination discloses the mechanical fuel valve.

134. Hallberg discloses two structures (described in more detail below), each of which teach a fuel lockout apparatus coupled to the mechanical fuel valve (fluid

dual valve structure 300). Because the two additional structures are part of the same fuel control assembly that includes the mechanical fuel valve, it would have been obvious to a POSA to combine Hallberg's fuel lockout apparatus with Chaudhari's dual fuel generator for the same reasons as discussed for the mechanical fuel valve. *See* §XII.A.1.g.

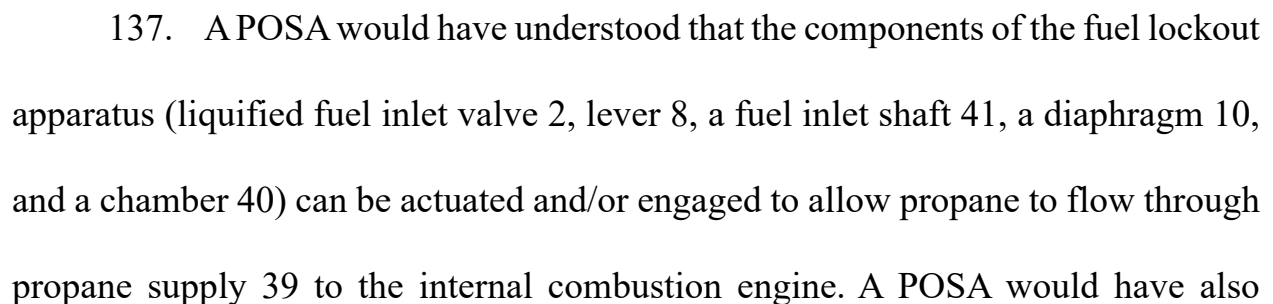
135. First, Hallberg discloses a fuel lockout apparatus comprising control 301 and control cable 302. EX1006, 7:27-44. As shown in Figure 1 (below), the fuel lockout apparatus comprising control 301 and control cable 302 is coupled to fluid dual valve 300. EX1006, 7:30-36, 8:3-9. Positioning control 301 in the "gasoline" mode acts through control cable 302 to permit gasoline to flow through fluid dual valve 300, and to lock out propane from flowing to the dual fuel engine. *See* §XII.A.1.g. Positioning control 301 in the "propane" mode acts through control cable 302 to permit propane to flow to the dual fuel engine, and to lock out gasoline from flowing through fluid dual valve 300. *Id.*



EX1006, Figure 1 (annotated).

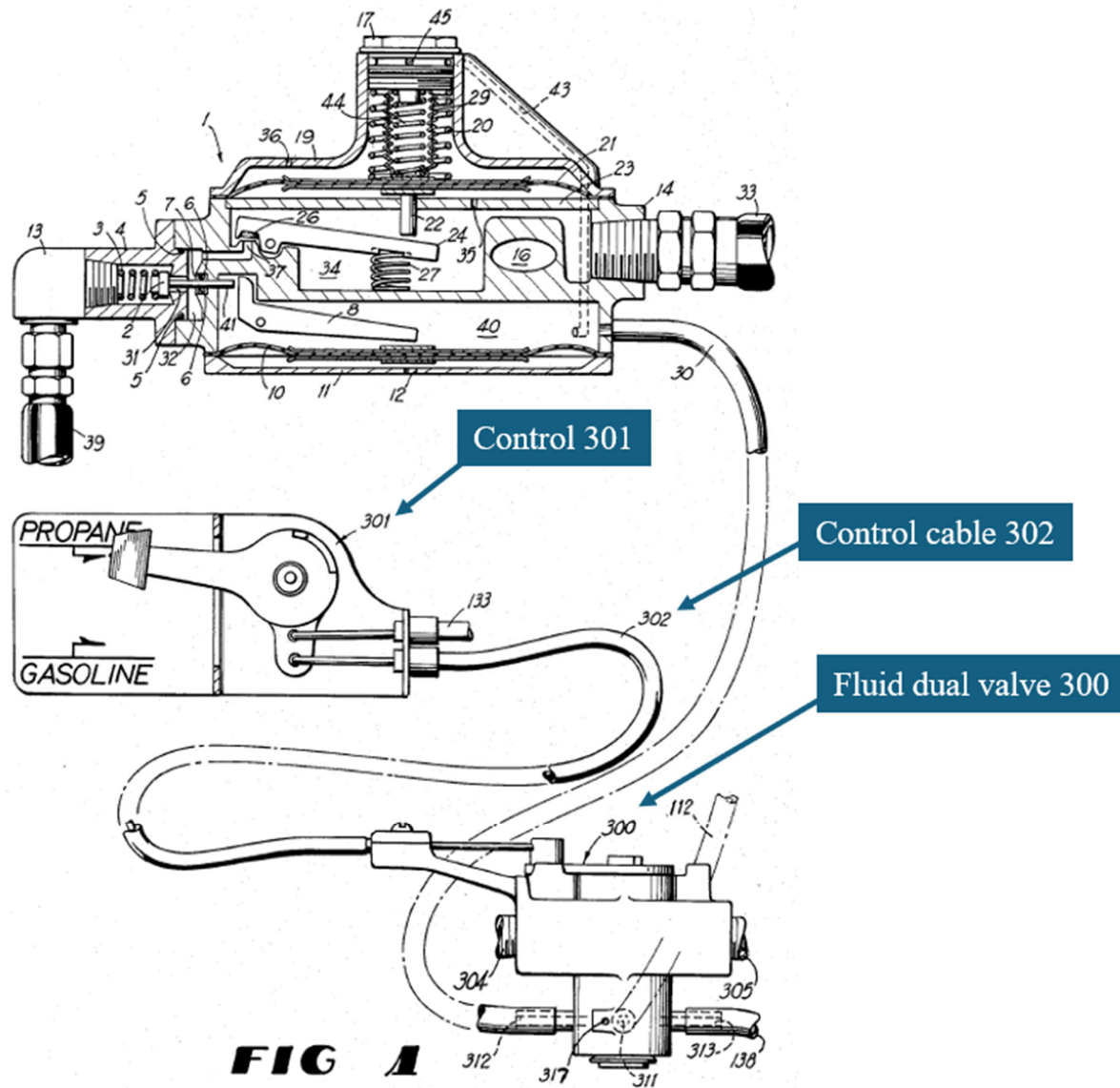
136. Alternatively, Hallberg also discloses a fuel lockout apparatus comprising a liquified fuel inlet valve 2, lever 8, a fuel inlet shaft 41, a diaphragm 10, and a chamber 40. EX1006, 7:64-8:2. As shown in Figure 1 (below), when placed in propane mode, vacuum from the engine intake urges diaphragm 10 upward against liquid inlet lever 8, the opposite end of which drives inlet valve shaft 41 against bias spring 3 and opens liquid inlet valve 2. EX1006, 8:23-40. Upon opening inlet valve

EX1006, Figure 1 (annotated).



understood that if the components of the fuel lockout apparatus are not actuated and/or engaged, propane is not supplied to the dual fuel generator.

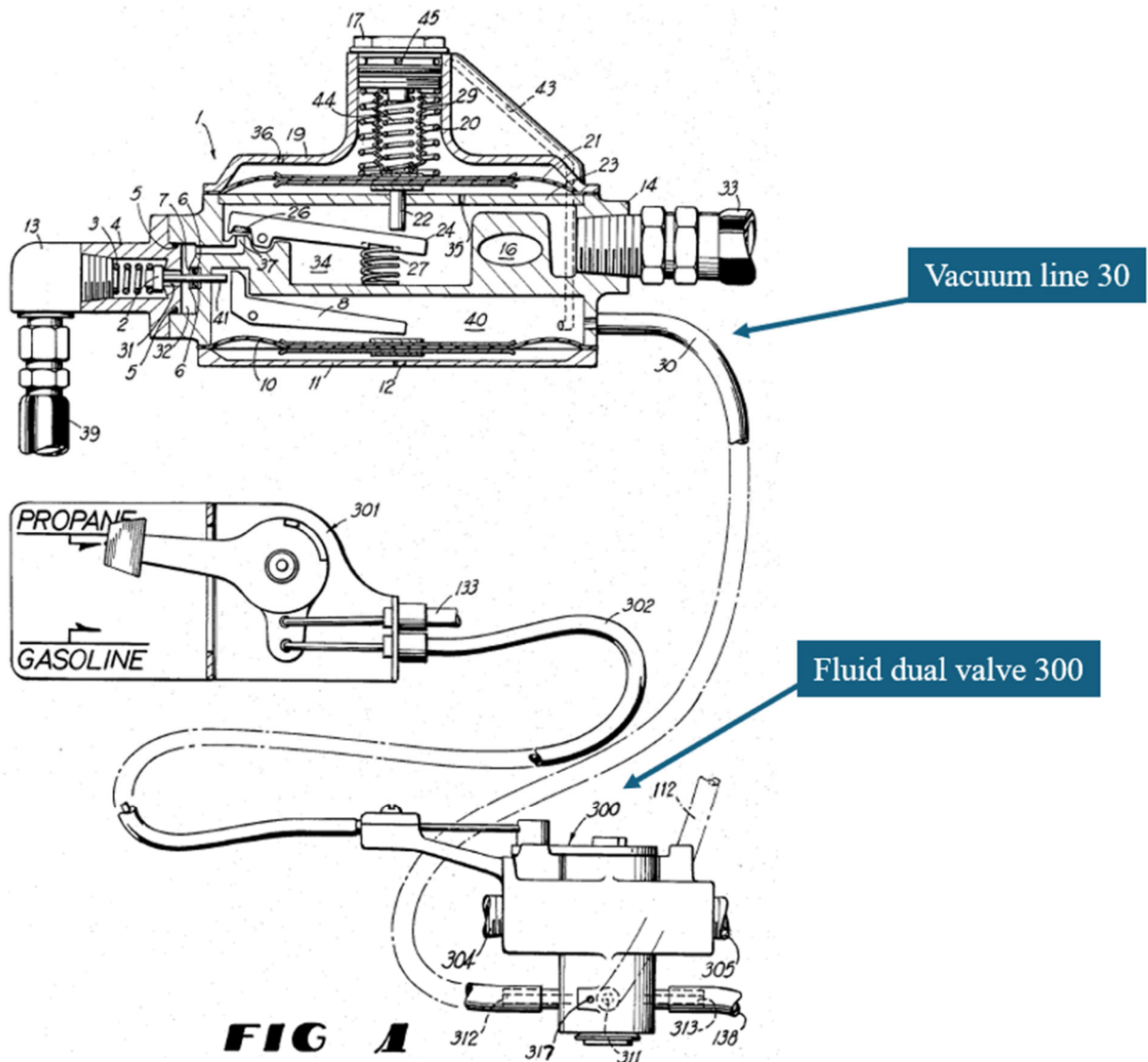
138. Hallberg also discloses that the fuel lockout apparatus is coupled to the mechanical fuel valve. As shown in Figure 1 (below), control cable 302 couples the fuel lockout apparatus comprising control 301 and control cable 302 to the mechanical fuel valve (fluid dual valve 300). Without control cable 302, the control 301 would be unable to rotate spool 306 within the valve body 307. EX1006, 7:30-32.



EX1006, Figure 1 (annotated).

139. Alternatively, as shown in Figure 1 (below), vacuum line 30 couples the fuel lockout apparatus comprising liquified fuel inlet valve 2, lever 8, fuel inlet shaft 41, diaphragm 10, and chamber 40 to the mechanical fuel valve. Without vacuum line 30 receiving vacuum from vacuum outlet port 312, chamber 40 would

be unable to actuate diaphragm 10, which engages lever 8, which drives inlet shaft 41 against bias spring 3 to open liquid inlet valve 2. EX1006, 8:23-42.



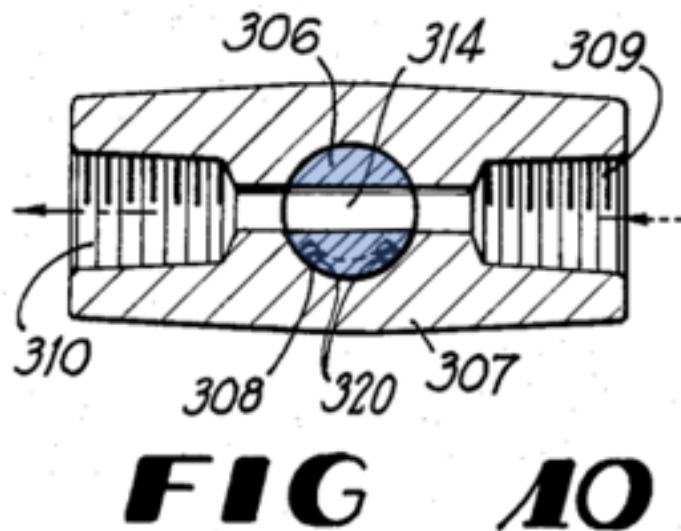
EX1006, Figure 1 (annotated).

b. Element [3.2]

140. Element [3.2] recites “wherein when the mechanical fuel valve is in the first position, the fuel lockout apparatus communicates the liquid fuel source to the

dual fuel generator and prevents the pressurized fuel source from coupling to the dual fuel generator, and actuation of the mechanical fuel valve to the second position causes the fuel lockout apparatus to permit the pressurized fuel source to couple to the dual fuel generator, and interrupts the liquid fuel source communication with the dual fuel generator.”

141. Hallberg discloses that when gasoline is selected on the control 301, spool 306, within valve body 307, is rotated such that gasoline from gasoline supply line 304 is supplied to the carburetor 110 through engine gasoline line 305. EX1006, 7:27-44. As shown in Figure 10 below, when gasoline is selected, gasoline is communicated through inlet opening 309, tunnel 314, and liquid outlet opening 310.



EX1006, Figure 10 (annotated).

142. During gasoline mode, the fuel lockout apparatus prevents the flow of propane to the internal combustion engine. *See* §§XII.A.1.g, XII.A.3.a. A POSA

would have therefore understood that when the mechanical fuel valve is in the first position, the fuel lockout apparatus communicates the liquid fuel source to the dual fuel generator and prevents the pressurized fuel source from coupling to the dual fuel generator.

143. When propane mode is selected on the control 301, propane is provided to the dual fuel engine. EX1006, 8:3-30. As discussed (*see* §§XII.A.1.g, XII.A.3.a), when propane mode is selected, spool 306 is rotated within valve body 307 to form a seal to prevent the flow of gasoline to the engine and a vacuum is created in line 30, urging diaphragm 10 upward against liquid inlet lever 8 which drives inlet valve shaft 41 against bias spring 3 which opens liquid inlet valve 2 allowing propane to flow through the propane fuel line to the engine. A POSA would have therefore also understood when the mechanical fuel valve is in a second position, the fuel lockout apparatus permits the pressurized fuel source to couple to the dual fuel generator and interrupts the liquid fuel source communication with the dual fuel generator.

144. Accordingly, a POSA would have understood that Hallberg teaches wherein the fuel lockout apparatus: communicates the liquid fuel source to the dual fuel generator and prevents the pressurized fuel source from coupling to the dual fuel generator, and actuation of the mechanical fuel valve to the second position causes the fuel lockout apparatus to permit the pressurized fuel source to couple to

the dual fuel generator, and interrupts the liquid fuel source communication with the dual fuel generator; and as recited in Element [3.2].

4. Claim 4

145. Claim 4 depends from Claim 1.

a. Element [4.1]

146. Element [4.1] recites “wherein the mechanical fuel valve opens and closes the liquid fuel line to selectively control fuel flow from the liquid fuel source to the dual fuel generator.”

147. As discussed (*see* §XII.A.1.g), Chaudhari in combination with Hallberg discloses a mechanical fuel valve that selectively controls fuel flow to the engine from the liquid fuel source through the liquid fuel line. The mechanical fuel valve selection controls fuel flow by opening and closing the liquid fuel line. *Id.*

b. Element [4.2]

148. Element [4.2] recites “a fuel lockout apparatus coupled to the mechanical fuel valve and configured to prevent the pressurize[d] fuel source from coupling to the gaseous fuel line while the mechanical fuel valve opens the liquid fuel line, and permit the pressurized fuel source to couple to the gaseous fuel line while the mechanical fuel valve closes the liquid fuel line.”

149. As discussed (*see* §XII.A.3.a), Chaudhari in combination with Hallberg discloses a fuel lockout apparatus coupled to the mechanical fuel valve. The fuel lockout apparatus prevents the pressurized fuel source from coupling to the

generator when communicating (i.e., opening) the liquid fuel line to the generator, and permits the pressurized fuel source to couple to the generator when interrupting (i.e., closing) the liquid fuel line to the generator. *See* §XII.A.3.b. The fuel lockout apparatus prevents and permits the pressurized fuel from coupling to the generator by closing and opening the gaseous fuel line.

5. Claim 5

150. Claim 5 depends from Claim 4, and further requires “wherein the fuel lockout apparatus is further configured to prevent the mechanical fuel valve from opening the liquid fuel line while the dual fuel generator receives fuel from the pressurized fuel source.”

151. As discussed (*see* §XII.A.3.a), Chaudhari in combination with Hallberg discloses a fuel lockout apparatus coupled to the mechanical fuel valve. When in “propane” mode, control 301 acts through control cable 302 and locks out gasoline from flowing through fluid dual valve structure 300. *See* §XII.A.1.g. This happens by spool 306 rotating within valve body 307 by control cable 302 such that O-ring 308 on the face of spool 306 forms a seal between spool 306 and valve body 307 around liquid inlet opening 309. EX1006, 8:3-7. Because control 301 dictates whether the seal between spool 306 and valve body 307 occurs, control 301 prevents the mechanical fuel valve from opening the liquid fuel line while the dual fuel generator receives fuel from the pressurized fuel source.

6. Claim 34

a. Element [34.0]

152. Element [34.0] recites “a dual fuel generator and fuel delivery system.”

153. Chaudhari discloses this element. *See* §XII.A.1.a.

b. Element [34.1]

154. Element [34.1] recites “a dual fuel generator 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.”

155. Chaudhari discloses this element. *See* §XII.A.1.b.

c. Element [34.2]

156. Element [34.2] recites “a fuel regulator system located off board the dual fuel generator, the fuel regulator system comprising.”

157. Chaudhari discloses this element. *See* §XII.A.1.d.

d. Element [34.3]

158. Element [34.3] recites “a primary pressure regulator coupled to a service valve of the pressurized fuel source and configured to regulate the fuel supplied from the pressurized fuel source to a reduced pressure.”

159. Chaudhari discloses this element. *See* §XII.A.1.e.

e. Element [34.4]

160. Element [34.4] recites “a secondary pressure regulator coupled to the primary pressure regulator and configured 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 dual fuel generator.”

161. Chaudhari discloses this element. *See* §XII.A.1.f.

f. Element [34.5]

162. Element [34.5] recites “a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.”

163. Chaudhari in combination with Hallberg discloses this element. *See* §XII.A.1.g.

g. Element [34.6]

164. Element [34.6] recites “wherein the mechanical fuel valve outputs gaseous fuel to the dual fuel generator during operation thereof on gaseous fuel at the desired pressure from the secondary pressure regulator.”

165. As discussed (*see* §XII.A.1.g), Chaudhari in combination with Hallberg discloses a mechanical fuel valve that supplies gaseous fuel to the carburetor of the dual fuel generator when in “propane” mode by connecting intake manifold vacuum line 112. The outputted LPG from the secondary pressure regulator at the desired pressure would flow to Chaudhari’s engine via the gaseous fuel line.

7. Claim 35

166. Claim 35 depends from Claim 34.

a. Element [35.1]

167. Element [35.1] recites “a fuel lockout apparatus coupled to the mechanical fuel valve.”

168. Chaudhari in combination with Hallberg discloses this element. *See* §XII.A.3.a.

b. Element [35.2]

169. Element [35.2] recites “wherein when the mechanical fuel valve is in the first position, the fuel lockout apparatus communicates the liquid fuel source to the dual fuel generator and prevents the pressurized fuel source from coupling to the dual fuel generator, and actuation of the mechanical fuel valve to the second position causes the fuel lockout apparatus to permit the pressurized fuel source to couple to the dual fuel generator, and interrupts the liquid fuel source communication with the dual fuel generator.”

170. Chaudhari in combination with Hallberg discloses this element. *See* §XII.A.3.b.

8. Claim 36

171. Claim 36 depends from Claim 34.

a. Element [36.1]

172. Element [36.1] recites “wherein the mechanical fuel valve opens and closes the liquid fuel line to selectively control fuel flow from the liquid fuel source to the dual fuel generator; and further comprises.”

173. Chaudhari in combination with Hallberg discloses this element. *See* §XII.A.4.a.

b. Element [36.2]

174. Element [36.2] recites “a fuel lockout apparatus coupled to the mechanical fuel valve and configured to prevent the pressurized fuel source from coupling to the gaseous fuel line while the mechanical fuel valve opens the liquid fuel line, and permit the pressurized fuel source to couple to the gaseous fuel line while the mechanical fuel valve closes the liquid fuel line.”

175. Chaudhari in combination with Hallberg discloses this element. *See* §XII.A.4.b.

9. Claim 37

176. Claim 37 depends from Claim 36, and further requires “wherein the fuel lockout apparatus is further configured to prevent the mechanical fuel valve from opening the liquid fuel line while the dual fuel generator receives fuel from the pressurized fuel source.”

177. Chaudhari in combination with Hallberg discloses this claim. *See* §XII.A.5.

B. Ground 2: Claims 12-14, 44, 48, and 50-51 are obvious over Chaudhari in view of Hallberg and Jungmann

178. In my opinion, Claims 12-14, 44, 48, and 50-51 of the '970 Patent are obvious under §103, for at least the reasons described below.

179. Of these claims, Claims 50-51 are obvious under Patent Owner's proposed constructions (*see* §X).

1. Claim 12

a. Element [12.0]

180. Element [12.0] recites “a dual fuel generator and fuel delivery system.”

181. Chaudhari discloses this element. *See* §XII.A.1.a.

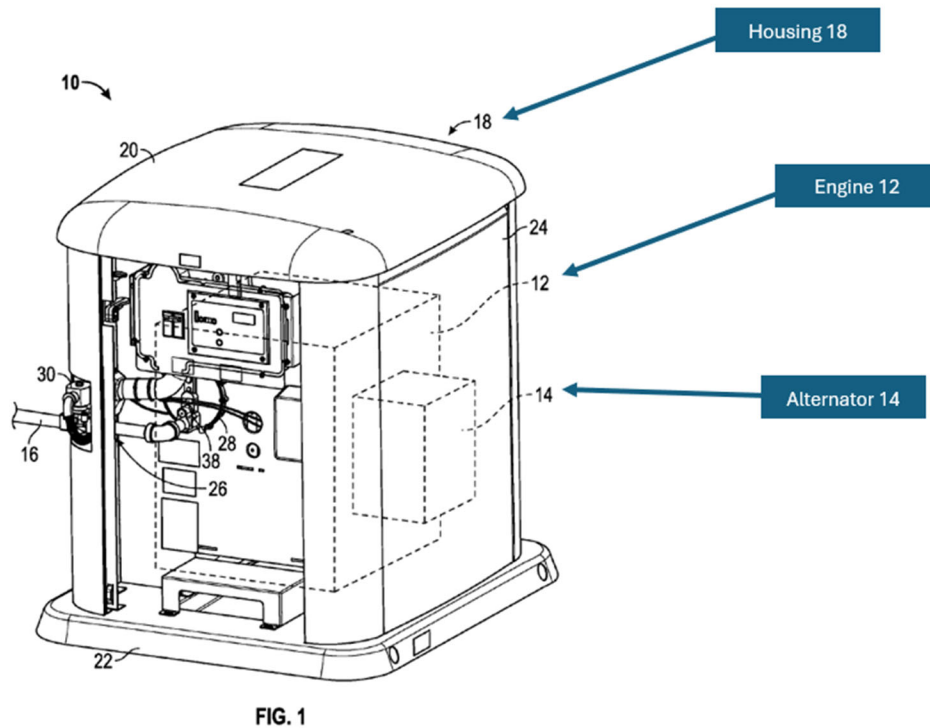
b. Element [12.1]

182. Element [12.1] recites “a dual fuel generator comprising: a generator housing, an alternator mounted within the generator housing, and an engine driving the alternator and mounted within the generator housing, the 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.”

