

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. 11,492,985

Issued: Nov. 8, 2022

Title: OFF-BOARD FUEL REGULATOR FOR GENERATOR ENGINE

Inter Partes Review No. IPR2025-01272

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

U.S. Patent No. 11,492,985

EX1003
HARBOR FREIGHT TOOLS
IPR2025-01272

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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. IPR2025-01272 to review the challenged claims of U.S. Patent No. 11,492,985 (“the ’985 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 1–19 of the ’985 Patent are invalid. Specifically, this report addresses the invalidity of Claims 1–19 (the “Challenged Claims”) of the ’985 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 ’985 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 exchanges, 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 '985 Patent (EX1001), the file history of the '985 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. 11,492,985 to Sarder et al. (“the ’985 Patent”)
1002	File History for U.S. Patent No. 11,492,985 (“the ’985 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

16. My opinions are additionally guided by my appreciation and understanding of how a POSA would have understood the claims of the ’985 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 1–19 recite nothing more than devices that were already known in the industry prior to the effective filing date of the ’985 Patent;
- b. Claims 1–3 and 11–13 are anticipated by Parlature or, alternatively, are obvious in view of Parlature;
- c. Claims 7–10 are obvious over Parlature in view of LP-Gas Handbook;
- d. Claims 1, 4, 7, 11, 14, 16, and 18 are anticipated by the Tri-Fuel Video;

- e. Claims 2-3, 8-10, 12-13, 17, and 19 are obvious over the Tri-Fuel Video in view of Parlatore and LP-Gas Handbook;
- f. Claims 1, 4, 11, 14, and 16 are anticipated by Chaudhari;
- g. Claims 4, 14, and 16–19 are obvious over Parlatore in view of Chaudhari and/or LP-Gas Handbook;
- h. Claims 4–6 and 14–15 are obvious over Parlatore in view of DuroMax and Elsdon;
- i. Claims 4–6 and 14–15 are obvious over Parlatore in view of Hallberg.

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 '985 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 '985 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 '985 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 '985 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 '985 Patent), unless otherwise noted.

VII. STATE OF THE ART

A. Multi-Fuel Generators

36. The '985 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, 1:40-45.

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 '985 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.)*