183. Chaudhari discloses a dual-fuel generator 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. *See* §XII.A.1.b.

184. It would have been obvious to use an alternator as Chaudhari's generator (driven by Chaudhari's engine) and to mount the alternator and Chaudhari's engine within a generator housing, as taught by Jungmann.

185. Jungmann discloses a generator including housing 18, alternator 14 driven by engine 12 and mounted within housing 18. EX1021, ¶¶[0002], [0016], Figure 1.



EX1021, Figure 1 (annotated).

i. Motivation to Combine/Expectation of Success

186. A POSA would have been motivated to use an alternator as Chaudhari's generator because an alternator was a common type of electrical generator at the time of the invention.

187. A POSA would have reasonably expected success in using an alternator within Chaudhari's generator given that this implementation was already demonstrated by Jungmann. Moreover, it was common and well known by that time

to use alternators to convert mechanical energy from an engine into electricity (for example, alternators are commonly combined with car engines to generate electricity).

188. A POSA would have been motivated to mount the alternator and Chaudhari's engine within a housing, as taught by Jungmann, to provide protective measures, noise reduction, and enhanced portability and aesthetics. It was common at the time of the invention to mount the components of a generator within a housing, as shown by Jungmann and the DuroMax generator. EX1021, Figure 1; EX1004, 1. This addition would improve usability and safety in various use environments, including harsh weather conditions, such as wind, rain, and snow.

189. A POSA would have had a reasonable expectation of success in mounting the components of a generator within a housing, including the alternator and engine, as demonstrated by Jungmann and DuroMax.

c. Element [12.2]

190. Element [12.2] recites "a fuel regulator system located off board the dual fuel generator, the fuel regulator system configured to."

191. Chaudhari discloses this element. *See* §XII.A.1.d.

d. Element [12.3]

192. Element [12.3] recites “regulate the gaseous fuel supplied from the pressurized fuel source in a first stage, the gaseous fuel regulated down to a reduced pressure in the first stage.”

193. As discussed (*see* §XII.A.1.e), Chaudhari discloses a primary regulator 3 (first stage) that regulates LPG supplied from the LPG cylinder to a reduced pressure.

e. Element [12.4]

194. Element [12.4] recites “regulate the reduced pressure gaseous fuel in a second stage, the reduced pressure gaseous fuel from the first stage regulated down to a desired pressure in the second stage for delivery through the gaseous fuel line to operate the dual fuel generator.”

195. As discussed (*see* §XII.A.1.f), Chaudhari discloses second stage regulator 5 that regulates the reduced pressure LPG from primary regulator 3 down to a desired pressure for supply through the gaseous fuel line to operate the dual fuel generator. The second stage regulator 5 is the “second stage” as recited in Element [12.4].

f. Element [12.5]

196. Element [12.5] recites “a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel

generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.”

197. Chaudhari in combination with Hallberg discloses this element. *See* §XII.A.1.g.

g. Element [12.6]

198. Element [12.6] recites “wherein the dual fuel generator is free of any pressure regulator mounted within the generator housing.”

199. Chaudhari discloses this element. *See* §XII.A.1.d.

2. Claim 13

200. Claim 13 depends from Claim 12, and further requires “wherein the mechanical fuel valve is mounted on or within the generator housing.”

201. As discussed (*see* §XII.A.1.g), Chaudhari in combination with Hallberg discloses a mechanical fuel valve that selectively controls fuel flow to the engine. As also discussed (*see* §XII.B.1.b), it would have been obvious to mount an alternator and Chaudhari’s engine within a housing, as taught by Jungmann.

202. It would have been obvious to a POSA to mount the mechanical fuel valve on or within the generator housing, as taught by Jungmann’s mounting of its valve 30:

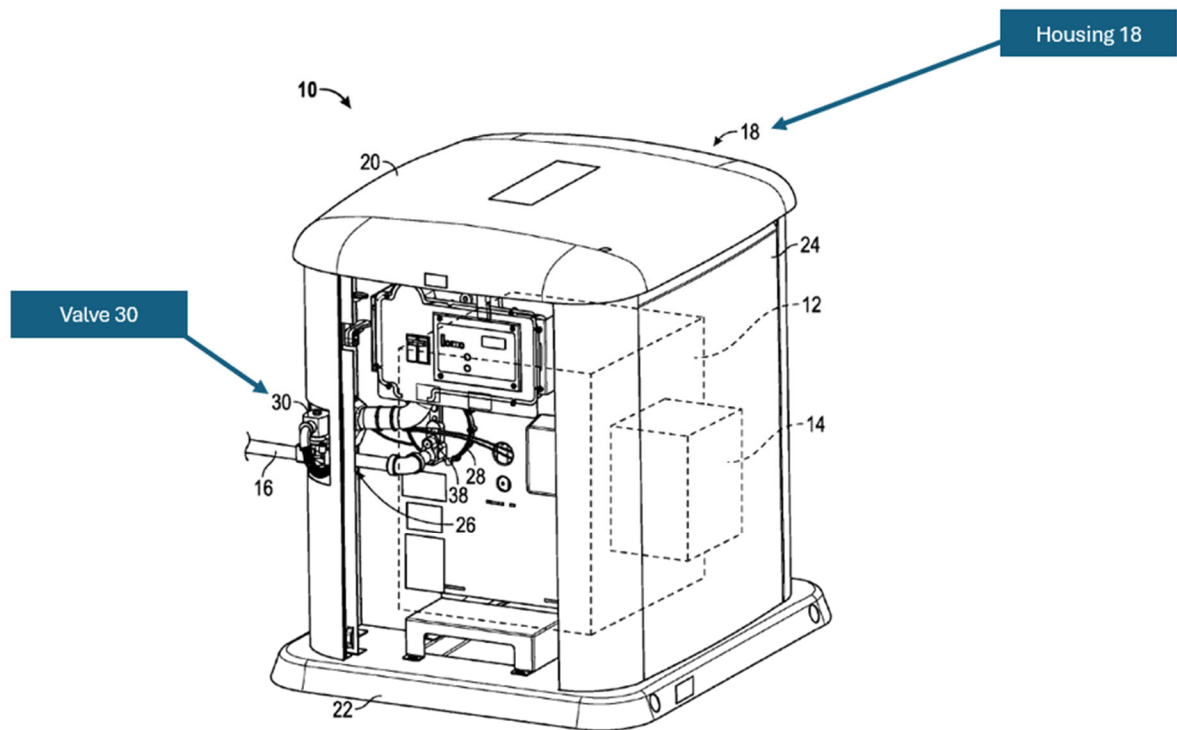


FIG. 1

EX1021, Figure 1 (annotated).

a. Motivation/Expectation of Success

203. A POSA would have been motivated to mount the valve on something, otherwise it would be dangling from the fuel lines, which would increase the risk of damage when moving or installing the generator. A POSA would have been motivated to mount the valve on the housing, as taught by Jungmann, to allow easy access for service or replacement. Alternatively, a POSA would have been motivated to mount the valve within the housing to protect it from harsh weather conditions, such as rain and snow. Both locations would have been logical choices to a POSA.

204. A POSA would have had a reasonably expectation of success in mounting the valve on or within the housing based on Jungmann, and because mounting valves on or within housings of appliances and other equipment was common at the time of the invention.

3. Claim 14

205. Claim 14 depends from Claim 12.

a. Element [14.1]

206. Element [14.1] recites “wherein the first stage comprises a primary pressure regulator coupled to a service valve of the pressurized fuel source and configured to regulate the gaseous fuel supplied from the pressurized fuel source to the reduced pressure.”

207. As discussed (*see* §§XII.A.1.e, XII.B.1.d), the first stage is primary regulator 3 (a primary pressure regulator) that is coupled to a service valve of the pressurized fuel source and configured to regulate the fuel supplied from the pressurized fuel source to a reduced pressure.

b. Element [14.2]

208. Element [14.2] recites “wherein the second stage comprises a secondary pressure regulator coupled to the primary pressure regulator and configured to regulate the gaseous fuel supplied from the primary pressure regulator to the desired pressure for delivery through the gaseous fuel line to operate the dual fuel generator.”

209. As discussed (*see* §§XII.A.1.f, XII.B.1.e), the second stage is second stage regulator 5 that is coupled to the primary pressure regulator and configured 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 dual fuel generator.

4. Claim 44

a. Element [44.0]

210. Element [44.0] recites “a dual fuel generator.”

211. Chaudhari discloses this element. *See* §XII.A.1.a.

b. Element [44.1]

212. Element [44.1] recites “an alternator.”

213. Chaudhari in combination with Jungmann discloses this element. *See* §XII.B.1.b.

c. Element [44.2]

214. Element [44.2] recites “a dual fuel engine coupled to drive the alternator, the dual fuel engine configured to operate on a liquid fuel supplied from a liquid fuel source and a gaseous fuel supplied from a pressurized fuel source.”

215. When combined with Jungmann, Chaudhari discloses a dual-fuel engine coupled to drive an alternator. *See* §XII.B.1.b. As discussed (*see* §XII.A.1.b), Chaudhari’s engine is configured to operate on a liquid fuel supplied from a liquid fuel source and a gaseous fuel supplied from a pressurized fuel source.

d. Element [44.3]

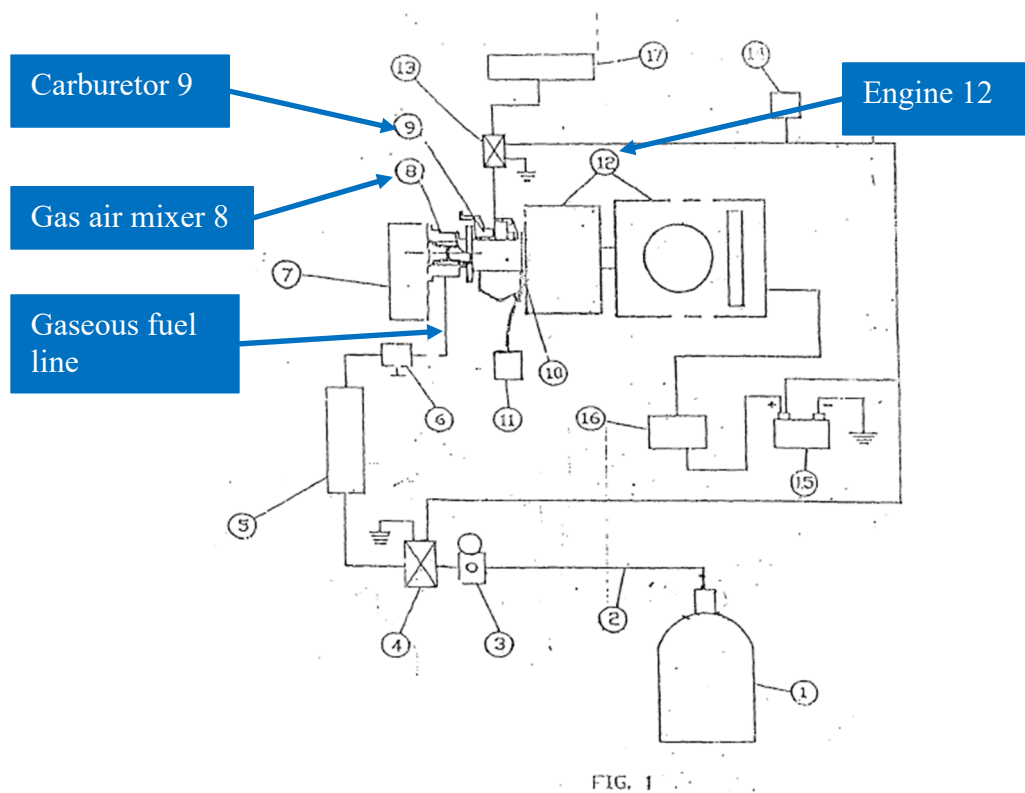
216. Element [44.3] recites “a liquid fuel line coupled to the dual fuel engine to provide the liquid fuel from the liquid fuel source.”

217. As discussed (*see* §XII.A.1.c), Chaudhari discloses a liquid fuel line that is coupled to engine 12 by way of carburetor 9. The liquid fuel line supplies liquid fuel from the liquid fuel source to the dual fuel engine. *See* §XII.A.1.b.

e. Element [44.4]

218. Element [44.4] recites “a gaseous fuel line coupled to the dual fuel engine to provide the gaseous fuel from the pressurized fuel source.”

219. As discussed (*see* §XII.A.1.b), Chaudhari’s dual fuel engine operates on gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line. As seen in Figure 1, the gaseous fuel line is coupled to the dual fuel engine by way of gas air mixer 8 and carburetor 9:



EX1008, Figure 1 (annotated); *see also* §XII.A.2.

f. Element [44.5]

220. Element [44.5] recites “a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel engine from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.”

221. Chaudhari in combination with Hallberg discloses this element. *See* §XII.A.1.g.

g. Element [44.6]

222. Element [44.6] recites “wherein the dual fuel generator is free from any gaseous fuel pressure regulator.”

223. Chaudhari discloses this element. *See* §XII.A.1.d.

5. Claim 48

224. Claim 48 depends from Claim 44, and further requires “wherein the mechanical fuel valve comprises a liquid fuel valve coupled to the liquid fuel line and a gaseous fuel valve coupled to the gaseous fuel line.”

225. As discussed, Hallberg’s fluid dual valve 300 is a liquid fuel valve coupled to the liquid fuel line (gasoline supply line 304) and a gaseous fuel valve coupled to the gaseous fuel line (gaseous fuel line 33) via vacuum line 30. *See* §XII.A.1.g.

6. Claim 50

226. As discussed for purposes of Claim 3, although I disagree with Plaintiff’s proposed construction and application, assuming Plaintiff’s proposed construction and application of “fuel lockout apparatus” are correct, it is my opinion that Claim 50 is obvious for at least the reasons described below. I apply this same understanding and assumption to the other claims in this Ground that recite a “fuel lockout apparatus.”

227. Claim 50 depends from Claim 44.

a. Element [50.1]

228. Element [50.1] recites “wherein the mechanical fuel valve opens and closes the liquid fuel line to selectively control fuel flow from the liquid fuel source to the dual fuel engine; and further comprises.”

229. As discussed (*see* §XII.A.4.a), Chaudhari in combination with Hallberg discloses a mechanical fuel valve that opens and closes the liquid fuel line to selectively control fuel flow from the liquid fuel source to the dual fuel generator. Selectively controlling fuel flow from the liquid fuel source to the dual fuel generator necessarily means controlling fuel flow from the liquid fuel source to the dual fuel engine. *See* §XII.A.1.g.

b. Element [50.2]

230. Element [50.2] recites “a fuel lockout apparatus coupled to the mechanical fuel valve and configured to prevent the pressurize[d] fuel source from coupling to the gaseous fuel line while the mechanical fuel valve opens the liquid fuel line, and permit the pressurized fuel source to couple to the gaseous fuel line while the mechanical fuel valve closes the liquid fuel line.”

231. Chaudhari in combination with Hallberg discloses this element. *See* §XII.A.4.b.

7. Claim 51

232. Claim 51 depends from Claim 50, and further requires “wherein the fuel lockout apparatus is further configured to prevent the mechanical fuel valve from opening the liquid fuel line while the dual fuel generator receives fuel from the pressurized fuel source.”

233. Chaudhari in combination with Hallberg discloses the elements of this claim. *See* §XII.A.5.

C. Ground 3: Claims 8-11, 16-19, and 40-43 are obvious over Chaudhari in view of Hallberg, Jungmann, and Parlatore

234. Claims 8-11, 16-19, and 40-43 of the '970 Patent are obvious under §103, for at least the reasons described below.

1. Claim 8

235. Claim 8 depends from Claim 1, and further recites “a regulator mounting device fixed to the pressurized fuel source with at least the secondary pressure regulator mounted on the regulator mounting device.”

236. It would have been obvious to mount Chaudhari’s secondary pressure regulator on a regulator mounting device of an LPG tank, as disclosed by Parlatore.

237. Parlatore discloses a primary pressure regulator 304 coupled to a LPG tank and a secondary pressure regulator 308 mounted on a mounting device secured to the LPG tank:

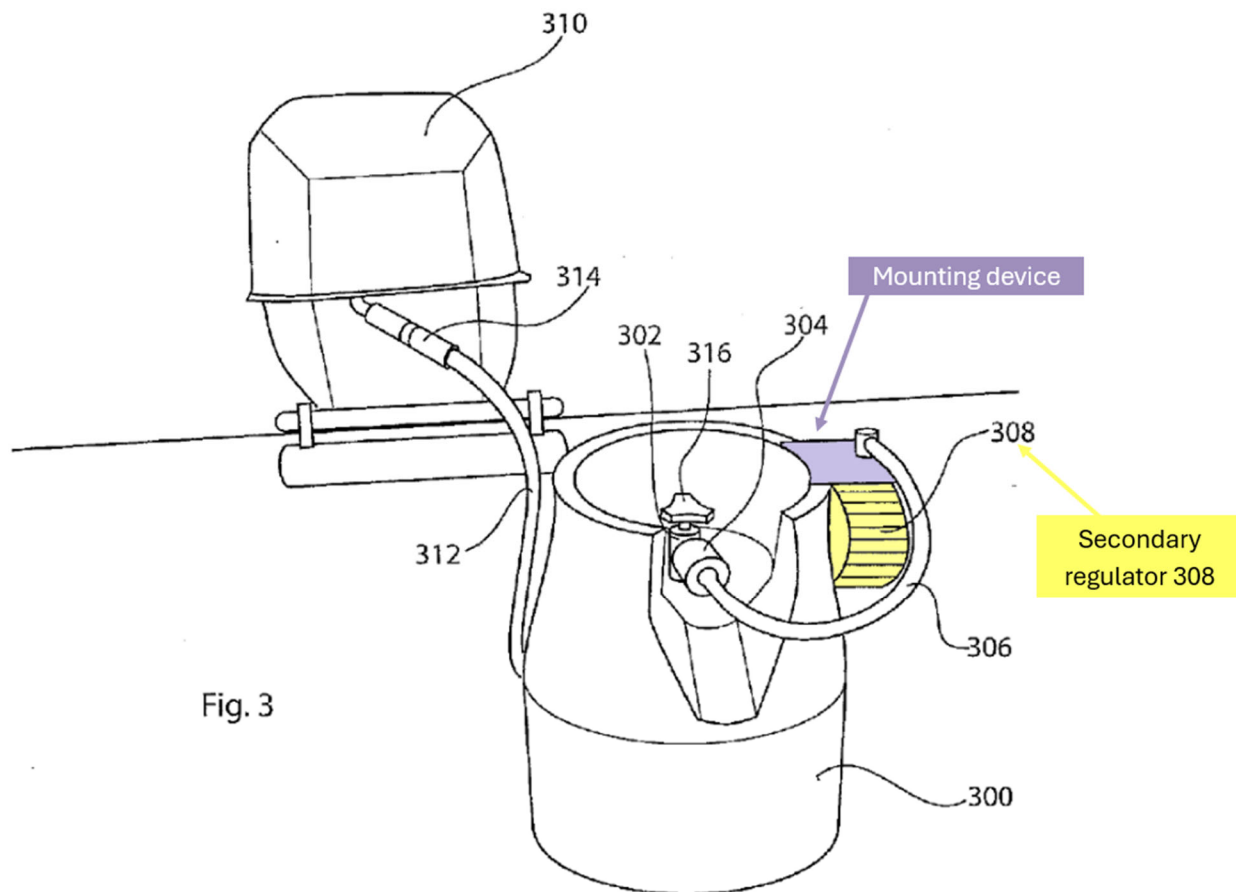


Fig. 3

Id., Figure 3 (annotated).

a. Motivation/Expectation of Success

238. A POSA would have been motivated to mount the secondary pressure regulator to the tank to avoid straining the connections between the second stage regulator and the tank from the weight of the regulator.

239. Mounting the regulator directly to the tank ensures that any potential leaks or failures in the high-pressure section occur at the tank, far from the generator and its ignition sources. This reduces the risk of fire or explosion, a critical consideration given propane's flammability. Also, generators vibrate during

operation, which can stress regulator components and lead to wear or failure. Attaching the regulator to a stationary tank protects it from these vibrations, improving safety and durability.

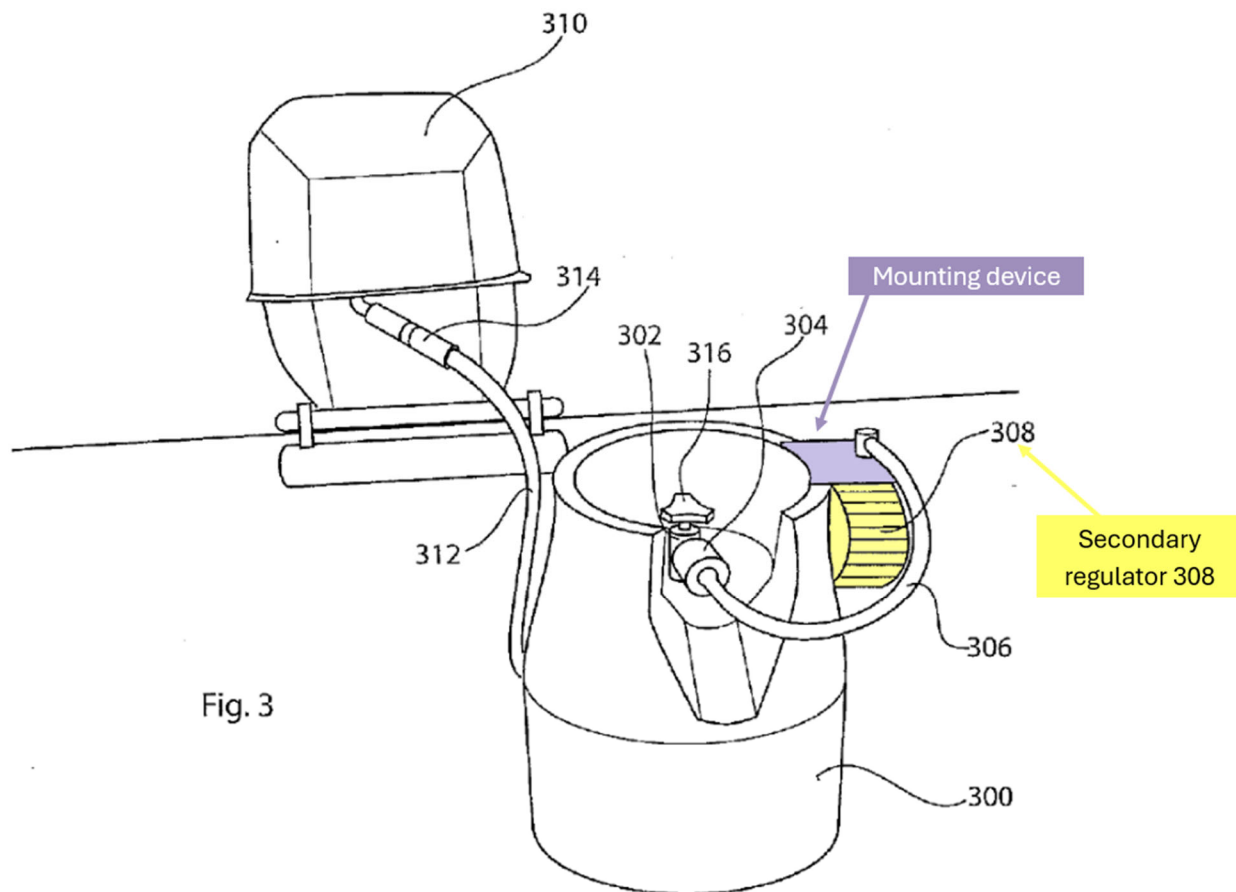
240. Additionally, mounting a regulator on the tank minimizes the length of high-pressure hose needed between the tank and the regulator. This simplifies the fuel system and lowers the risk of damage to the high-pressure hose.

241. Parlatore shows that a POSA would have had a reasonable expectation of success mounting the secondary regulator to the tank. EX1010, Figure 3.

2. Claim 9

242. Claim 9 depends from Claim 8, and further recites “wherein the primary pressure regulator is mounted on the regulator mounting device.”

243. Parlatore discloses that at least the secondary pressure regulator 308 is mounted on a mounting device secured to the tank:



Id., Figure 3 (annotated).

244. Parlatores also discloses the primary and secondary regulators can be combined as a single, two-stage regulator. *Id.*, ¶[0018]. Parlatores discloses the combined, two-stage regulator 202 may be used “[i]n further exemplary embodiments,” such that Parlatores also teaches the use of combined, two-stage regulator with the off-board embodiment shown in Figure 3. *Id.*

245. Using the same mounting arrangement from Figure 3 with the combined regulator 202 (instead of separate regulators), the primary pressure regulator would also be mounted on the mounting device. *Id.*, Figure 3.

246. Alternatively, this configuration would have been obvious.

a. Motivation/Expectation of Success

247. A POSA would have been motivated to use a combined, dual stage regulator, such as Parlatores combined regulator 202, rather than Chaudhari's two, separate regulators. A POSA would have been motivated to use a dual-stage regulator with the embodiment of Figure 3 because dual-stage regulators were readily available at the time of the invention, and it would be more compact and lighter to use a single component (a dual-stage regulator) rather than two components (separate primary and secondary regulators) to achieve the same purpose. They are particularly advantageous in portable generator applications, where minimizing the physical footprint simplifies design and installation.

248. Additionally, installing one combined unit with fewer connections is faster and less complex than setting up two separate regulators, which require precise connections and alignment. This simplicity reduces the likelihood of errors, such as utilizing components with improper pressure ratings or failing to fully tighten connections, making it a practical choice for both manufacturers and end-users. Further, a combined dual stage regulator ensures that the first stage and the second stage work seamlessly together. The pre-calibrated setup delivers stable output pressure without the need for manual adjustments that two separate regulators may require.

249. A POSA would have had a reasonable expectation of success replacing Chaudhari's two, separate regulators with a combined, dual-stage regulator (such as Parlatore's combined regulator 202) because they operate in the same manner and achieve the same outcome as two regulators in series and were commonly used for similar applications at the time of the invention.

250. A POSA would have been motivated to mount the dual-stage regulator to the tank (in the same way shown in Figure 3) for the same reasons as mounting the secondary regulator to the tank: to avoid straining the connections between the dual-stage regulator and the tank from the weight of the dual-stage regulator; to ensure that any potential leaks or failures in the high-pressure section occur at the tank and away from the generator and its ignition sources; to protect the dual-stage regulator from damage caused by vibration from the generator; and to minimize the length of high-pressure hose needed between the tank and the regulator.

251. Parlatore shows that a POSA would have had a reasonable expectation of success mounting the secondary regulator to the tank, and mounting a combined, dual-stage regulator would be no different and would not have an impact on the performance of the fuel delivery system. EX1010, Figure 3.

3. Claim 10

252. Claim 10 depends from Claim 9, and further recites "wherein the pressurized fuel source comprises a pressurized fuel container having a collar; and

wherein the regulator mounting device fixes to the collar so that the primary and secondary pressure regulators are positioned adjacent each other along an outer periphery of the collar.”

253. Parlatore discloses the mounting device secures to the collar of the propane tank:

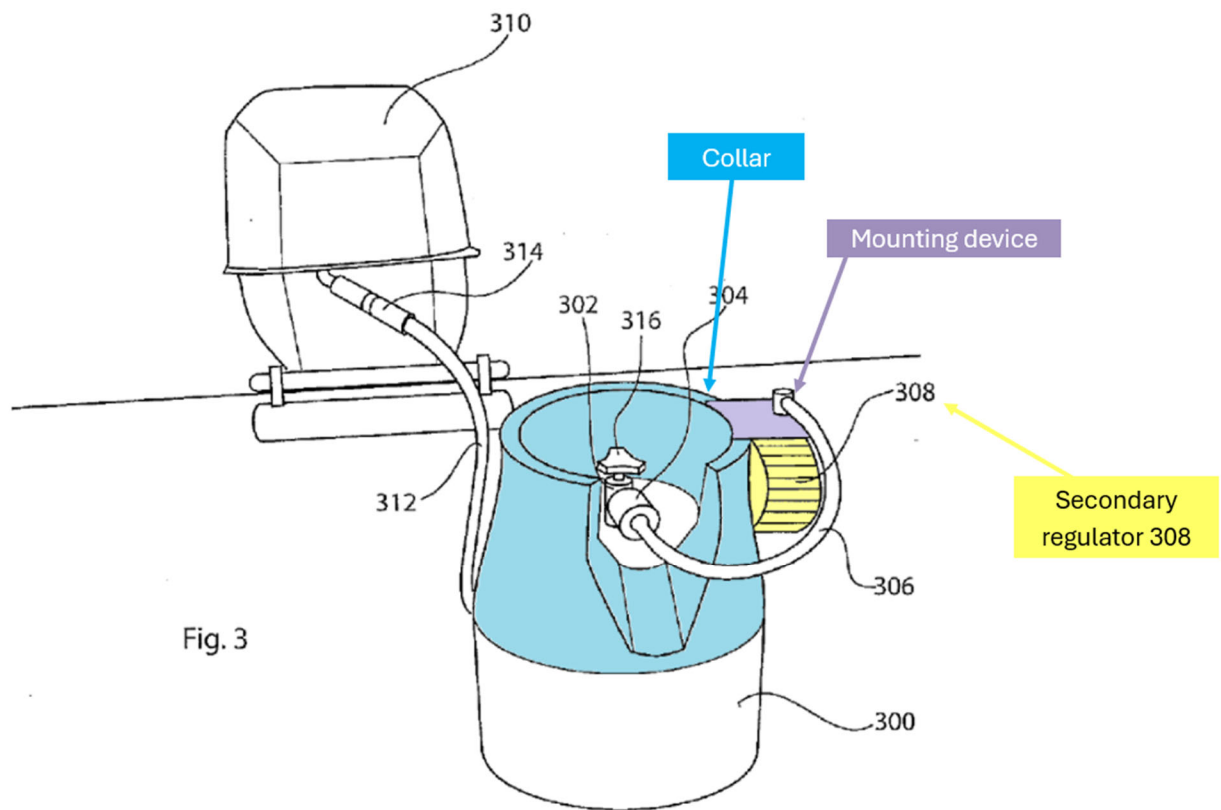


Fig. 3

Id., Figure 3 (annotated).

254. Parlatore also discloses the primary and secondary regulators can be combined as a single, two-stage regulator 202. *Id.*, ¶[0018]. Using the same mounting arrangement from Figure 3 with the combined regulator 202 (replacing the secondary regulator 308), both the primary and secondary pressure regulators (as

part of the combined regulator) would also be mounted on the mounting device on the collar.

255. Alternatively, as discussed, this configuration would have been obvious. §XII.C.2.

256. In this configuration, the primary and secondary pressure regulators would be positioned adjacent each other along an outer periphery of the collar. EX1010, Figure 3.

4. Claim 11

257. Claim 11 depends from Claim 1, and further recites “wherein the primary and secondary pressure regulators are integral components of a dual stage pressure regulator.”

258. As discussed (*see* §XII.C.2), it would have been obvious to a POSA to use a combined, dual-stage regulator with Chaudhari’s dual-fuel generator, as opposed to using Chaudhari’s two, separate regulators based on the teachings of Parlatore.

259. Parlatore discloses “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.” EX1010, ¶[0018]; *see also id.*, Claim 8, Figure 2. In this way, the primary regulator and secondary regulator are integral components of a dual-stage pressure regulator. *Id.*

260. The primary regulator within the combined regulator 202 regulates the gaseous fuel supplied from the pressurized fuel source to a reduced stage. EX1010, ¶¶[0005]-[0006], [0016]-[0022]. The secondary regulator within the combined regulator 202 further regulates the gaseous fuel from the primary regulator for delivery to the engine. *Id.*

5. Claim 16

261. Claim 16 depends from Claim 14, and further recites “a regulator mounting device fixed to the pressurized fuel source with at least one of the primary pressure regulator and the secondary pressure regulator mounted on the regulator mounting device.”

262. As discussed, it would have been obvious to mount Chaudhari’s secondary pressure regulator on a regulator mounting device of a LPG tank, as disclosed by Parlatore. §XII.C.1.

6. Claim 17

263. Claim 17 depends from Claim 16, and further recites “wherein the pressurized fuel source comprises a pressurized fuel container having a collar; and wherein the regulator mounting device fixes to the collar so that the primary and secondary pressure regulators are positioned adjacent each other along an outer periphery of the collar.”

264. As discussed, Parlatores discloses this configuration and, additionally, this configuration was obvious. *See* §XII.C.3.

7. Claim 18

265. Claim 18 depends from Claim 12, and further recites “wherein the first and second stages comprise a dual stage regulator configured to regulate the gaseous fuel supplied from the pressurized fuel source and regulate the reduced pressure gaseous fuel.”

266. As discussed, Parlatores discloses this element. *See* §XII.C.4.

8. Claim 19

267. Claim 19 depends from Claim 18, and further recites “wherein the dual stage regulator is mounted directly onto the pressurized fuel source.”

268. As discussed, Parlatores discloses this configuration and, additionally, this configuration was obvious. *See* §XII.C.2.

9. Claim 40

269. Claim 40 depends from Claim 34, and further recites “a regulator mounting device fixed to the pressurized fuel source with at least the secondary pressure regulator mounted on the regulator mounting device.”

270. As discussed, it would have been obvious to mount Chaudhari’s secondary pressure regulator on a regulator mounting device of a LPG tank, as disclosed by Parlatores. *See* §XII.C.1.

10. Claim 41

271. Claim 41 depends from Claim 40, and further recites “wherein the primary pressure regulator is mounted on the regulator mounting device.”

272. As discussed, Parlatores discloses this configuration and, additionally, this configuration was obvious. *See* §XII.C.2.

11. Claim 42

273. Claim 42 depends from Claim 41, and further recites “wherein the pressurized fuel source comprises a pressurized fuel container having a collar; and wherein the regulator mounting device fixes to the collar so that the primary and secondary pressure regulators are positioned adjacent each other along an outer periphery of the collar.”

274. As discussed, Parlatores discloses this configuration and, additionally, this configuration was obvious. *See* §XII.C.3.

12. Claim 43

275. Claim 43 depends from Claim 34, and further recites “wherein the primary and secondary pressure regulators are integral components of a dual stage pressure regulator.”

276. As discussed, Parlatores discloses this element. *See* §XII.C.4.

D. Ground 4: Claims 7, 15, 20-27, 29-33, 39, 45-46, and 49 are obvious over Chaudhari in view of Hallberg, Jungmann, Parlatore, LP-Gas Handbook, Sturgis, and Tri-Fuel Video

277. In my opinion, Claims 7, 15, 20-27, 29-33, 39, 45-46, and 49 of the '970 Patent are obvious under §103, for at least the reasons described below.

278. Of these claims, Claims 25-27 are obvious under Patent Owner's proposed constructions (*see* §X).

1. Claim 7

279. Claim 7 depends from Claim 1, and further requires “a first end of a quick-connect hose coupling coupled to an outlet of the secondary pressure regulator; and a second end of the quick-connect hose coupling coupled to an inlet of the gaseous fuel line to mate with the first end of the quick-connect hose coupling to couple the secondary pressure regulator to the gaseous fuel line.”

280. As discussed, it would have been obvious to use Parlatore's mounting configuration of Figure 3 and dual-stage regulator with Chaudari's dual-fuel generator. *See* §XII.C.1.

281. Chaudhari and Parlatore do not explicitly disclose which type of hose coupling they use. However, LP-Gas Handbook discloses the use of quick-connect couplings in LP-gas systems. EX1017, 40 (§3.3.62 commentary: “Quick connectors are also used in other LP-Gas systems, such as those used for engine fuel refueling

and cylinder filling, connecting cylinders to gas-fired barbecue grills, and connecting gas systems between two sections of mobile homes.”).

282. It would have been obvious to a POSA to use a quick connector at the end of the Parlature hose (e.g., as coupling 314) in view of the teachings of the LP-Gas Handbook.

i. Motivation/Expectation of Success

283. A POSA would have been motivated to use a quick connector because Parlature states that the secondary regulator may be connected to the carburetor or engine “either permanently or releasably” (EX1010, ¶[0020]) and refers to “releasably coupling the second regulator to the engine” (*id.*, Claim 10, 15).

284. A POSA would have understood that a quick-connect could be used to achieve the releasable connection as coupling 314:

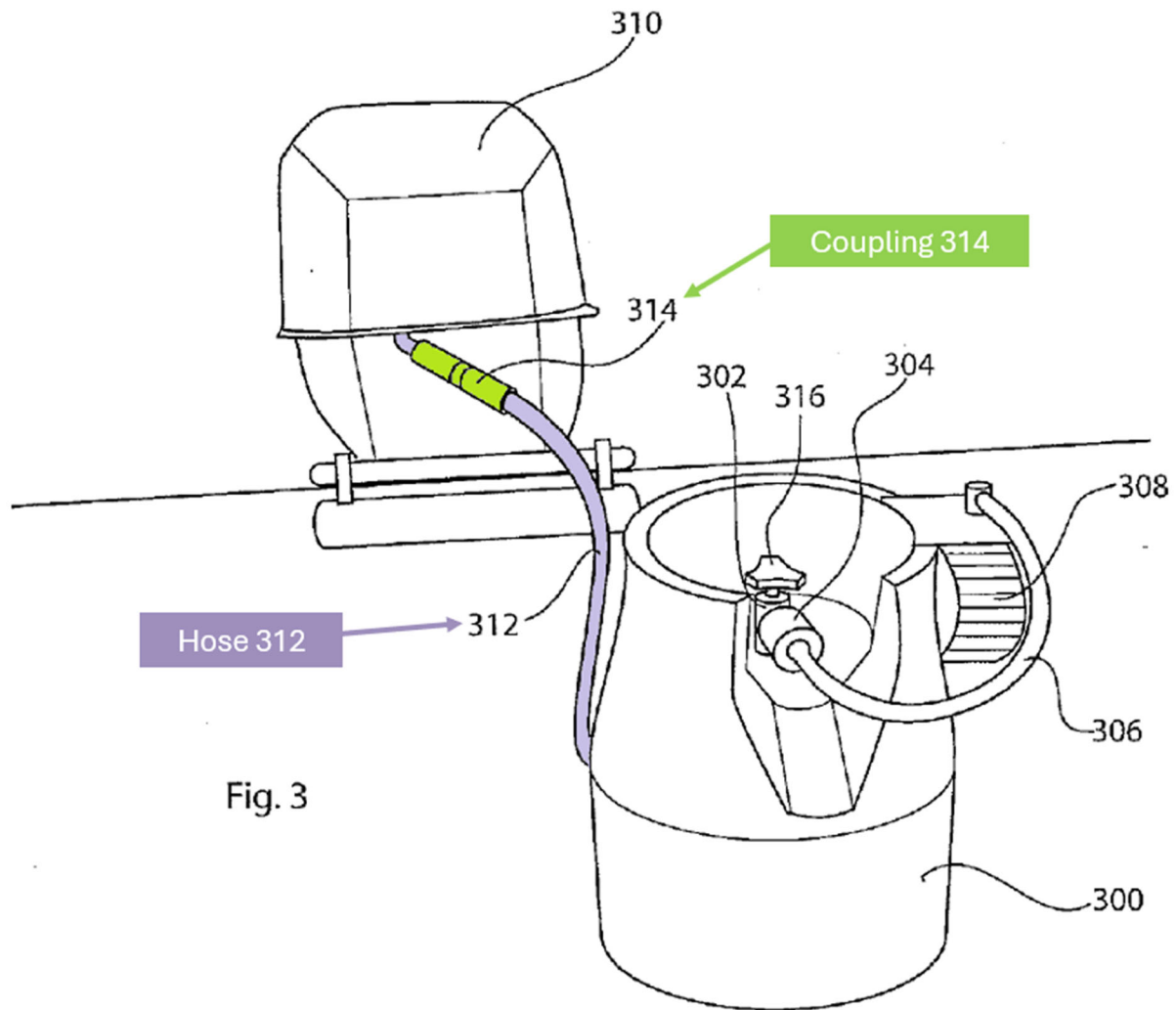


Fig. 3

Id., Figure 3 (annotated).

285. As such, a first end would be coupled to the outlet of the secondary regulator and a second end would be coupled to an inlet of the gaseous fuel line of the engine of Chaudhari's generator to couple the secondary pressure regulator to the gaseous fuel line. *Id.*

286. At the time of the invention, quick-connect couplings were a standard, well-understood solution for fuel lines where connections need to be secure but detachable, safe against leaks, and tool-free for ease of service. EX1017, 40 (§3.3.62:

“Quick Connectors. Fittings used to connect hose assemblies to piping and valves without the use of tools.”).

287. A POSA would have also been motivated to use a quick connector for easy connection and disconnection of Parlatore’s LPG tank for refilling the tank or replacing an empty tank with a full tank. A POSA would have been further motivated to provide for easy connection/disconnection so that the tank could be used for other common applications when not in use by the generator, such as a BBQ grill. A POSA would have been further motivated to use a quick connector to allow easy and rapid connection and disconnection so that the portable generator could be more easily moved to other locations or could be stored when not in use.

288. Additionally, many quick connectors stop gas flow when disconnected, preventing propane from escaping during tank swaps or maintenance. This is especially valuable in off-board regulator setups.

289. Quick connectors also allow users to connect and disconnect the hose effortlessly, making them ideal for non-experts using portable generators in residential or emergency settings. This minimizes downtime when replacing the propane tank, which is common in extended generator use or mobile applications.

290. A POSA would have had a reasonable expectation of success because quick connectors were commonly used in propane and fuel systems, including portable setups like those described in Parlatore. EX1017, 40 (§3.3.62 commentary).

The benefits of a quick-connect coupling, such as rapid setup, easy maintenance, and safety, would have been especially attractive in systems that were meant to be modular or portable, as the Parlatore Figure 3 configuration. *See* EX1010, Figure 3.

2. Claim 15

291. Claim 15 depends from Claim 14, and further recites “a first end of a quick-connect hose coupling coupled to an outlet of the secondary pressure regulator; and a second end of the quick-connect hose coupling coupled to an inlet of the gaseous fuel line to mate with the first end of the quick-connect hose coupling to couple the secondary pressure regulator to the gaseous fuel line.”

292. As discussed, it would have been obvious to a POSA to use a quick connector at the end of the Parlatore hose (e.g., as coupling 314) in view of the teachings of the LP-Gas Handbook and the combination would have this element. *See* §XII.D.1.

3. Claim 20

a. Element [20.0]

293. Element [20.0] recites “a dual fuel generator and fuel delivery system.”

294. Chaudhari discloses this element. *See* §XII.A.1.a.

b. Element [20.1]

295. Element [20.1] recites “a dual fuel generator 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 dual fuel generator comprising.”

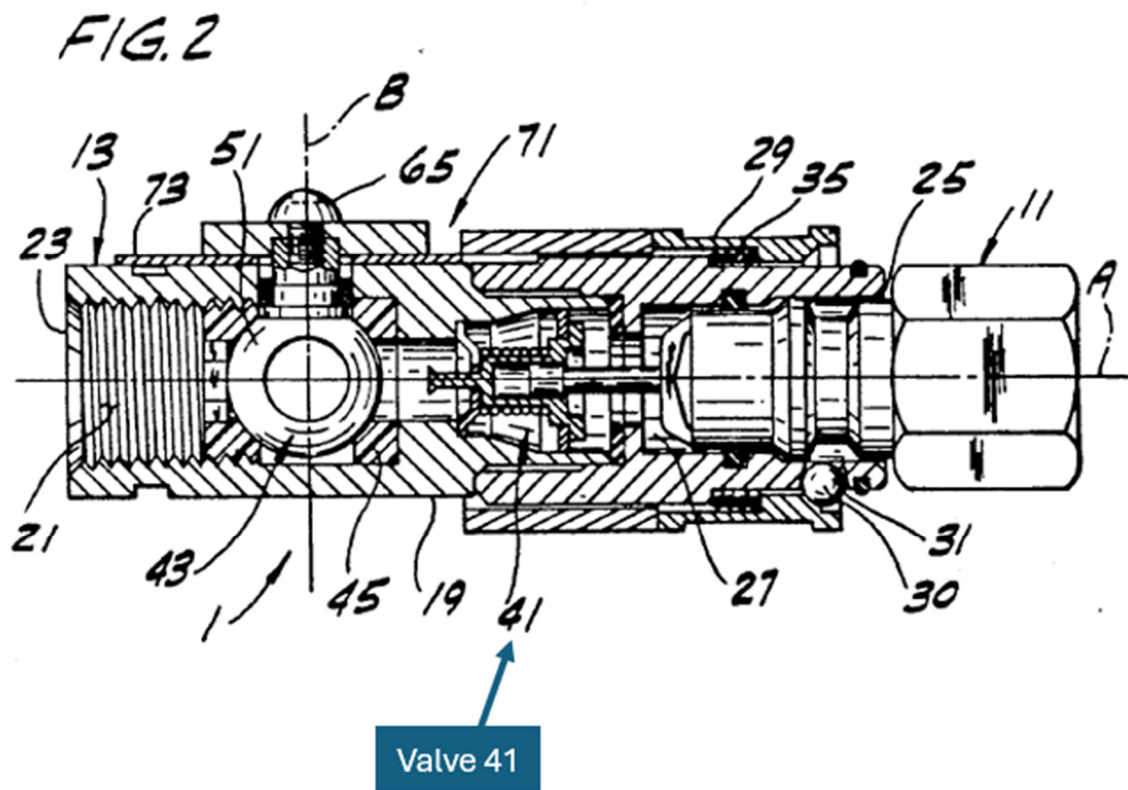
296. Chaudhari discloses this element. *See* §XII.A.1.b.

c. Element [20.2]

297. Element [20.2] recites “a gaseous fuel valve coupled to an inlet of the gaseous fuel line and connectable to the pressurized fuel source.”

298. As discussed, it would have been obvious to use a quick-connect hose coupling to connect a LPG tank to Chaudhari’s generator as Parlatore’s coupling 314. *See* §XII.D.1.

299. A quick-connect typically has an integral valve and a POSA would have been aware of quick-connects with integral valves. Sturgis discloses an example of a quick-connect for a gas supply line (natural gas or LPG) with an integral valve (first valve 41). EX1023, 1:5-9, 4:6-13, 5:32-52, Figures 2, 2A & 2B.



EX1023, Figure 2 (annotated).

300. As noted by owner's manuals of gas grills, quick connects were commonly used prior to the priority date for the '970 Patent:

INSTALL GAS SUPPLY

General Specifications for Piping

Note: *Contact your local municipality for building codes regulating outdoor gas barbecue installations. In absence of Local Codes, you must conform to the latest edition of the National Fuel Gas Code: ANSI Z 223.1/NFPA 54, or CAN/CGA-B149.1, Natural Gas and Propane Installation Code. WE RECOMMEND THAT THIS INSTALLATION BE DONE BY A PROFESSIONAL.*

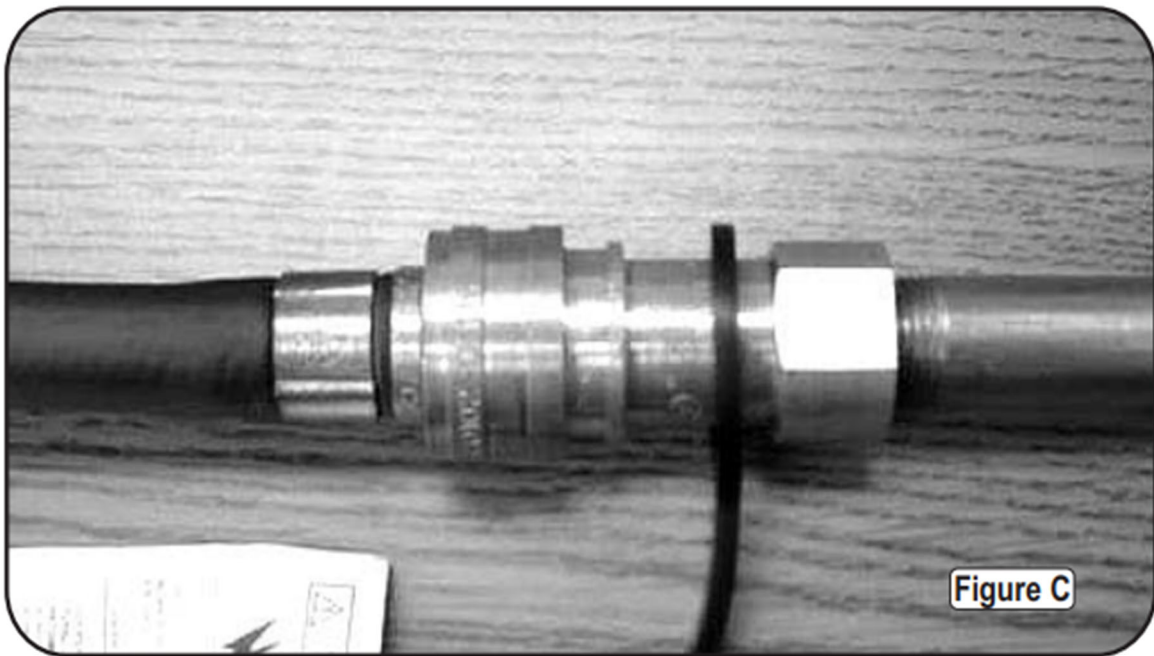
Some of the following are general requirements taken from the latest edition of the National Fuel Gas Code: ANSI Z 223.1/NFPA 54, or CAN/CGA-B149.1, Natural Gas and Propane Installation Code for complete specifications.

- This barbecue is designed to operate at 4.5" of water column pressure (.163 psi).
- A manual shut-off valve must be installed outdoors, immediately ahead of the quick disconnect.
- An additional manual shut-off valve indoors should be installed in the branch fuel line in an accessible location near the supply line.
- The quick disconnect connects to a 1/2" NPT thread from the gas source. The quick disconnect fitting is a hand-operated device that automatically shuts off the flow of gas from the source when the barbecue is disconnected.
- The quick disconnect fitting can be installed horizontally, or pointing downward. Installing the fitting with the open end pointing upward can result in collecting water and debris.
- The dust covers (supplied plastic plugs) help keep the open ends of the quick disconnect fitting clean while disconnected.
- Pipe compound should be used which is resistant to the action of natural gas when connections are made.
- The outdoor connector must be firmly attached to rigid, permanent construction.

⚠ WARNING: Do not route the 10 foot hose under a deck. The hose must be visible.

EX1024, 8.

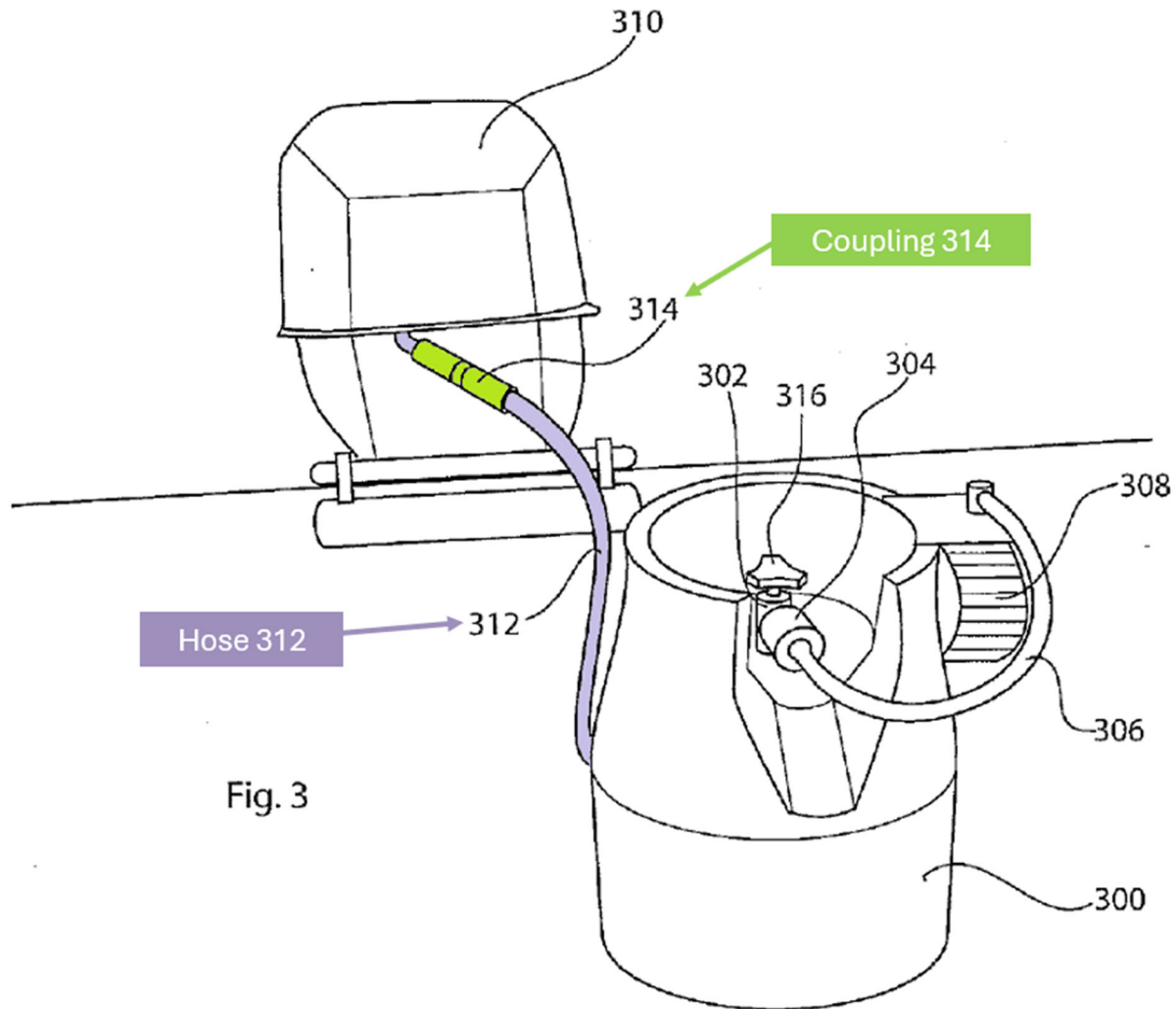
4. When the quick disconnect socket and the gas hose are connected, a valve in the socket opens automatically to permit full gas flow. When the gas hose is disconnected, the valve in the socket instantly and positively shuts off the flow of gas. Because the valve in the socket positively shuts off the flow of gas, the grill can be disconnected from the gas source by disconnecting the gas hose from the quick disconnect socket. The socket should be left attached to the gas source (house piping). **Figure C**, below, shows properly connected hose and socket.



EX1025, 3.

301. Therefore, the valve of the quick-connect would be a gaseous fuel valve for purposes of this claim.

302. When using a quick-connect as Parlatore's coupling 314, the valve of the quick-connect would be coupled to an inlet of the gaseous fuel line to the Chaudhari engine and would be "connectable" to an LPG tank:



EX1010, Figure 3 (annotated).

303. In addition, Hallberg's fluid dual valve 300 is a gaseous fuel valve that would be coupled to Chaudhari's gaseous fuel line and connectable to Chaudhari's LPG cylinder. *See* §XII.A.1.g.

d. Element [20.3]

304. Element [20.3] recites “a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.”

305. As discussed (*see* §XII.A.1.g), Chaudhari in combination with Hallberg discloses a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the engine from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line. Because Chaudhari’s engine is within a dual fuel generator (*see* §XII.A.1.a), selectively controlling fuel flow to the engine necessarily means selectively controlling fuel flow to the dual fuel generator.

e. Element [20.4]

306. Element [20.4] recites “a fuel regulator system located off board the dual fuel generator, the fuel regulator system comprising.”

307. Chaudhari discloses this element. *See* §XII.A.1.d.

f. Element [20.5]

308. Element [20.5] recites “a primary pressure regulator connectable to a service valve of the pressurized fuel source and configured to regulate the fuel supplied from the pressurized fuel source to a reduced pressure.”

309. As discussed (*see* §XII.A.1.e), Chaudhari discloses primary regulator 3 coupled to a service valve mounted on the LPG cylinder 1 using high pressure tube 2 and configured to regulate the fuel supplied from the pressurized fuel source to a reduced pressure. Because primary regulator 3 is connected to the service valve of the LPG cylinder using a tube, it is “connectable” to the service valve in that it is not permanently mounted to the service valve. *Id.*

310. Alternatively, as discussed (*see* §XII.C.1), it would have been obvious to use Parlatores Figure 3 off-board configuration with Chaudhari’s generator. Similar to Chaudhari, Parlatores discloses a primary pressure regulator that can be connected to a LPG tank using a hose or connector 302, which means it is “connectable” to the service valve in that it is not permanently affixed to the service valve. EX1010, ¶¶[0016], [0020], Figures 1 & 3.

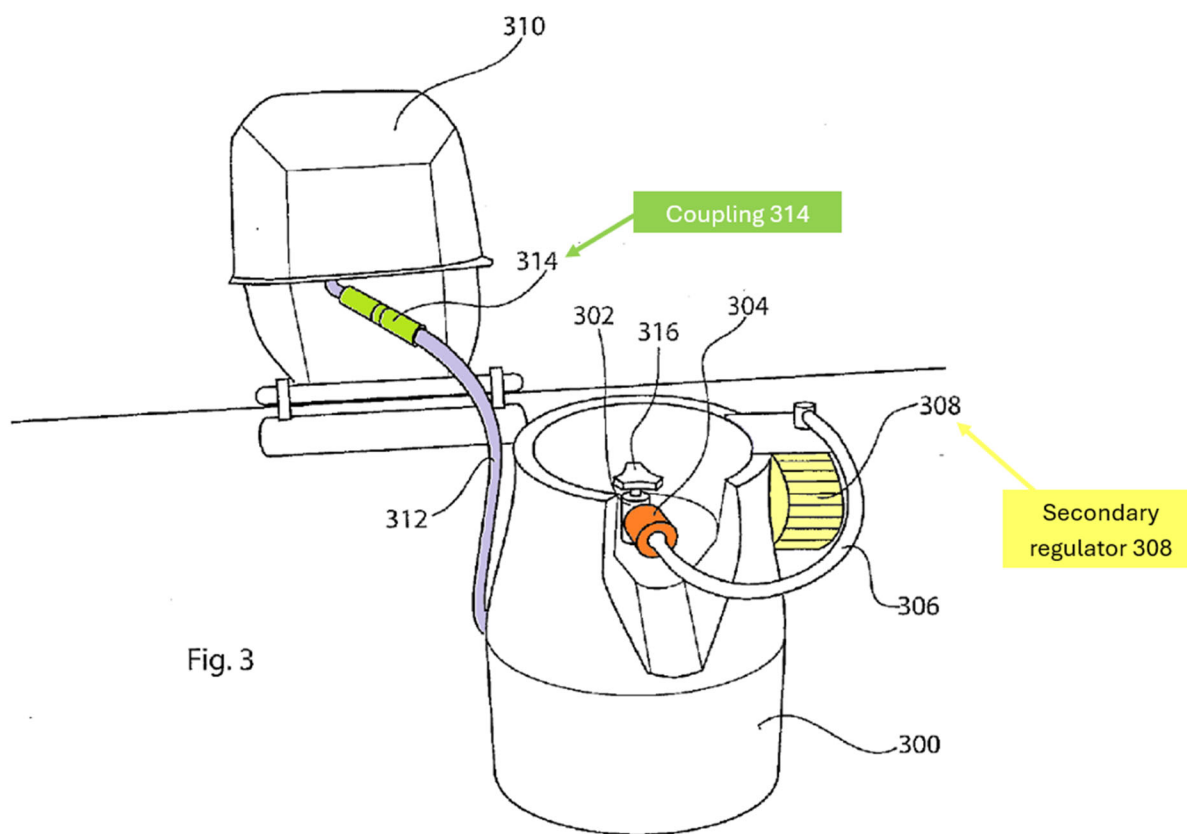
g. Element [20.6]

311. Element [20.6] recites “a secondary pressure regulator coupled to the primary pressure regulator and connectable to the gaseous fuel valve, the secondary pressure regulator configured 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 dual fuel generator.”

312. As discussed (*see* §XII.A.1.f), Chaudhari discloses second stage regulator 5 coupled to primary regulator 3 which is configured 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 dual fuel generator.

313. As discussed, it would have been obvious to use Parlatore's Figure 3 off-board configuration with Chaudhari's generator, and to use a quick-connect as Parlatore's coupling 314, with an integral valve (a gaseous fuel valve for purposes of this claim). *See* §§XII.C.1, XII.D.1, XII.D.3.c. With this configuration, Chaudhari's second stage regulator 5 would be "connectable" with the gaseous fuel valve via the quick-connect:



EX1010, Figure 3 (annotated).

4. Claim 21

314. Claim 21 depends from Claim 20, and further requires “wherein the pressurized fuel source is independent and disconnected from the dual fuel generator.”

315. As discussed (*see* §XII.A.1.d), Chaudhari’s fuel regulator system, which operates on LPG supplied from LPG cylinder 1, is located off-board the dual fuel generator. Because the LPG cylinder 1, and fuel regulator system is an “Add-On” system to the dual fuel generator, it is not mounted or fixed to the dual fuel generator. EX1008, 4-5. Thus, the LPG cylinder 1 is independent and disconnected from the dual fuel generator.

316. Alternatively, as discussed (*see* §XII.C.1), it would have been obvious to use Parlatores Figure 3 off-board configuration with Chaudhari’s generator, in which case, Chaudhari’s LPG tank 1 would be independent and disconnected from the dual-fuel generator. EX1010, Figure 3.

5. Claim 22

317. Claim 22 depends from Claim 21, and further requires “wherein the fuel regulator system is disconnected from the dual fuel generator.”

318. As discussed (*see* §XII.A.1.d), Chaudhari’s fuel regulator system, which operates on LPG supplied from LPG cylinder 1, is located off-board the dual fuel generator. Because the fuel regulator system is an “Add-On” system to the dual

fuel generator, it is not mounted or fixed to the dual fuel generator thus making it disconnected from the dual fuel generator. EX1008, 4-5.

319. Alternatively, as discussed (*see* §XII.C.1), it would have been obvious to use Parlatores Figure 3 off-board configuration with Chaudhari's generator, in which case, the fuel regulator system would be "disconnected" from the dual-fuel generator in that it is not permanently affixed to the generator. EX1010, Figure 3.

6. Claim 23

320. Claim 23 depends from Claim 21, and further requires "wherein the primary pressure regulator is disconnected from the pressurized fuel source."

321. As discussed (*see* §XII.A.1.e), Chaudhari's primary regulator 3 is coupled to LPG cylinder 1 through high pressure tube 2 and, therefore, is "disconnected" from LPG cylinder 1 in that it is not permanently affixed to the cylinder. EX1008, 7, Figure 1.

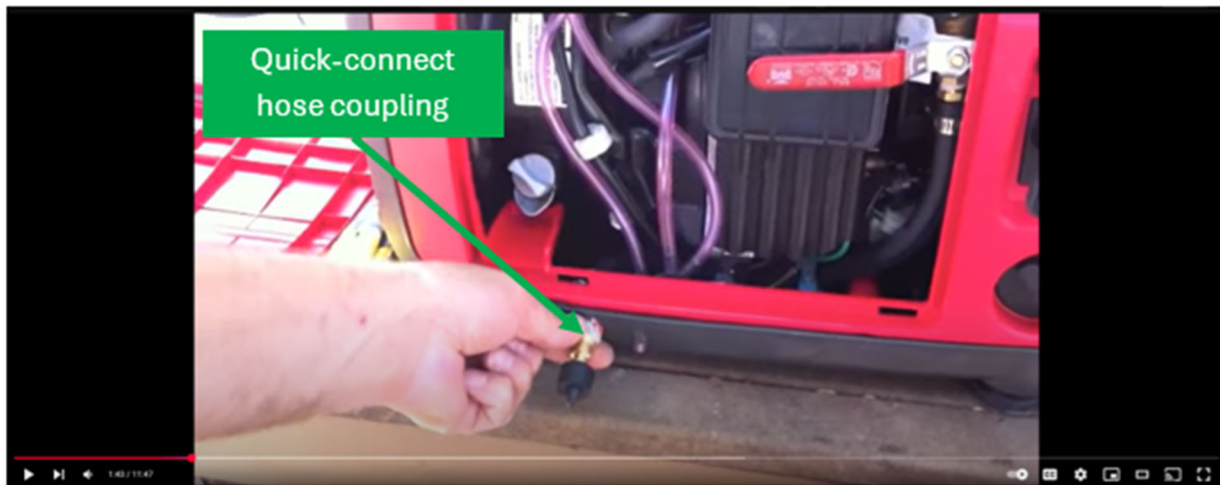
322. Alternatively, as discussed (*see* §XII.C.1), it would have been obvious to use Parlatores Figure 3 off-board configuration with Chaudhari's generator. Similar to Chaudhari, Parlatores discloses a primary pressure regulator can be connected to a LPG tank using a hose or connector 302, which means it is "disconnected" from tank in that it is not permanently affixed to the tank. EX1010, ¶¶[0016], [0020], Figures 1 & 3.

7. Claim 24

323. Claim 24 depends from Claim 20, and further recites “wherein the gaseous fuel valve comprises at least one end of a quick-connect hose coupling mounted to an external surface of the dual fuel generator.”

324. As discussed, it would have been obvious to use a quick-connect hose coupling with an integral valve to connect a LPG tank to Chaudhari’s generator. *See* §XII.D.1.

325. It would have been obvious to mount the quick connect (and its integral valve) to an external surface of the dual fuel generator based on the teachings of the Tri-Fuel Video. The Tri-Fuel Video discloses a quick-connect mounted to the external service of a tri-fuel generator:



EX1007, 1:43 (annotated), 0:36–2:00 (gasoline generator modified to also run on propane and natural gas).

a. Motivation/Expectation of Success

326. A POSA would have been motivated to mount the quick-connect to the external surface of the generator to have the quick-connect serve the dual purpose as an easy attachment/detachment mechanism for the LPG hose and to provide a sturdy attachment for the LPG hose to connect to the generator.

327. A POSA would have had a reasonable expectation of success based on the success of the individual in the Tri-Fuel Video, who appears to have made this modification with tools at his home.

8. Claim 25

328. As discussed for purposes of Claim 3, although I disagree with Plaintiff's proposed construction and application, assuming Plaintiff's proposed construction and application of "fuel lockout apparatus" are correct, it is my opinion that Claim 25 is obvious for at least the reasons described below. I apply this same understanding and assumption to the other claims in this Ground that recite a "fuel lockout apparatus."

329. Claim 25 depends from Claim 20.

a. Element [25.1]

330. Element [25.1] recites "a fuel lockout apparatus coupled to the mechanical fuel valve."

331. Chaudhari in combination with Hallberg discloses this element. *See* §XII.A.3.a.

b. Element [25.2]

332. Element [25.2] recites “wherein when the mechanical fuel valve is in the first position, the fuel lockout apparatus communicates the liquid fuel source to the dual fuel generator and prevents the pressurized fuel source from coupling to the dual fuel generator, and actuation of the mechanical fuel valve to the second position causes the fuel lockout apparatus to permit the pressurized fuel source to couple to the dual fuel generator, and interrupts the liquid fuel source communication with the dual fuel generator.”

333. Chaudhari in combination with Hallberg discloses this element. *See* §XII.A.3.b.

9. Claim 26

334. Claim 26 depends from Claim 20.

a. Element [26.1]

335. Element [26.1] recites “wherein the mechanical fuel valve opens and closes the liquid fuel line to selectively control fuel flow from the liquid fuel source to the dual fuel generator.”

336. Chaudhari in combination with Hallberg discloses this element. *See* §XII.A.4.a.

b. Element [26.2]

337. Element [26.2] recites “a fuel lockout apparatus coupled to the mechanical fuel valve and configured to prevent the pressurize[d] fuel source from

coupling to the gaseous fuel line while the mechanical fuel valve opens the liquid fuel line, and permit the pressurized fuel source to couple to the gaseous fuel line while the mechanical fuel valve closes the liquid fuel line.”

338. Chaudhari in combination with Hallberg discloses this element. *See* §XII.A.4.b.

10. Claim 27

339. Claim 27 depends from Claim 26, and further requires “wherein the fuel lockout apparatus is further configured to prevent the mechanical fuel valve from opening the liquid fuel line while the dual fuel generator receives fuel from the pressurized fuel source.”

340. Chaudhari in combination with Hallberg discloses this element. *See* §XII.A.5.

11. Claim 29

341. Claim 29 depends from Claim 20, and further recites “wherein the gaseous fuel valve comprises: a first end of a quick-connect hose coupling coupled to an outlet of the secondary pressure regulator; and a second end of the quick-connect hose coupling coupled to an inlet of the gaseous fuel line to mate with the first end of the quick-connect hose coupling to couple the secondary pressure regulator to the gaseous fuel line.”

342. As discussed, it would have been obvious to use a quick-connect hose coupling with an integral valve to connect a LPG tank to Chaudhari's generator as Parlatore's coupling 314, which would have the elements of this claim. *See* §§XII.D.1., XII.D.3.c.

12. Claim 30

343. Claim 30 depends from Claim 20, and further recites "a regulator mounting device fixed to the pressurized fuel source with at least the secondary pressure regulator mounted on the regulator mounting device."

344. As discussed, it would have been obvious to mount Chaudhari's secondary pressure regulator on a regulator mounting device of a LPG tank, as disclosed by Parlatore. *See* §XII.C.1.

13. Claim 31

345. Claim 31 depends from Claim 30, and further recites "wherein the primary pressure regulator is mounted on the regulator mounting device."

346. As discussed, Parlatore discloses this configuration and, additionally, this configuration was obvious. *See* §XII.C.2.

14. Claim 32

347. Claim 32 depends from Claim 31, and further recites "wherein the pressurized fuel source comprises a pressurized fuel container having a collar; and wherein the regulator mounting device fixes to the collar so that the primary and

secondary pressure regulators are positioned adjacent each other along an outer periphery of the collar.”

348. As discussed, Parlatore discloses this configuration and, additionally, this configuration was obvious. *See* §XII.C.3.

15. Claim 33

349. Claim 33 depends from Claim 20, and further recites “wherein the primary and secondary pressure regulators are integral components of a dual stage pressure regulator.”

350. As discussed, Parlatore discloses this element. *See* §XII.C.4.

16. Claim 39

351. Claim 39 depends from Claim 34, and further recites “a first end of a quick-connect hose coupling coupled to an outlet of the secondary pressure regulator; and a second end of the quick-connect hose coupling coupled to an inlet of the gaseous fuel line to mate with the first end of the quick-connect hose coupling to couple the secondary pressure regulator to the gaseous fuel line.”

352. As discussed, it would have been obvious to a POSA to use a quick connector at the end of the Parlatore hose (e.g., as coupling 314) in view of the teachings of the LP-Gas Handbook and the combination would have this element. *See* §XII.D.1.

17. Claim 45

353. Claim 45 depends from Claim 44, and further requires “a gaseous fuel valve coupled to an inlet of the gaseous fuel line to connect the pressurized fuel source thereto.”

354. As discussed, it would have been obvious to use a quick-connect hose coupling with an integral valve to connect a LPG tank to Chaudhari’s generator as Parlatore’s coupling 314 and the combination would have this element. *See* §XII.D.3.c.

355. In addition, the DuroMax manual also discloses a gaseous fuel valve (the service valve on the LPG tank) coupled to the gaseous fuel line to connect the LPG tank to the gaseous fuel line. EX1004, 1.

18. Claim 46

356. Claim 46 depends from Claim 45, and further recites “a generator housing surrounding at least the dual fuel engine and the alternator with the gaseous fuel valve mounted on or within the generator housing.”

357. As discussed, it would have been obvious to mount the quick connect (and its integral valve) to an external surface of the dual fuel generator based on the teachings of the Tri-Fuel Video. *See* §XII.B.1.b; *see also* §XII.F.3.

19. Claim 49

358. Claim 49 depends from Claim 44, and further recites “a first end of a quick-connect hose coupling coupled to an outlet of the pressurized fuel source; and

a second end of the quick-connect hose coupling coupled to an inlet of the gaseous fuel line to mate with the first end of the quick-connect hose coupling to couple the pressurized fuel source to the gaseous fuel line.”

359. As discussed, it would have been obvious to use a quick-connect hose coupling to connect a LPG tank to Chaudhari’s generator as Parlatore’s coupling 314, which would have the elements of this claim. *See* §XII.D.1.

E. Ground 5: Claims 1-6, 8-14, 16-19, 34-38, 40-44, 47-48, and 50-52 are obvious over DuroMax in view of Parlatore and Elsdon

360. In my opinion, Claims 1-6, 8-14, 16-19, 34-38, 40-44, 47-48, and 50-52 of the ’970 Patent are obvious under §103, for at least the reasons described below.

1. Claim 1

a. Element [1.0]

361. Element [1.0] recites “a dual fuel generator and fuel delivery system.”

362. DuroMax discloses a dual-fuel generator that operates on either LPG or gasoline. EX1004, 9-12. DuroMax discloses a fuel delivery system where the liquid fuel (gasoline) is supplied from a liquid fuel source (tank) through a liquid fuel line. EX1004, 9, 20-21; *see also id.*, 30-31 (parts diagram and parts list depicting liquid fuel line as “PartNo. 137, Outlet Pipe”).

Step 2 - Add Gasoline

⚠ WARNING: Gasoline and gas fumes are highly flammable.

- Do not fill tank near an open flame.
- Do not overfill. Always check for fuel spills.

To ensure that the generator runs smoothly use only FRESH, UNLEADED GAS WITH AN OCTANE RATING OF 87 OR HIGHER.

To add gasoline:

1. Make sure the generator is on a level surface.
2. Unscrew gas cap and set aside (NOTE: the gas cap may be tight and hard to unscrew).
3. Slowly add unleaded gasoline to the fuel tank. Be careful not to overfill. Please refer to the chart in *figure 4* to find the gas capacity of your generator model. The fuel gauge on the top of the gas tank indicates how much gasoline is in the generator gas tank.
NOTE: Gas can expand. Do not fill the gas tank to the very top.
4. Replace fuel cap and wipe up any spilled gasoline with a dry cloth.

Id., 9.

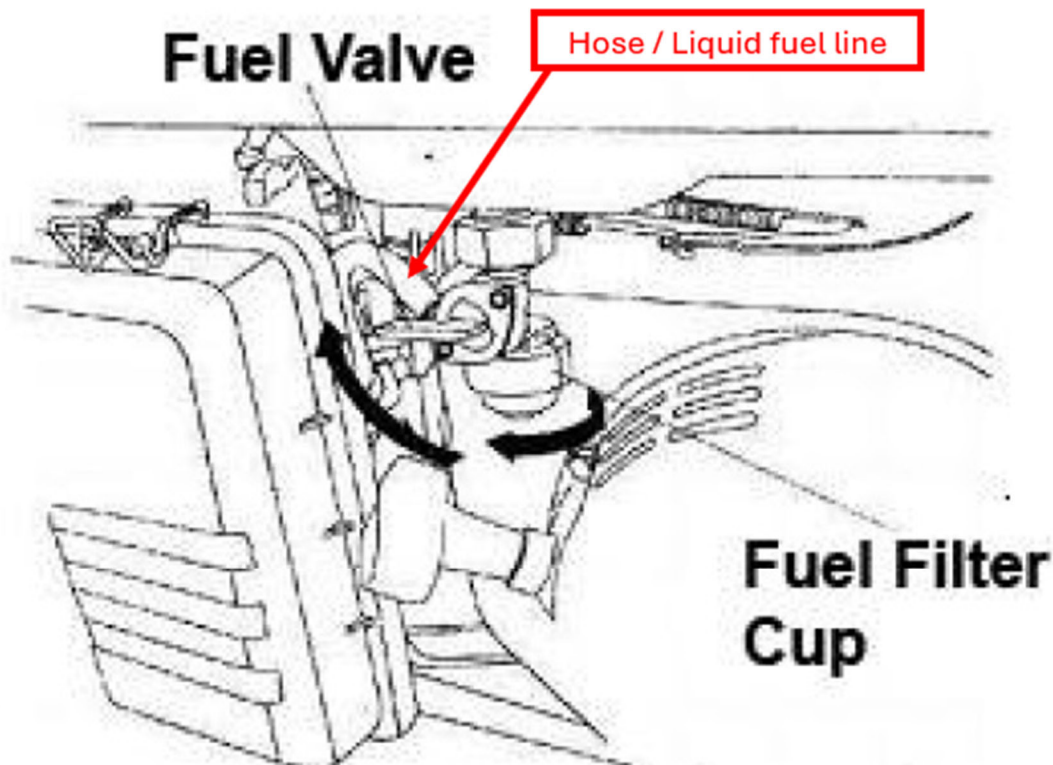


Figure 19 –Removing the Fuel Filter Cup

Id., 20 (annotated).

b. Element [1.1]

363. Element [1.1] recites “a dual fuel generator comprising: an 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.”

364. DuroMax discloses that gasoline is supplied from the liquid fuel tank through a liquid fuel line. *Id.*, 9, 20-21, 30-31 (parts diagram/list depicting liquid fuel line as “PartNo. 137, Outlet Pipe”).

365. DuroMax also discloses that LPG is supplied from a pressurized LPG tank through a gaseous fuel line. *Id.*, 1 (cover showing LPG tank and hose), 12 (LPG hose), 30-31 (“Gas tube” 161 and “Intake tube, carburetor” 162).

366. It is inherent that the LPG tank is pressurized because: (1) LPG tanks are pressurized, (2) DuroMax refers to the LPG as “liquid propane gas supply” and propane is stored in liquid form under pressure, (3) the LPG tube is referred to as Part No. 163 “Pressure Tube,” and (4) DuroMax discloses a pressure release valve before starting the engine to release excess pressure and the use of pressure regulators to reduce the pressure of LPG from the tank. *Id.*, 1, 12, 30-31.

c. Element [1.2]

367. Element [1.2] recites “a carburetor attached to an intake of the engine to mix air and fuel and connect the liquid fuel line to the intake.”

368. DuroMax discloses a carburetor. *Id.* 28-29 (parts diagram/list referring to carburetor). A POSA would have recognized that the carburetor functions to mix air and fuel, as its primary purpose in internal combustion engines is to atomize liquid fuel and blend it with incoming air to create a combustible mixture. Further, by design, the carburetor connects the liquid fuel line to the engine’s intake, receiving fuel from the line through its inlet and delivering the air-fuel mixture to the intake.

d. Element [1.3]

369. Element [1.3] recites “a fuel regulator system located off board the dual fuel generator, the fuel regulator system comprising.”

370. DuroMax’s generator had one pressure regulator off-board (attached to the off-board hose, as shown in Figure C) and one pressure regulator on-board (attached to the generator, as indicated in step 4 and Figure B):

To start your generator with LPG, perform the following steps:

1. Make sure no electrical devices are connected to the generator.
2. Check that the generator is properly grounded (see page 13, "Ground the Generator").
3. Turn the gasoline fuel valve to the "OFF" position (see figure 6).
4. Connect the propane gas hose to the regulator (see figure B).
5. Connect the regulator to the liquid propane gas supply and then turn on the liquid propane gas supply, making sure there are no leaks (see figure C).
6. Open the clasp connected to the Pressure Release Valve (see figure C).
7. Press the button on Pressure Release Valve two to three times before starting the engine. (see figure D)
8. When starting the engine:
 - a. If the engine is warm (The unit was run recently) start with the choke half open.
 - i. Wait another 30 seconds and then move the choke lever all the way to the "OPEN" position.
 - b. If the engine is cold (The unit has not been run for half an hour or more) start with the choke open. (see figure E & F).
9. Pull on the recoil starter handle slowly until a slight resistance is felt (see figure 8). Then pull quickly to start the engine. Return cord gently into the machine. Never allow the cord to snap back.
10. Allow the generator to run for several minutes before attempting to connect any electrical devices.

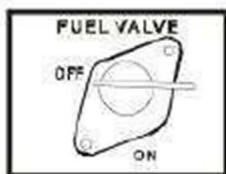


Figure A - Fuel Valve in the "OFF" position



Figure C-Connect Valve



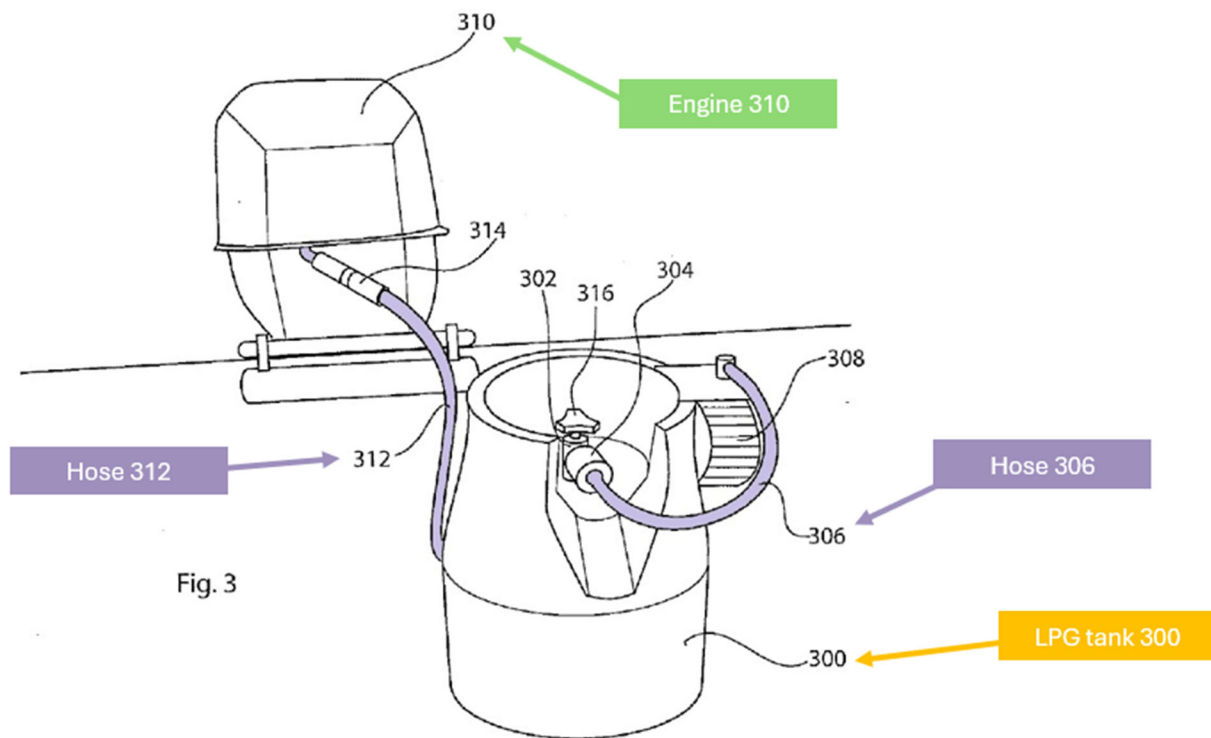
Figure B - Connect the Hose

EX1004, 12.

371. A POSA would have found it obvious to use an off-board regulator system with both regulators off-board, such as Parlatore's off-board configuration depicted in Figure 3, with DuroMax's generator.

372. Parlatore discloses a fuel regulator system with a primary regulator (first stage) and a secondary regulator (second stage): “The fuel delivery system may include a fuel tank that houses propane; a **first regulator** coupled to the fuel tank; a **second regulator** coupled to the first regulator; and a fuel metering system coupled to the second regulator and delivering propane to an engine.” *Id.*, ¶[0005]; *see also id.* ¶¶[0006], [0016]-[0021], Figures 1-3.

373. Parlatore discloses the fuel regulator system may be “off-board” (i.e., “separate” from) the engine. *Id.*, ¶[0020]. This is shown in Figure 3:



Id., Figure 3 (annotated).

374. Parlatore discloses the embodiment of Figure 2 with a generator and discloses the embodiment of Figure 3 for “any situation where more fuel may be

desired.” *Id.*, ¶¶[0019], [0024]. Parlatore also discloses its “LPG applications may be used on any desired form of engine.” *Id.*, ¶[0025]; *see also id.* ¶[0012] (“the term ‘embodiments of the invention’ does not require that all embodiments of the invention include the discussed feature, advantage or mode of operation”), ¶[0026] (“the invention should not be construed as being limited to the particular embodiments discussed above”); ¶[0027] (“the above-described embodiments should be regarded as illustrative rather than restrictive” and “variations to those embodiments can be made by those skilled in the art”).

375. Therefore, Parlatore teaches the embodiment of Figure 3 (where the fuel regulator system is “off-board” the engine) for use with any engine (including in the context of a generator, such as the generators mentioned in paragraph [0019]), such that the fuel regulator system would be “off-board” a generator. *Id.*, ¶¶[0019], [0012], [0024]-[0027].

376. It would have been obvious to use Parlatore’s off-board fuel regulator system with the DuroMax dual-fuel generator.

i. Motivation/Expectation of Success

377. 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. 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. Additional benefits include improved access for servicing and more stable operating conditions (i.e., less exposure to heat and vibrations created by the generator, both of which can prematurely wear the regulator components).

378. It would have been obvious to a POSA to use the off-board fuel regulator system disclosed in Parlature because Parlature discloses the use a regulator system with “any desired form of engine” and specifically suggests the use of its regulator system with generators. EX1010, ¶¶[0019] & [0025]; *see also id.*, ¶[0024] (suggesting off-board configuration “where more fuel may be desired”).

379. Parlature thus shows that a POSA would have had a reasonable expectation of success using an off-board fuel regulator system.

e. Element [1.4]

380. Element [1.4] recites “a primary pressure regulator coupled to a service valve of the pressurized fuel source and configured to regulate the fuel supplied from the pressurized fuel source to a reduced pressure.”

381. Parlature discloses the gaseous fuel (LPG) supplied from the pressurized fuel source (LPG tank) is regulated down to a reduced pressure (through the primary regulator) in the first stage:

The primary regulator 106 may step down the pressure of any stored propane vapor energy in tank 102, and may further output this lowered pressure to a secondary

regulator 110. For example, *the primary regulator 106 may be such that it reduces pressure of the propane from a high pressure state while the propane is in the LPG tank 102, which may be approximately 180-250 psi, to a sub-atmospheric pressure, approximately 10 psi.*

Id., ¶[0016] (emphasis added); see also *id.* ¶¶[0005]-[0006], [0017]-[0021], Figures 1-3.

382. Parlatore discloses a connector 302 for coupling the primary pressure regulator to a service valve (shut off valve 316) of a propane tank. EX1010, ¶¶[0020], [0023], Figure 3.

f. Element [1.5]

383. Element [1.5] recites “a secondary pressure regulator coupled to the primary pressure regulator and configured 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 dual fuel generator.”

384. Parlatore discloses regulating the reduced pressure gaseous fuel (i.e., LPG that has exited the primary regulator) in the second stage down to a desired pressure in the second stage (i.e., through the secondary regulator) for delivery through the gaseous fuel line (e.g., hose 112) to operate the generator. *Id.*, ¶¶[0005]-[0006], [0016]-[0021], Figures 1-3. Parlatore discloses the LPG regulated down to the second stage is used to operate the generator because it flows from the secondary

regulator to the carburetor through a hose (such as hose 112). *Id.*, ¶¶[0017]-[0018], [0020], Figure 1, 3.

g. Element [1.6]

385. Element [1.6] recites “a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the engine from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.”

386. DuroMax discloses a mechanical fuel valve coupled to the internal combustion engine:

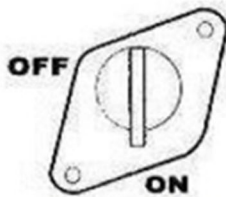


Figure 6 - fuel valve in the "on" position

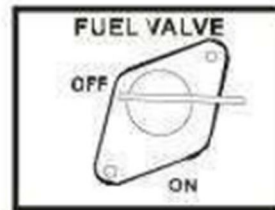
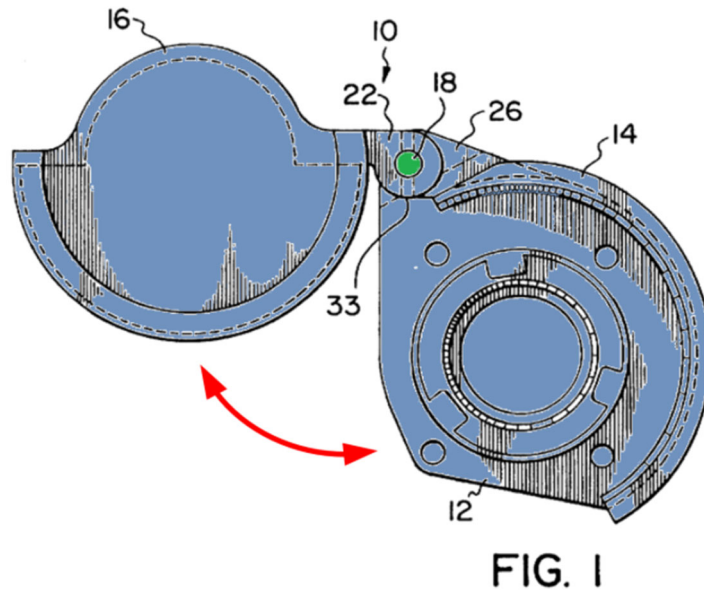


Figure A - Fuel Valve in the "OFF" position

EX1004, 11-12.

387. Elsdon discloses a fuel conduit coupler 12 shield 14 and cap 16 that, when closed, prevents connection of a fuel source. EX1005, 3:3-14. Elsdon discloses that by rotating cap 16 over conduit coupler 12, cap 16 prohibits access to the coupler interface, thereby preventing connecting of a hose with the coupler interface. *Id.*, 3:3-14, 5:1-10.



Id., Figure 1 (annotated).

388. It would have been obvious to a POSA to combine the Elsdon fuel conduit coupler cap with DuroMax's gasoline fuel valve to provide a mechanical fuel valve that both controls the flow of gasoline from the tank through the gasoline line (as disclosed by DuroMax) and simultaneously rotates to block and unblock the LPG inlet of the DuroMax generator (as disclosed by Elsdon). By blocking and unblocking the LPG inlet, this combined apparatus would selectively control the flow of LPG through the LPG fuel line. This combination would appear and function the same way as Figures 2-4B of the '970 Patent.

i. Motivation to Combine

389. A POSA would be motivated to implement the fuel conduit coupler cap assembly of Elsdon to selectively cover and uncover the LPG fuel conduit coupler of DuroMax. Specifically, a POSA would have been motivated to connect

the Elsdon fuel conduit coupler cap to the mechanical fuel valve of DuroMax to restrict access to the LPG hose connector interface of DuroMax when the DuroMax generator is operating on gasoline.

390. A POSA would have understood that by implementing the Elsdon fuel conduit coupler cap assembly in this way, one could link the opening and closing of the DuroMax mechanical fuel valve with the covering and uncovering of the LPG fuel conduit coupler. A POSA would have understood such an arrangement to prevent simultaneous use of LPG and gasoline, which was a known problem to avoid with generators such as DuroMax. EX1004, 11; EX1001, 1:56-67.

391. A POSA would have understood that while DuroMax can run on either gasoline fuel or LPG fuel, DuroMax is not configured to run on both fuel sources at the same time. For example, DuroMax provides the following warning label:

 **CAUTION:**
**When using gasoline, LPG must be shut off! When using LPG,
gasoline must be shut off!**

EX1004, 11.

392. Elsdon explicitly discloses the importance of properly sequencing the connection of fuel sources with the opening of associated valves. For example, Elsdon notes that it may be important to ensure the closing or opening of fuel valves before permitting coupling or uncoupling to the connection interface. EX1005, 1:23-

40. Elsdon discloses that its cap and shield may be utilized in such sequenced interconnected valve and coupler arrangements. *Id.*, 4:44-53.

393. In addition, a POSA would have been motivated to make this combination to ensure the inlet is automatically shielded when not connected, to prevent debris from entering the LPG fuel inlet of the DuroMax generator. Elsdon specifically teaches this motivation: “It is an object of the present invention to provide a cap and shield assembly to protect a fluid conduit coupler from debris.” EX1005, 2:7-9.

ii. Expectation of Success

394. A POSA would have had a reasonable expectation of success in implementing the fuel conduit coupler cap of Elsdon onto the LPG fuel conduit coupler of DuroMax. Elsdon emphasizes that its cap assembly may be “retrofit” to cover existing fuel couplers on “construction equipment” such as a generator. EX1005, 2:10-12, 2:27-31, 5:11-14. Elsdon uses a simple connection arrangement, in which cap 16 rotates around the axis of the shaft 18:

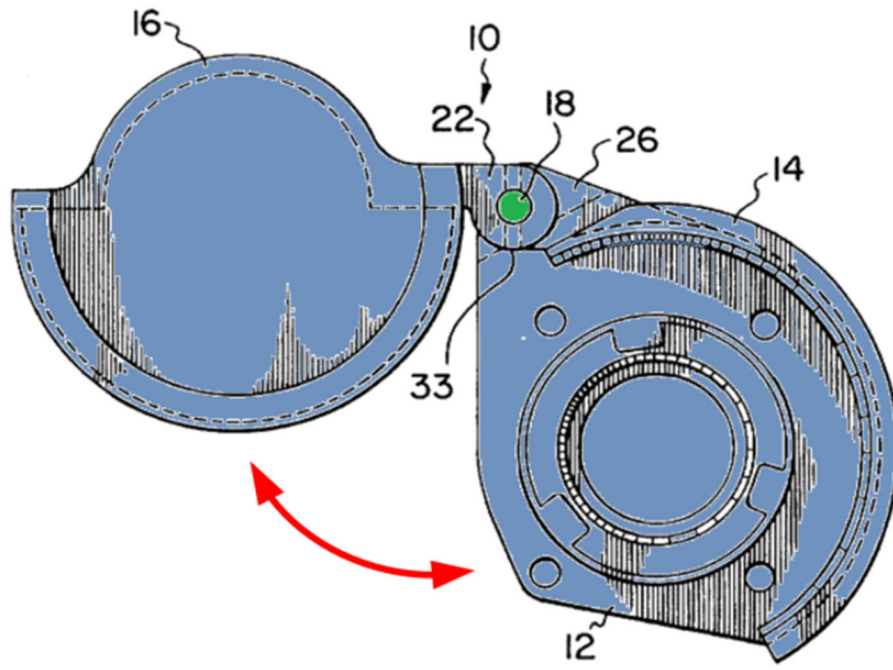


FIG. 1

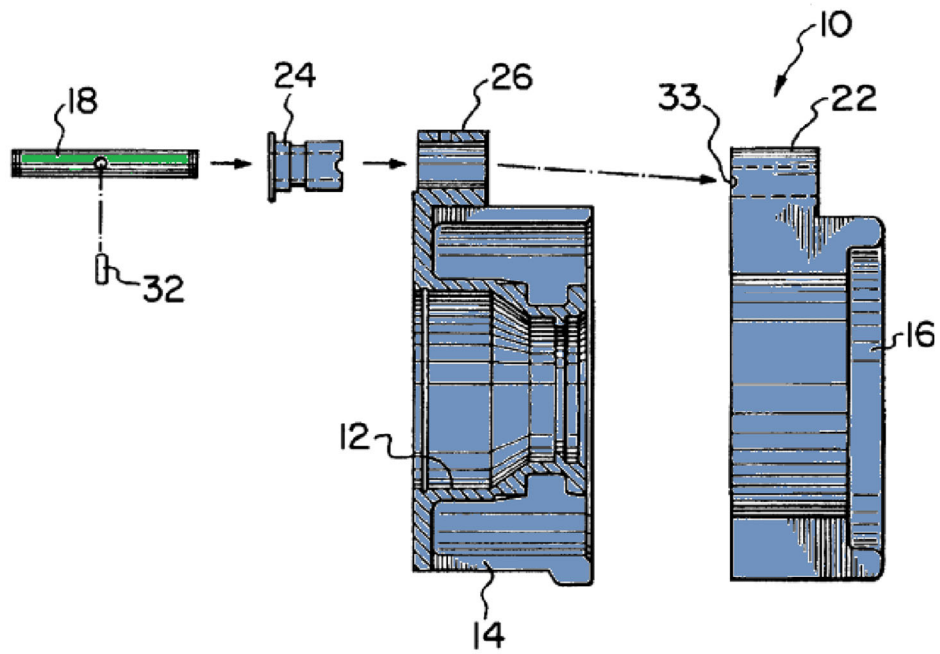


FIG. 3

EX1005, Figures 1, 3 (annotated).

395. A POSA would have understood that the fuel valve of DuroMax is a simple mechanical fuel valve using a valve handle that rotates a shaft connected to a stop inside of the valve body for preventing fuel flow. EX1004, 11-12.

396. A POSA would have understood that the valve handle and shaft of the DuroMax fuel valve could be readily connected to cap 16 of Elsdon such that the DuroMax valve handle and shaft rotate together with Elsdon cap 16.

397. A POSA would have further understood that the fuel valve and LPG fuel conduit coupler of DuroMax could easily be moved to different positions on the generator such that the two components are located immediately next to each other. *See* EX1013, 15:39-16:20 (discussing how the position of the LPG regulator, and therefore the inlet connector on a portable generator can be easily moved to different locations). In that case, cap 16 of Elsdon would rotate with the valve handle of the DuroMax fuel valve to cover the LPG fuel conduit coupler when the DuroMax fuel valve is open, and could rotate to permit access to the LPG fuel conduit coupler when the DuroMax fuel valve is closed.

2. Claim 2

398. Claim 2 depends from Claim 1, and further requires “wherein the carburetor connects the gaseous fuel line to the intake.”

399. The DuroMax carburetor connects the gaseous fuel line to the intake. EX1004, 28-29 (Part No. 18 is “LPG Carburetor ASSY”), 30-31 (Part No. 161 “Gas

tub” connected to Part No. 86 “Pressure Release Valve,” which is connected to Part No. 162 “Intake tube, carburetor”).

3. Claim 3

400. Claim 3 depends from Claim 1.

a. Element [3.1]

401. Element [3.1] recites “a fuel lockout apparatus coupled to the mechanical fuel valve.”

402. As discussed (*see* §XII.E.1.g), it would have been obvious to connect the valve handle and shaft of the DuroMax fuel valve to cap 16 of Elsdon, which would have resulted in a flange that is rigidly coupled to a fuel valve handle, with the flange extending radially from the fuel valve handle so that the flange rotates with the fuel valve handle and rotates transversely over the fuel inlet for LPG between a first position in which the flange blocks access to the fuel inlet for the LPG when the fuel valve handle is in position to allow gasoline to run the engine, and between a second position in which the flange does not block the fuel inlet for the LPG when the fuel valve handle is in position to restrict gasoline from running the engine.

b. Element [3.2]

403. Element [3.2] recites “wherein when the mechanical fuel valve is in the first position, the fuel lockout apparatus communicates the liquid fuel source to the dual fuel generator and prevents the pressurized fuel source from coupling to the

dual fuel generator, and actuation of the mechanical fuel valve to the second position causes the fuel lockout apparatus to permit the pressurized fuel source to couple to the dual fuel generator, and interrupts the liquid fuel source communication with the dual fuel generator.”

404. The DuroMax mechanical fuel valve rotates between a first position in which the valve is opened (communicating the gasoline fuel source to the dual fuel engine) and a second position in which the valve is closed (interrupting communication of the gasoline fuel source to the dual fuel engine). It would have been obvious to connect the valve handle and shaft of the DuroMax fuel valve to cap 16 of Elsdon to prevent the simultaneous flow of gasoline and LPG fuel to the dual fuel engine. *See* §XII.E.1.g. Specifically, it would have been obvious to connect these components so that cap 16 covers the LPG fuel conduit coupler when the mechanical fuel valve is in the open (first) position (preventing communication between the LPG fuel source and the dual fuel engine) and to uncover the LPG fuel conduit coupler (communicating the second fuel source to the dual fuel engine) when the mechanical fuel valve is in the closed (second) position. *See* §XII.A.1.g.

4. Claim 4

405. Claim 4 depends from Claim 1.

a. Element [4.1]

406. Element [4.1] recites “wherein the mechanical fuel valve opens and closes the liquid fuel line to selectively control fuel flow from the liquid fuel source to the dual fuel generator.”

407. As discussed (*see* §XII.E.1.g), DuroMax in combination with Elsdon discloses a mechanical fuel valve that selectively controls fuel flow to the engine from the liquid fuel source through the liquid fuel line. The mechanical fuel valve selection controls fuel flow by opening and closing the liquid fuel line. *Id.*

b. Element [4.2]

408. Element [4.2] recites “a fuel lockout apparatus coupled to the mechanical fuel valve and configured to prevent the pressurize[d] fuel source from coupling to the gaseous fuel line while the mechanical fuel valve opens the liquid fuel line, and permit the pressurized fuel source to couple to the gaseous fuel line while the mechanical fuel valve closes the liquid fuel line.”

409. As discussed (*see* §XII.E.3.a), Duromax in combination with Elsdon discloses a fuel lockout apparatus coupled to the mechanical fuel valve. The fuel lockout apparatus prevents the pressurized fuel source from coupling to the generator when communicating (i.e., opening) the liquid fuel source to the generator, and permits the pressurized fuel source to couple to the generator when interrupting (i.e., closing) the liquid fuel source to the generator. *See* §XII.E.3.b. The fuel lockout

apparatus prevents and permits the pressurized fuel source from coupling to the generator by closing and opening the gaseous fuel line.

5. Claim 5

410. Claim 5 depends from Claim 4, and further requires “wherein the fuel lockout apparatus is further configured to prevent the mechanical fuel valve from opening the liquid fuel line while the dual fuel generator receives fuel from the pressurized fuel source.”

411. As discussed (*see* §XII.E.3.a), DuroMax in combination with Elsdon discloses a fuel lockout apparatus coupled to the mechanical fuel valve. When the generator of DuroMax is running on LPG, the LPG tank connector couples to an LPG hose of an external LPG tank. *See* §XII.E.1.b. When an LPG hose is coupled to the LPG tank connector, the flange of Elsdon would be physically unable to rotate to a position that blocks the LPG tank connector of DuroMax due to the presence of the LPG hose. Thus, because the flange would be unable to rotate to a position blocking the LPG tank connector, it would prevent the mechanical fuel valve from opening the liquid fuel line while the dual fuel generator receives fuel from the LPG tank.

6. Claim 6

412. Claim 6 depends from Claim 4, and further requires “wherein the fuel lockout apparatus further comprises a fuel inlet cover that actuates with the

mechanical fuel valve to cover an inlet of the gaseous fuel line while the mechanical fuel valve opens the liquid fuel line and to uncover the inlet of the gaseous fuel line when the mechanical fuel valve closes the liquid fuel line.”

413. As discussed (*see* §XII.E.3.a), DuroMax in combination with Elsdon discloses a fuel lockout apparatus coupled to the mechanical fuel valve. The cap 16 of Elsdon would actuate with the DuroMax mechanical fuel valve to cover an inlet of the gaseous fuel line while the mechanical fuel valve opens the liquid fuel line. *See* §XII.E.1.g. Similarly, cap 16 of Elsdon would actuate with the DuroMax mechanical fuel valve to uncover an inlet of the gaseous fuel line when the mechanical fuel valve closes the liquid fuel line. *Id.*

7. Claim 8

414. Claim 8 depends from Claim 1, and further recites “a regulator mounting device fixed to the pressurized fuel source with at least the secondary pressure regulator mounted on the regulator mounting device.”

415. As discussed, Parlature’s Figure 3 configuration discloses the secondary pressure regulator mounted on the LPG tank via a mounting device. *See* §XII.C.1.

8. Claim 9

416. Claim 9 depends from Claim 8, and further recites “wherein the primary pressure regulator is mounted on the regulator mounting device.”

417. As discussed, Parlature discloses the option of using a two-stage regulator rather than separate primary and secondary regulators in its various embodiments (which includes the Figure 3 off-board embodiment), such that Parlature discloses the two-stage regulator (which includes the primary regulator) could be mounted on the LPG tank in the same way as the secondary pressure regulator shown in Figure 3. *See* §XII.C.2. Additionally, this configuration was obvious. *Id.*

9. Claim 10

418. Claim 10 depends from Claim 9, and further recites “wherein the pressurized fuel source comprises a pressurized fuel container having a collar; and wherein the regulator mounting device fixes to the collar so that the primary and secondary pressure regulators are positioned adjacent each other along an outer periphery of the collar.”

419. As discussed, mounting Parlature’s two-stage regulator in the same way as the secondary regulator of Figure 3, the primary and secondary regulators would be positioned adjacent each other along an outer periphery of the collar. *See* §XII.C.3. Additionally, this configuration was obvious. *Id.*

10. Claim 11

420. Claim 11 depends from Claim 1, and further requires “wherein the primary and secondary pressure regulators are integral components of a dual stage pressure regulator.”

421. As discussed (*see* §XII.E.1.d), it would have been obvious to use Parlature’s off-board fuel regulator system with DuroMax’s dual fuel generator. As discussed (*see* §XII.C.4), Parlature discloses the primary and secondary pressure regulators can be integral components of a dual-stage pressure regulator. A POSA would have been motivated to use Parlature’s two-stage regulator with the DuroMax generator for the same reasons discussed with respect to using Parlature’s two-stage regulator with the Chaudhari generator. *See* §XII.C.2; *see also* §XII.E.8.

11. Claim 12

a. Element [12.0]

423. Element [12.0] recites “a dual fuel generator and fuel delivery system.”

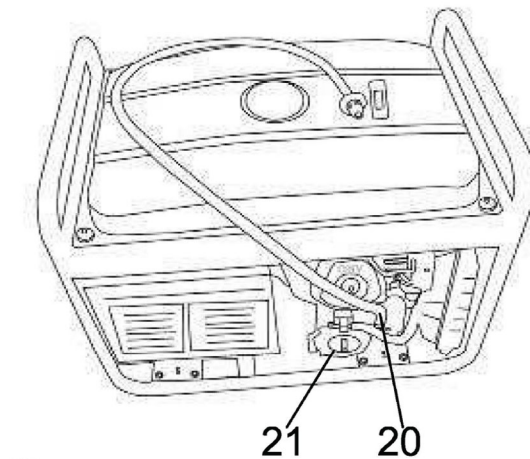
424. DuroMax discloses this element. *See* §XII.E.1.a.

b. Element [12.1]

425. Element [12.1] recites “a dual fuel generator comprising: a generator housing, an alternator mounted within the generator housing, and an engine driving the alternator and mounted within the generator housing, the 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.”

426. DuroMax discloses an engine configured to operate on a liquid 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. *See* §XII.E.1.b. DuroMax’s generator contains a housing where the engine is mounted:



EX1004, 7.

428. DuroMax discloses an alternator. EX1004, 7 (the generator includes AC receptacles), 30-31 (parts diagram/list depicting alternator as “PartNo. 123, Stator & Rotator ASSY”).

429. The alternator is mounted to the housing with at least flange bolts 141. *Id.*, 1 (showing all the internal components of the generator mounted within the housing, off the ground).

430. It is inherent that the engine drives the alternator, as the drive mechanism is a fundamental and necessary aspect of engine-powered generators.

c. Element [12.2]

431. Element [12.2] recites “a fuel regulator system located off board the dual fuel generator.”

432. DuroMax in combination with Parlatores discloses this element. *See* §XII.E.1.d.

d. Element [12.3]

433. Element [12.3] recites “regulate the gaseous fuel supplied from the pressurized fuel source in a first stage, the gaseous fuel regulated down to a reduced pressure in the first stage.”

434. As discussed (*see* §XII.E.1.e), DuroMax in combination with Parlatores discloses a primary regulator (first stage) that would regulate LPG supplied from the LPG tank to a reduced pressure.

e. Element [12.4]

435. Element [12.4] recites “regulate the reduced pressure gaseous fuel in a second stage, the reduced pressure gaseous fuel from the first stage regulated down to a desired pressure in the second stage for delivery through the gaseous fuel line to operate the dual fuel generator.”

436. As discussed (*see* §XII.E.1.f), DuroMax in combination with Parlatores discloses a secondary regulator (second stage) that would regulate the reduced

pressure from the primary regulator down to a desired pressure for supply through the gaseous fuel line to operate the dual fuel generator.

f. Element [12.5]

437. Element [12.5] recites “a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.”

438. As discussed (*see* §XII.E.1.g), DuroMax in combination with Elsdon discloses a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the engine of DuroMax’s dual-fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.

g. Element [12.6]

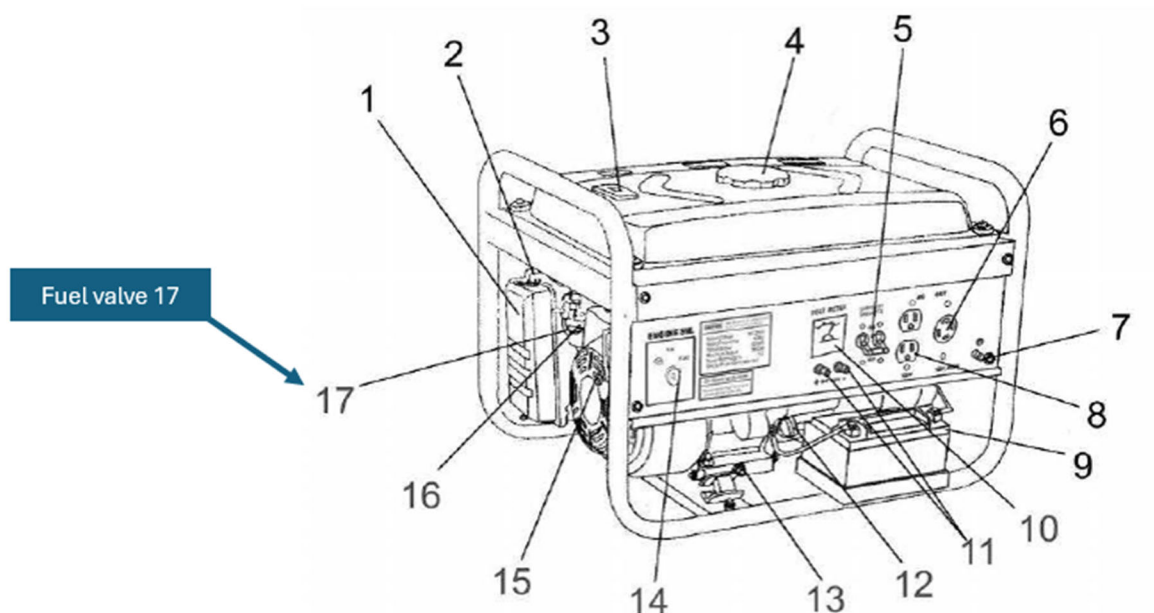
439. Element [12.6] recites “wherein the dual fuel generator is free of any pressure regulator mounted within the generator housing.”

440. As discussed (*see* §XII.E.1.d), DuroMax in combination with Parlatore’s Figure 3 configuration discloses this element.

12. Claim 13

441. Claim 13 depends from Claim 12, and further requires “wherein the mechanical fuel valve is mounted on or within the generator housing.”

442. DuroMax’s fuel valve is mounted within its housing:



EX1004, 7 (annotated); *see also, id.*, 8.

443. It would have been obvious to a POSA to similarly locate DuroMax's fuel valve combined with Elsdon's fuel conduit coupler within DuroMax's housing to prevent the combined component from being damaged. A POSA would have had a reasonable expectation of success based on the configuration of the DuroMax configuration and housing.

13. Claim 14

444. Claim 14 depends from Claim 12.

a. Element [14.1]

445. Element [14.1] recites “wherein the first stage comprises a primary pressure regulator coupled to a service valve of the pressurized fuel source and configured to regulate the gaseous fuel supplied from the pressurized fuel source to the reduced pressure.”

446. DuroMax in combination with Parlatores discloses this element. *See* §§XII.E.1.e, XII.E.11.d.

b. Element [14.2]

447. Element [14.2] recites “wherein the second stage comprises a secondary pressure regulator coupled to the primary pressure regulator and configured to regulate the gaseous fuel supplied from the primary pressure regulator to the desired pressure for delivery through the gaseous fuel line to operate the dual fuel generator.”

448. DuroMax in combination with Parlatores discloses this element. *See* §§XII.E.1.f, XII.E.11.e.

14. Claim 16

449. Claim 16 depends from Claim 14, and further recites “a regulator mounting device fixed to the pressurized fuel source with at least one of the primary pressure regulator and the secondary pressure regulator mounted on the regulator mounting device.”

450. As discussed, Parlature's Figure 3 configuration discloses the secondary pressure regulator mounted on the LPG tank via a mounting device. *See* §§XII.C.1.

15. Claim 17

451. Claim 17 depends from Claim 16, and further recites "wherein the pressurized fuel source comprises a pressurized fuel container having a collar; and wherein the regulator mounting device fixes to the collar so that the primary and secondary pressure regulators are positioned adjacent each other along an outer periphery of the collar."

452. As discussed, Parlature discloses this configuration and, additionally, this configuration was obvious. *See* §§XII.C.3.

16. Claim 18

453. Claim 18 depends from Claim 12, and further recites "wherein the first and second stages comprise a dual stage regulator configured to regulate the gaseous fuel supplied from the pressurized fuel source and regulate the reduced pressure gaseous fuel."

454. As discussed, Parlature discloses this element. *See* §§XII.C.4.

17. Claim 19

455. Claim 19 depends from Claim 18, and further recites "wherein the dual stage regulator is mounted directly onto the pressurized fuel source."

456. As discussed, Parlatore discloses this configuration and, additionally, this configuration was obvious. *See* §§XII.C.2.

18. Claim 34

a. Element [34.0]

457. Element [34.0] recites “a dual fuel generator and fuel delivery system.”

458. DuroMax discloses this element. *See* §XII.E.1.a.

b. Element [34.1]

459. Element [34.1] recites “a dual fuel generator 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.”

460. DuroMax discloses this element. *See* §XII.E.1.b.

c. Element [34.2]

461. Element [34.2] recites “a fuel regulator system located off board the dual fuel generator, the fuel regulator system comprising.”

462. As discussed (*see* §XII.E.1.d), DuroMax in combination with Parlatore discloses this element.

d. Element [34.3]

463. Element [34.3] recites “a primary pressure regulator coupled to a service valve of the pressurized fuel source and configured to regulate the fuel supplied from the pressurized fuel source to a reduced pressure.”

464. As discussed (*see* §XII.E.1.e), DuroMax in combination with Parlature discloses this element.

e. Element [34.4]

465. Element [34.4] recites “a secondary pressure regulator coupled to the primary pressure regulator and configured 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 dual fuel generator.”

466. As discussed (*see* §XII.E.1.f), DuroMax in combination with Parlature discloses this element.

f. Element [34.5]

467. Element [34.5] recites “a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.”

468. As discussed (*see* §XII.E.1.g), DuroMax in combination with Elsdon discloses a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the engine of DuroMax’s dual-fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.

g. Element [34.6]

469. Element [34.6] recites “wherein the mechanical fuel valve outputs gaseous fuel to the dual fuel generator during operation thereof on gaseous fuel at the desired pressure from the secondary pressure regulator.”

470. As discussed (*see* §XII.E.1.g), DuroMax in combination with Elsdon discloses a mechanical fuel valve that would allow gaseous fuel to flow to the dual fuel generator when the DuroMax fuel valve is closed, thus outputting gaseous fuel to the generator in the same way as the mechanical fuel valve of the '970 Patent.

19. Claim 35

471. Claim 35 depends from Claim 34.

a. Element [35.1]

472. Element [35.1] recites “a fuel lockout apparatus coupled to the mechanical fuel valve.”

473. DuroMax in combination with Elsdon discloses this element. *See* §XII.E.3.a.

b. Element [35.2]

474. Element [35.2] recites “wherein when the mechanical fuel valve is in the first position, the fuel lockout apparatus communicates the liquid fuel source to the dual fuel generator and prevents the pressurized fuel source from coupling to the dual fuel generator, and actuation of the mechanical fuel valve to the second position causes the fuel lockout apparatus to permit the pressurized fuel source to couple to

the dual fuel generator, and interrupts the liquid fuel source communication with the dual fuel generator.”

475. DuroMax in combination with Elsdon discloses this element. *See* §XII.E.3.b.

20. Claim 36

476. Claim 36 depends from Claim 34.

a. Element [36.1]

477. Element [36.1] recites “wherein the mechanical fuel valve opens and closes the liquid fuel line to selectively control fuel flow from the liquid fuel source to the dual fuel generator; and further comprises.”

478. DuroMax in combination with Elsdon discloses this element. *See* §XII.E.4.a.

b. Element [36.2]

479. Element [36.2] recites “a fuel lockout apparatus coupled to the mechanical fuel valve and configured to prevent the pressurized fuel source from coupling to the gaseous fuel line while the mechanical fuel valve opens the liquid fuel line, and permit the pressurized fuel source to couple to the gaseous fuel line while the mechanical fuel valve closes the liquid fuel line.”

480. DuroMax in combination with Elsdon discloses this element. *See* §XII.E.4.b.

21. Claim 37

481. Claim 37 depends from Claim 36, and further requires “wherein the fuel lockout apparatus is further configured to prevent the mechanical fuel valve from opening the liquid fuel line while the dual fuel generator receives fuel from the pressurized fuel source.”

482. DuroMax in combination with Elsdon discloses the elements of this claim. *See* §XII.E.5.

22. Claim 38

483. Claim 38 depends from Claim 36, and further requires “wherein the fuel lockout apparatus further comprises a fuel inlet cover that actuates with the mechanical fuel valve to cover an inlet of the gaseous fuel line while the mechanical fuel valve opens the liquid fuel line and to uncover the inlet of the gaseous fuel line when the mechanical fuel valve closes the liquid fuel line.”

484. DuroMax in combination with Elsdon discloses the elements of this claim. *See* §XII.E.6.

23. Claim 40

485. Claim 40 depends from Claim 34, and further recites “a regulator mounting device fixed to the pressurized fuel source with at least the secondary pressure regulator mounted on the regulator mounting device.”

486. As discussed, Parlature's Figure 3 configuration discloses the secondary pressure regulator mounted on the LPG tank via a mounting device. *See* §§XII.C.1.

24. Claim 41

487. Claim 41 depends from Claim 40, and further recites "wherein the primary pressure regulator is mounted on the regulator mounting device."

488. As discussed, Parlature discloses this configuration and, additionally, this configuration was obvious. *See* §XII.C.2.

25. Claim 42

489. Claim 42 depends from Claim 41, and further recites "wherein the pressurized fuel source comprises a pressurized fuel container having a collar; and wherein the regulator mounting device fixes to the collar so that the primary and secondary pressure regulators are positioned adjacent each other along an outer periphery of the collar."

490. As discussed, Parlature discloses this configuration and, additionally, this configuration was obvious. *See* §XII.C.3.

26. Claim 43

491. Claim 43 depends from Claim 34, and further recites "wherein the primary and secondary pressure regulators are integral components of a dual stage pressure regulator."

492. As discussed, Parlature discloses this element. *See* §XII.C.4.

27. Claim 44

a. Element [44.0]

493. Element [44.0] recites “a dual fuel generator.”

494. DuroMax discloses this element. *See* §XII.E.1.a.

b. Element [44.1]

495. Element [44.1] recites “an alternator.”

496. DuroMax discloses this element. *See* §XII.E.11.b.

c. Element [44.2]

497. Element [44.2] recites “a dual fuel engine coupled to drive the alternator, the dual fuel engine configured to operate on a liquid fuel supplied from a liquid fuel source and a gaseous fuel supplied from a pressurized fuel source.”

498. As discussed (*see* §§XII.E.1.b, XII.E.11.b), DuroMax’s dual fuel engine is configured to operate on a liquid fuel supplied from a liquid fuel source and a gaseous fuel supplied from a pressurized fuel source. It is inherent that DuroMax’s engine drives its alternator to generate electricity for the generator, because there is no other power source to generate electricity.

d. Element [44.3]

499. Element [44.3] recites “a liquid fuel line coupled to the dual fuel engine to provide the liquid fuel from the liquid fuel source.”

500. As discussed (*see* §§XII.E.1.b-XII.G.1.c), DuroMax discloses this element.

e. Element [44.4]

501. Element [44.4] recites “a gaseous fuel line coupled to the dual fuel engine to provide the gaseous fuel from the pressurized fuel source.”

502. As discussed (*see* §§XII.E.1.b, XII.E.2), DuroMax discloses this element.

f. Element [44.5]

503. Element [44.5] recites “a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel engine from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.”

504. DuroMax in combination with Elsdon discloses this element. *See* §XII.E.1.g.

g. Element [44.6]

505. Element [44.6] recites “wherein the dual fuel generator is free from any gaseous fuel pressure regulator.”

506. As discussed (*see* §XII.E.1.d), DuroMax in combination with Parlatores discloses this element.

28. Claim 47

507. Claim 47 depends from Claim 44, and further requires “wherein the mechanical fuel valve is located upstream from the liquid fuel line and the gaseous

fuel line to selectively control fuel flow into the liquid fuel line from the liquid fuel source and the gaseous fuel line from the pressurized fuel source.”

508. The mechanical fuel valve of the DuroMax-Elsdon combination would be upstream from the liquid fuel line and the gaseous fuel line to selectively control fuel flow into the liquid fuel line from the liquid fuel source and the gaseous fuel line from the pressurized fuel source. *See* §XII.E.1.g.

29. Claim 48

509. Claim 48 depends from Claim 44, and further requires “wherein the mechanical fuel valve comprises a liquid fuel valve coupled to the liquid fuel line and a gaseous fuel valve coupled to the gaseous fuel line.”

510. The DuroMax generator has a liquid fuel valve coupled to the liquid fuel line. *See* §XII.E.1.g.

511. The DuroMax manual also discloses a gaseous fuel valve coupled to the gaseous fuel line (the service valve on the LPG tank). EX1004, 1.

30. Claim 50

512. Claim 50 depends from Claim 44.

a. Element [50.1]

513. Element [50.1] recites “wherein the mechanical fuel valve opens and closes the liquid fuel line to selectively control fuel flow from the liquid fuel source to the dual fuel engine.”

514. As discussed (*see* §§XII.E.1.g, XII.E.4.a), DuroMax in combination with Elsdon discloses a mechanical fuel valve that opens and closes the liquid fuel line to selectively control fuel flow from the liquid fuel source to DuroMax's dual fuel engine.

b. Element [50.2]

515. Element [50.2] recites “a fuel lockout apparatus coupled to the mechanical fuel valve and configured to prevent the pressurize[d] fuel source from coupling to the gaseous fuel line while the mechanical fuel valve opens the liquid fuel line, and permit the pressurized fuel source to couple to the gaseous fuel line while the mechanical fuel valve closes the liquid fuel line.”

516. DuroMax in combination with Elsdon discloses this element. *See* §XII.E.4.b.

31. Claim 51

517. Claim 51 depends from Claim 50, and further requires “wherein the fuel lockout apparatus is further configured to prevent the mechanical fuel valve from opening the liquid fuel line while the dual fuel generator receives fuel from the pressurized fuel source.”

518. DuroMax in combination with Elsdon discloses the elements of this claim. *See* §XII.E.5.

32. Claim 52

519. Claim 52 depends from Claim 50, and further requires “wherein the fuel lockout apparatus further comprises a fuel inlet cover that actuates with the mechanical fuel valve to cover an inlet of the gaseous fuel line while the mechanical fuel valve opens the liquid fuel line and to uncover the inlet of the gaseous fuel line when the mechanical fuel valve closes the liquid fuel line.”

520. DuroMax in combination with Elsdon discloses the elements of this claim. *See* §XII.E.6.

F. Ground 6: Claims 7, 15, 20-33, 39, 45-46, and 49 are obvious over DuroMax in view of Parlatore, LP-Gas Handbook, Sturgis, Elsdon, and Tri-Fuel Video

521. In my opinion, Claims 7, 15, 20-33, 39, 45-46, and 49 of the '970 Patent are obvious under §103, for at least the reasons described below.

1. Claim 7

522. Claim 7 depends from Claim 1, and further requires “a first end of a quick-connect hose coupling coupled to an outlet of the secondary pressure regulator; and a second end of the quick-connect hose coupling coupled to an inlet of the gaseous fuel line to mate with the first end of the quick-connect hose coupling to couple the secondary pressure regulator to the gaseous fuel line.”

523. As discussed, it would have been obvious to use Parlatore’s fuel regulator system with DuroMax’s dual-fuel generator. *See* §XII.E.1.d.

524. As discussed, it would have been obvious to a POSA to use a quick connector at the end of the Parlature hose (e.g., as coupling 314) in view of the teachings of the LP-Gas Handbook. *See* §XII.D.1.

525. As such, a first end would be coupled to the outlet of the secondary regulator 308 and a second end would be coupled to an inlet of the gaseous fuel line, such as Part No. 161 “Gas tube” (EX1004, 30-31), of the engine of the DuroMax generator to couple the secondary pressure regulator to the gaseous fuel line.

2. Claim 15

526. Claim 15 depends from Claim 14, and further recites “a first end of a quick-connect hose coupling coupled to an outlet of the secondary pressure regulator; and a second end of the quick-connect hose coupling coupled to an inlet of the gaseous fuel line to mate with the first end of the quick-connect hose coupling to couple the secondary pressure regulator to the gaseous fuel line.”

527. As discussed, it would have been obvious to use a quick-connect hose coupling to connect a LPG tank to the DuroMax generator, thus meeting the elements of this claim. *See* §§XII.D.1, XII.F.1.

3. Claim 20

a. Element [20.0]

528. Element [20.0] recites “a dual fuel generator and fuel delivery system.”

529. DuroMax discloses this element. *See* §XII.E.1.a.

b. Element [20.1]

530. Element [20.1] recites “a dual fuel generator 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 dual fuel generator comprising.”

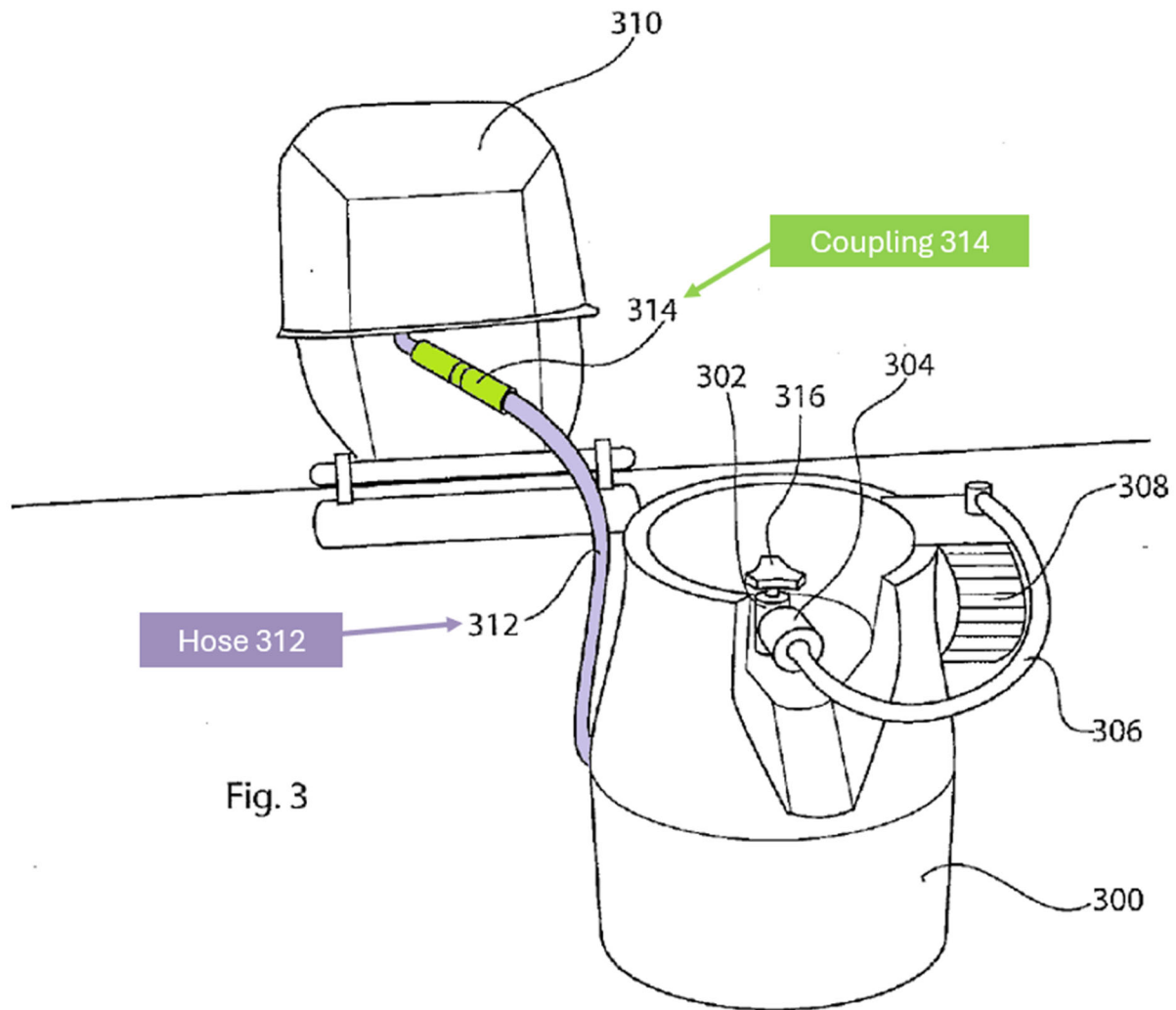
531. DuroMax discloses this element. *See* §XII.E.1.b.

c. Element [20.2]

532. Element [20.2] recites “a gaseous fuel valve coupled to an inlet of the gaseous fuel line and connectable to the pressurized fuel source.”

533. As discussed, it would have been obvious to use a quick-connect hose coupling to connect a LPG tank to DuroMax’s generator as Parlature’s coupling 314. *See* §XII.F.1.

534. As discussed, a quick-connect typically has an integral valve (as shown by Sturgis) and, therefore, the valve of the quick-connect would be a gaseous fuel valve for purposes of this claim. *See* §XII.D.3.c. When using a quick-connect as Parlature’s coupling 314, the valve of the quick-connect would be coupled to an inlet of the gaseous fuel line to the DuroMax engine and would be “connectable” to an LPG tank:



EX1010, Figure 3 (annotated).

535. The DuroMax manual also discloses a gaseous fuel valve (the service valve on the LPG tank) coupled to an inlet of the gaseous fuel line and connectable to the LPG tank. EX1004, 1.

d. Element [20.3]

536. Element [20.3] recites “a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel

generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.”

537. DuroMax in combination with Elsdon discloses this element. *See* §XII.E.11.f.

e. Element [20.4]

538. Element [20.4] recites “a fuel regulator system located off board the dual fuel generator, the fuel regulator system comprising.”

539. DuroMax in combination with Parlatores discloses this element. *See* §XII.E.1.d.

f. Element [20.5]

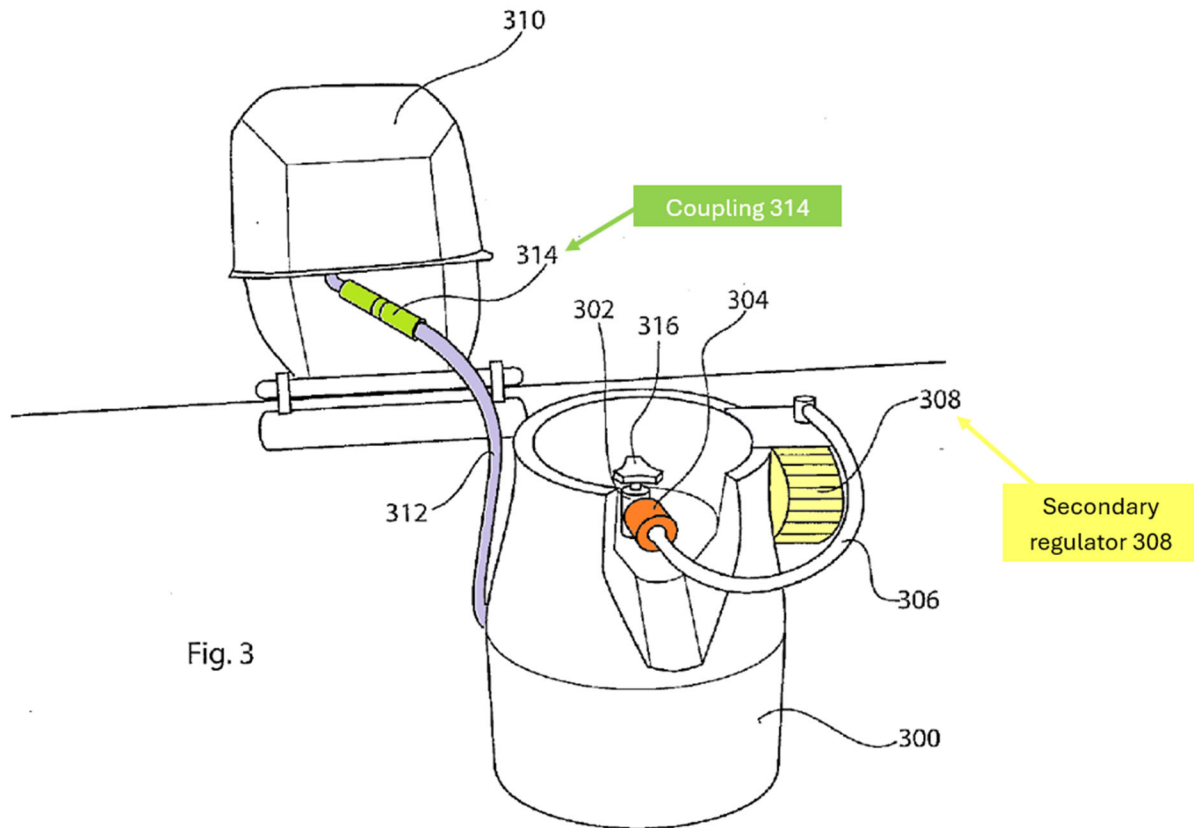
540. Element [20.5] recites “a primary pressure regulator connectable to a service valve of the pressurized fuel source and configured to regulate the fuel supplied from the pressurized fuel source to a reduced pressure.”

541. As discussed (*see* §XII.E.1.e), Parlatores discloses primary regulator 106 coupled to a service valve of tank 102 and configured to regulate the fuel supplied from the pressurized fuel source to a reduced pressure. Parlatores discloses primary regulator 106 can be connected to a LPG tank using a hose or connector 302, which means it is “connectable” to the service valve in that it is not permanently affixed to the service valve. EX1010, ¶¶[0016], [0020], Figures 1 & 3.

g. Element [20.6]

542. Element [20.6] recites “a secondary pressure regulator coupled to the primary pressure regulator and connectable to the gaseous fuel valve, the secondary pressure regulator configured 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 dual fuel generator.”

543. As discussed (*see* §XII.E.1.f), Parlatore discloses a secondary pressure regulator coupled to the primary regulator, which is configured 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 dual fuel generator. As discussed, it would have been obvious to use a quick-connect as Parlatore’s coupling 314, with an integral valve (a gaseous fuel valve for purposes of this claim). *See* §§XII.D.1, XII.D.3.c., XII.F.1, XII.F.3.c With this configuration, Parlatore’s secondary regulator would be “connectable” with the gaseous fuel valve via the quick-connect:



EX1010, Figure 3 (annotated).

4. Claim 21

545. Claim 21 depends from Claim 20, and further requires “wherein the pressurized fuel source is independent and disconnected from the dual fuel generator.”

546. As discussed (*see* §XII.E.1.d), DuroMax in combination with Parlatores discloses a fuel regulator system, including LPG tank 300, that is located off-board the dual fuel generator. Parlatores’s LPG tank 300 is a standalone component and would not be mounted or fixed to DuroMax’s dual fuel generator, thus making LPG tank 300 independent and disconnected from the dual fuel generator.

5. Claim 22

547. Claim 22 depends from Claim 21, and further requires “wherein the fuel regulator system is disconnected from the dual fuel generator.”

548. As discussed (*see* §XII.E.1.d), DuroMax in combination with Parlature discloses a fuel regulator system that is located off-board the dual fuel generator. In this configuration, Parlature’s fuel regulator system is “disconnected” from DuroMax’s dual-fuel generator in that it is not permanently affixed to the tank. EX1010, Figure 3.

6. Claim 23

549. Claim 23 depends from Claim 21, and further requires “wherein the primary pressure regulator is disconnected from the pressurized fuel source.”

550. As discussed (*see* §XII.E.1.e), DuroMax in combination with Parlature discloses a primary pressure regulator, which is part of the fuel regulator system. Parlature discloses a primary pressure regulator can be connected to a LPG tank using a hose or connector 302, which means it is “disconnected” from tank in that it is not permanently affixed to the tank. EX1010, ¶¶[0016], [0020], Figures 1 & 3.

7. Claim 24

551. Claim 24 depends from Claim 20, and further recites “wherein the gaseous fuel valve comprises at least one end of a quick-connect hose coupling mounted to an external surface of the dual fuel generator.”

552. As discussed, it would have been obvious to use a quick-connect hose coupling with an integral valve to connect a LPG tank to DuroMax's generator. *See* §XII.D.1, XII.F.1.

553. It would have been obvious to mount the quick connect (and its integral valve) to an external surface of DuroMax's dual fuel generator based on the teachings of the Tri-Fuel Video for the same reasons discussed. *See* §XII.D.7.

8. Claim 25

554. Claim 25 depends from Claim 20.

a. Element [25.1]

555. Element [25.1] recites "a fuel lockout apparatus coupled to the mechanical fuel valve."

556. DuroMax in combination with Elsdon discloses this element. *See* §XII.E.3.a.

b. Element [25.2]

557. Element [25.2] recites "wherein when the mechanical fuel valve is in the first position, the fuel lockout apparatus communicates the liquid fuel source to the dual fuel generator and prevents the pressurized fuel source from coupling to the dual fuel generator, and actuation of the mechanical fuel valve to the second position causes the fuel lockout apparatus to permit the pressurized fuel source to couple to the dual fuel generator, and interrupts the liquid fuel source communication with the dual fuel generator."

558. DuroMax in combination with Elsdon discloses this element. *See* §XII.E.3.b.

9. Claim 26

559. Claim 26 depends from Claim 20.

a. Element [26.1]

560. Element [26.1] recites “wherein the mechanical fuel valve opens and closes the liquid fuel line to selectively control fuel flow from the liquid fuel source to the dual fuel generator.”

561. DuroMax in combination with Elsdon discloses this element. *See* §XII.E.4.a.

b. Element [26.2]

562. Element [26.2] recites “a fuel lockout apparatus coupled to the mechanical fuel valve and configured to prevent the pressurize[d] fuel source from coupling to the gaseous fuel line while the mechanical fuel valve opens the liquid fuel line, and permit the pressurized fuel source to couple to the gaseous fuel line while the mechanical fuel valve closes the liquid fuel line.”

563. DuroMax in combination with Elsdon discloses this element. *See* §XII.E.4.b.

10. Claim 27

564. Claim 27 depends from Claim 26, and further requires “wherein the fuel lockout apparatus is further configured to prevent the mechanical fuel valve

from opening the liquid fuel line while the dual fuel generator receives fuel from the pressurized fuel source.”

565. DuroMax in combination with Elsdon discloses this claim. *See* §XII.E.5.

11. Claim 28

566. Claim 28 depends from Claim 26, and further requires “wherein the fuel lockout apparatus further comprises a fuel inlet cover that actuates with the mechanical fuel valve to cover an inlet of the gaseous fuel line while the mechanical fuel valve opens the liquid fuel line and to uncover the inlet of the gaseous fuel line when the mechanical fuel valve closes the liquid fuel line.”

567. DuroMax in combination with Elsdon discloses this claim. *See* §XII.E.6.

12. Claim 29

568. Claim 29 depends from Claim 20, and further recites “wherein the gaseous fuel valve comprises: a first end of a quick-connect hose coupling coupled to an outlet of the secondary pressure regulator; and a second end of the quick-connect hose coupling coupled to an inlet of the gaseous fuel line to mate with the first end of the quick-connect hose coupling to couple the secondary pressure regulator to the gaseous fuel line.”

569. As discussed, it would have been obvious to use a quick-connect hose coupling to connect a LPG tank to DuroMax's generator as Parlatore's coupling 314, which would have the elements of this claim. *See* §§XII.D.1., XII.D.3.c, XII.F.1, XII.F.3.c.

13. Claim 30

570. Claim 30 depends from Claim 20, and further recites "a regulator mounting device fixed to the pressurized fuel source with at least the secondary pressure regulator mounted on the regulator mounting device."

571. As discussed, Parlatore's Figure 3 configuration discloses the secondary pressure regulator mounted on the LPG tank via a mounting device. *See* §§XII.C.1, XII.E.7.

14. Claim 31

572. Claim 31 depends from Claim 30, and further recites "wherein the primary pressure regulator is mounted on the regulator mounting device."

573. As discussed, Parlatore discloses this configuration and, additionally, this configuration was obvious. *See* §§XII.C.2, XII.E.8.

15. Claim 32

574. Claim 32 depends from Claim 31, and further recites "wherein the pressurized fuel source comprises a pressurized fuel container having a collar; and wherein the regulator mounting device fixes to the collar so that the primary and

secondary pressure regulators are positioned adjacent each other along an outer periphery of the collar.”

575. As discussed, Parlatore discloses this configuration and, additionally, this configuration was obvious. *See* §§XII.C.3, XII.E.9.

16. Claim 33

576. Claim 33 depends from Claim 20, and further requires “wherein the primary and secondary pressure regulators are integral components of a dual stage pressure regulator.”

577. As discussed, Parlatore discloses this element. *See* §§XII.C.4, XII.E.10.

17. Claim 39

578. Claim 39 depends from Claim 34, and further recites “a first end of a quick-connect hose coupling coupled to an outlet of the secondary pressure regulator; and a second end of the quick-connect hose coupling coupled to an inlet of the gaseous fuel line to mate with the first end of the quick-connect hose coupling to couple the secondary pressure regulator to the gaseous fuel line.”

579. As discussed, it would have been obvious to use a quick-connect hose coupling to connect a LPG tank to DuroMax’s generator as Parlatore’s coupling 314, which would have the elements of this claim. *See* §XII.F.1.

18. Claim 45

580. Claim 45 depends from Claim 44, and further requires “a gaseous fuel valve coupled to an inlet of the gaseous fuel line to connect the pressurized fuel source thereto.”

581. As discussed, it would have been obvious to use a quick-connect hose coupling with an integral valve to connect a LPG tank to the DuroMax generator as Parlatore’s coupling 314 and the combination would have this element. *See* §XII.F.3.c

582. In addition, the DuroMax manual discloses a gaseous fuel valve (the service valve on the LPG tank) coupled to an inlet of the gaseous fuel line to connect the LPG to the gaseous fuel line. EX1004, 1.

19. Claim 46

583. Claim 46 depends from Claim 45, and further recites “a generator housing surrounding at least the dual fuel engine and the alternator with the gaseous fuel valve mounted on or within the generator housing.”

584. As discussed, it would have been obvious to mount the quick connect (and its integral valve) to an external surface of a dual fuel generator based on the teachings of the Tri-Fuel Video. *See* §XII.F.7.

20. Claim 49

585. Claim 49 depends from Claim 44, and further recites “a first end of a quick-connect hose coupling coupled to an outlet of the pressurized fuel source; and

a second end of the quick-connect hose coupling coupled to an inlet of the gaseous fuel line to mate with the first end of the quick-connect hose coupling to couple the pressurized fuel source to the gaseous fuel line.”

586. As discussed, it would have been obvious to use a quick-connect hose coupling to connect a LPG tank to DuroMax’s generator as Parlatore’s coupling 314, which would have the elements of this claim. *See* §XII.F.1.

G. Ground 7: Claims 1-2, 12-14, 20-21, 34, 44-45, and 48 are obvious over Chaudhari in view of Monros and Jungmann

587. In my opinion, Claims 1-2, 12-14, 20-21, 34, 44-45, and 48 of the ’970 Patent are obvious under §103, for at least the reasons described below.

1. Claim 1

a. Element [1.0]

588. Element [1.0] recites “a dual fuel generator and fuel delivery system.”

589. Chaudhari discloses this element. *See* §XII.A.1.a.

b. Element [1.1]

590. Element [1.1] recites “a dual fuel generator comprising: an 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.”

591. Chaudhari discloses this element. *See* §XII.A.1.b.

c. Element [1.2]

592. Element [1.2] recites “a carburetor attached to an intake of the engine to mix air and fuel and connect the liquid fuel line to the intake.”

593. Chaudhari discloses this element. *See* §XII.A.1.c.

d. Element [1.3]

594. Element [1.3] recites “a fuel regulator system located off board the dual fuel generator, the fuel regulator system comprising.”

595. Chaudhari discloses this element. *See* §XII.A.1.d.

e. Element [1.4]

596. Element [1.4] recites “a primary pressure regulator coupled to a service valve of the pressurized fuel source and configured to regulate the fuel supplied from the pressurized fuel source to a reduced pressure.”

597. Chaudhari discloses this element. *See* §XII.A.1.e.

f. Element [1.5]

598. Element [1.5] recites “a secondary pressure regulator coupled to the primary pressure regulator and configured 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 dual fuel generator.”

599. Chaudhari discloses this element. *See* §XII.A.1.f.

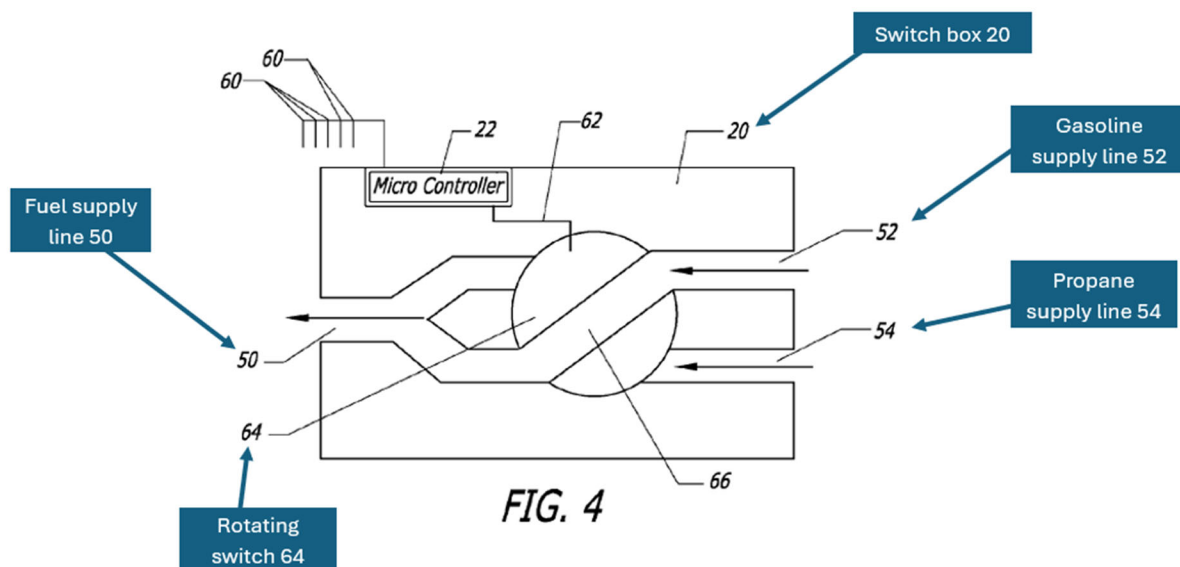
g. Element [1.6]

600. Element [1.6] recites “a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the engine from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.”

601. Chaudhari discloses electronic selector switch 14 to control solenoid valves 4 and 13 for fuel selection. EX1008, 8-9. *See* §XII.A.1.g.

602. It would have been obvious to add a mechanical version of a switch box to Chaudhari’s system, based on the teachings of Monros. A mechanical version of Monros’ switch box would be a “mechanical fuel valve” for purposes of this claim.

603. Monros discloses a switch box 20 for selectively controlling the flow of gasoline or propane to an engine, actuatable between a first position and second position by rotation. EX1022, ¶¶[0025], [0027]. The switch box is shown in Monros’ Figure 4:



EX1022, Figure 4 (annotated).

604. Monros discloses that the switch box 20 is electronically controlled using microcontroller 22 or manually controlled via operation of a selector switch:

The switch box 20 is controlled by a microcontroller 22 housed therein. The microcontroller 22 has a logic circuit (not shown) and receives data inputs from various engine sensors (i.e. RPMs, temperature, etc.). The microcontroller 22 causes the fuel that is run through the fuel supply line 50 to switch back and forth between gasoline and propane based on these data inputs. Alternately, the driver of the vehicle may manually switch the fuel source from a switch on the dashboard inside the car (described below).

EX1022, ¶[0025].

605. The switch box 20 is manually controlled using selector switch 78. *Id.*, ¶[0030].

606. It would have been obvious to connect Chaudhari's liquid fuel line and gaseous fuel line to Monros' switch box, to allow only one fuel to flow to Chaudhari's engine at any given time. It would have been obvious to use a mechanical control to control Monros' switch box, such as a control knob, as was well known in the prior art for actuating valves. *See, e.g.*, EX1026, 14:61-65.

i. Motivation/Expectation of Success

607. A POSA would have been motivated to add Monros' switch box 20 to Chaudhari's system to prevent two types of fuels from flowing to the engine at the same time (gasoline and LPG or kerosene and LPG), which would result in an improper air/fuel ratio in the engine. Although Chaudhari discloses solenoid valves and a switch to allow only one type of fuel to flow to the engine at a time, adding Monros' switch box 20 would provide an extra safety measure in the event one of Chaudhari's solenoid valves failed or a failure of the electrical system. A POSA would have been motivated to use a mechanical control for Monros' switch box, such as a control knob, to allow switching in the event of a failure of the electrical system. This technique was well-known in the art for actuating valves. *See, e.g.*, EX1026, 14:61-65.

608. A POSA would have had a reasonable expectation of success because the addition would simply involve connecting Chaudhari's liquid fuel line and gaseous fuel line to Monros' switch box 20, and connecting the fuel supply line of Monros' switch box 20 to Chaudhari's engine via a fuel line. Employing a mechanical control would have been more basic than Monros' microcontroller.

2. Claim 2

609. Claim 2 depends from Claim 1, and further requires "wherein the carburetor connects the gaseous fuel line to the intake."

610. Chaudhari discloses this element. *See* §XII.A.2.

3. Claim 12

a. Element [12.0]

611. Element [12.0] recites "a dual fuel generator and fuel delivery system."

612. Chaudhari discloses this element. *See* §XII.A.1.a.

b. Element [12.1]

613. Element [12.1] recites "a dual fuel generator comprising: a generator housing, an alternator mounted within the generator housing, and an engine driving the alternator and mounted within the generator housing, the 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."

614. Chaudhari discloses this element in combination with Jungmann. *See* §XII.B.1.b.

c. Element [12.2]

615. Element [12.2] recites “a fuel regulator system located off board the dual fuel generator, the fuel regulator system configured to.”

616. Chaudhari discloses this element. *See* §XII.A.1.d.

d. Element [12.3]

617. Element [12.3] recites “regulate the gaseous fuel supplied from the pressurized fuel source in a first stage, the gaseous fuel regulated down to a reduced pressure in the first stage.”

618. Chaudhari discloses this element. *See* §XII.A.1.e.

e. Element [12.4]

619. Element [12.4] recites “regulate the reduced pressure gaseous fuel in a second stage, the reduced pressure gaseous fuel from the first stage regulated down to a desired pressure in the second stage for delivery through the gaseous fuel line to operate the dual fuel generator.”

620. Chaudhari discloses this element. *See* §XII.A.1.f,

f. Element [12.5]

621. Element [12.5] recites “a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel

generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.”

622. This element was obvious based on the combination of Chaudhari and Monros. *See* §XII.G.1.g.

g. Element [12.6]

623. Element [12.6] recites “wherein the dual fuel generator is free of any pressure regulator mounted within the generator housing.”

624. Chaudhari discloses this element. *See* §XII.A.1.d,

4. Claim 13

625. Claim 13 depends from Claim 12, and further requires “wherein the mechanical fuel valve is mounted on or within the generator housing.”

626. It would have been obvious to a POSA to mount a mechanical version of Monros’ switch box 20 (the mechanical fuel valve) on or within the generator housing for the same reasons explained with respect to mounting Hallberg’s mechanical fuel valve. *See* §XII.B.2.

5. Claim 14

627. Claim 14 depends from Claim 12.

a. Element [14.1]

628. Element [14.1] recites “wherein the first stage comprises a primary pressure regulator coupled to a service valve of the pressurized fuel source and

configured to regulate the gaseous fuel supplied from the pressurized fuel source to the reduced pressure.”

629. Chaudhari discloses this element. *See* §XII.A.1.e.

b. Element [14.2]

630. Element [14.2] recites “wherein the second stage comprises a secondary pressure regulator coupled to the primary pressure regulator and configured to regulate the gaseous fuel supplied from the primary pressure regulator to the desired pressure for delivery through the gaseous fuel line to operate the dual fuel generator.”

631. Chaudhari discloses this element. *See* §XII.A.1.f

6. Claim 20

a. Element [20.0]

632. Element [20.0] recites “a dual fuel generator and fuel delivery system.”

633. Chaudhari discloses this element. *See* §XII.A.1.a,

b. Element [20.1]

634. Element [20.1] recites “a dual fuel generator 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 dual fuel generator comprising.”

635. Chaudhari discloses this element. *See* §XII.A.1.b,

c. Element [20.2]

636. Element [20.2] recites “a gaseous fuel valve coupled to an inlet of the gaseous fuel line and connectable to the pressurized fuel source.”

637. Chaudhari discloses a LPG solenoid valve 4, which is coupled to an inlet of the gaseous fuel line. EX1008, 7. Chaudhari discloses that the LPG solenoid valve 4 is connected to the primary regulator 3, which is connected to the LPG cylinder 1 using a high pressure tube 2. *Id.*

d. Element [20.3]

638. Element [20.3] recites “a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.”

639. This element was obvious based on the combination of Chaudhari and Monros. *See* §XII.G.1.g.

e. Element [20.4]

640. Element [20.4] recites “a fuel regulator system located off board the dual fuel generator, the fuel regulator system comprising.”

641. Chaudhari discloses this element. *See* §XII.A.1.d,

f. Element [20.5]

642. Element [20.5] recites “a primary pressure regulator connectable to a service valve of the pressurized fuel source and configured to regulate the fuel supplied from the pressurized fuel source to a reduced pressure.”

643. Chaudhari discloses this element. *See* §XII.D.3.f.

g. Element [20.6]

644. Element [20.6] recites “a secondary pressure regulator coupled to the primary pressure regulator and connectable to the gaseous fuel valve, the secondary pressure regulator configured 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 dual fuel generator.”

645. Chaudhari discloses this element. *See* §§XII.A.1.f, XII.D.3.g.

7. Claim 21

646. Claim 21 depends from Claim 20, and further requires “wherein the pressurized fuel source is independent and disconnected from the dual fuel generator.”

647. Chaudhari discloses this element. *See* §XII.D.4.

8. Claim 34

a. Element [34.0]

648. Element [34.0] recites “a dual fuel generator and fuel delivery system.”

649. Chaudhari discloses this element. *See* §XII.A.1.a,

b. Element [34.1]

650. Element [34.1] recites “a dual fuel generator 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.”

651. Chaudhari discloses this element. *See* §XII.A.1.b.

c. Element [34.2]

652. Element [34.2] recites “a fuel regulator system located off board the dual fuel generator, the fuel regulator system comprising.”

653. Chaudhari discloses this element. *See* §XII.A.1.d.

d. Element [34.3]

654. Element [34.3] recites “a primary pressure regulator coupled to a service valve of the pressurized fuel source and configured to regulate the fuel supplied from the pressurized fuel source to a reduced pressure.”

655. Chaudhari discloses this element. *See* §XII.A.1.e.

e. Element [34.4]

656. Element [34.4] recites “a secondary pressure regulator coupled to the primary pressure regulator and configured 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 dual fuel generator.”

657. Chaudhari discloses this element. *See* §XII.A.1.f.

f. Element [34.5]

658. Element [34.5] recites “a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel generator from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.”

659. This element was obvious based on the combination of Chaudhari and Monros. *See* §XII.G.1.g.

g. Element [34.6]

660. Element [34.6] recites “wherein the mechanical fuel valve outputs gaseous fuel to the dual fuel generator during operation thereof on gaseous fuel at the desired pressure from the secondary pressure regulator.”

661. A mechanical version of Monros’ switch box 20 (the mechanical fuel valve) would output LPG to Chaudhari’s dual fuel generator during operation thereof on LPG at the desired pressure from Chaudhari’s secondary pressure regulator because Monros’ switch box 20 would be located downstream of Chaudhari’s secondary pressure regulator.

9. Claim 44

a. Element [44.0]

662. Element [44.0] recites “a dual fuel generator.”

663. Chaudhari discloses this element. *See* §XII.A.1.a.

b. Element [44.1]

664. Element [44.1] recites “an alternator.”

665. Chaudhari discloses this element in combination with Jungmann. *See* §XII.B.1.b.

c. Element [44.2]

666. Element [44.2] recites “a dual fuel engine coupled to drive the alternator, the dual fuel engine configured to operate on a liquid fuel supplied from a liquid fuel source and a gaseous fuel supplied from a pressurized fuel source.”

667. Chaudhari discloses this element in combination with Jungmann. *See* §XII.B.4.c.

d. Element [44.3]

668. Element [44.3] recites “a liquid fuel line coupled to the dual fuel engine to provide the liquid fuel from the liquid fuel source.”

669. Chaudhari discloses this element. *See* §XII.B.4.d.

e. Element [44.4]

670. Element [44.4] recites “a gaseous fuel line coupled to the dual fuel engine to provide the gaseous fuel from the pressurized fuel source.”

671. Chaudhari discloses this element. *See* §XII.B.4.e.

f. Element [44.5]

672. Element [44.5] recites “a mechanical fuel valve actuatable between a first position and a second position to selectively control fuel flow to the dual fuel

engine from the liquid fuel source through the liquid fuel line and the pressurized fuel source through the gaseous fuel line.”

673. This element was obvious based on the combination of Chaudhari and Monros. *See* §XII.G.1.g.

g. Element [44.6]

674. Element [44.6] recites “wherein the dual fuel generator is free from any gaseous fuel pressure regulator.”

675. Chaudhari discloses this element. *See* §XII.A.1.d.

10. Claim 45

676. Claim 45 depends from Claim 44, and further requires “a gaseous fuel valve coupled to an inlet of the gaseous fuel line to connect the pressurized fuel source thereto.”

677. Chaudhari discloses this element. *See* §XII.G.6.c.

11. Claim 48

678. Claim 48 depends from Claim 44, and further requires “wherein the mechanical fuel valve comprises a liquid fuel valve coupled to the liquid fuel line and a gaseous fuel valve coupled to the gaseous fuel line.”

679. A mechanical version of Monros’ switch box 20 (the mechanical fuel valve) is a liquid fuel valve coupled to the liquid fuel line and a gaseous fuel valve coupled to the gaseous fuel line because it is a valve that controls both fuel sources and is coupled to both fuel lines.

XIII. CONCLUSION

680. For at least the foregoing reasons, in my opinion, Claims 1-52 of the '970 Patent are invalid.

* * * * *

I hereby declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct, and that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true. I understand that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. § 1001).

Date: September 19, 2025

Respectfully submitted,

By: Timothy L. Morse

Timothy L. Morse, Ph.D., P.E.



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Professional Profile

Dr. Morse is a licensed professional mechanical engineer who specializes in failure analysis, failure prevention, and design risk assessment for thermal and flow processes, products, and equipment. His project experience includes turbines, compressors, engines, generators, valves, heat exchangers, boilers, furnaces, refrigeration systems, piping systems, heat transfer systems, flammable liquids, cryogenic liquids, consumer products, and medical devices.

Dr. Morse's expertise is used in a variety of litigation matters, and he has experience testifying at both trial and international arbitration. Dr. Morse also has experience with intellectual property matters involving mechanical engineering principles, including medical devices, consumer products, and industrial equipment.

Dr. Morse applies his expertise to the investigation and prevention of fires, explosions, floods, and equipment failures. He has conducted fire origin and cause investigations involving electrical appliances, electrical systems, consumer products, heating appliances, and other combustion equipment. Dr. Morse performs testing and analysis of HVAC systems and components, including the analysis of the production and spread of carbon monoxide. Dr. Morse also investigates the origin and cause of motor vehicle fires, including post-collision fires.

Dr. Morse has performed engineering analysis for the oil and gas industry, ranging from offshore oil and gas extraction facilities to retail motor fuel stations. Dr. Morse has investigated flow-induced vibration issues over a wide range of applications, including heat exchanger tube bundles, pipelines, and offshore structures.

Dr. Morse has extensive experience with power generation equipment and facilities, including nuclear power plants, fossil fuel power plants, and renewable energy. He has investigated failures in heat exchangers, generators, compressors, turbines, and boilers. In the renewable energy area, Dr. Morse has investigated wind turbine failures and wind turbine fires.

Prior to joining Exponent, Dr. Morse was a researcher in the Fluid Dynamics Research Laboratories at Cornell University where he conducted research on the wakes of stationary and oscillating structures in a flow and particularly on how flow-induced vibration due to vortex shedding causes fatigue and failure of structures.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Cornell University, 2009

M.S., Mechanical Engineering, Cornell University, 2007

B.E., Mechanical Engineering, Cooper Union, 2003

National Science Foundation Fellowship, 2004-2008

National Defense Science and Engineering Graduate Fellowship, 2004-2007

Tau Beta Pi Engineering Honor Society, 2002

Pi Tau Sigma Mechanical Engineering Honor Society, 2002

Licenses and Certifications

Professional Engineer Mechanical, California, #35464

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Professional Engineer Chemical and Mechanical, New Hampshire, #13976

Professional Engineer, New York, #110148

Professional Engineer, Pennsylvania, #PE084735

Professional Engineer, Rhode Island, #PE.0011724

Professional Engineer Mechanical, Vermont, #018.0126189

40-Hour Hazardous Waste Operation and Emergency Response Certification (HAZWOPER)

Certified Fire and Explosion Investigator (CFEI)

Professional Affiliations

American Society of Mechanical Engineers

American Clean Power Association

- Wind Technical Standards Committee Member

National Association of Fire Investigators

National Fire Protection Association

- Alternate Member: NFPA Technical Committee on Vehicular Alternative Fuel Systems (VAF-AAA), responsible for NFPA 52: Vehicular Natural Gas Fuel Systems Code.

- Alternate Member: NFPA Technical Committee on Liquefied Petroleum Gases (LPG-AAA), responsible for NFPA 58: Liquefied Petroleum Gas Code.

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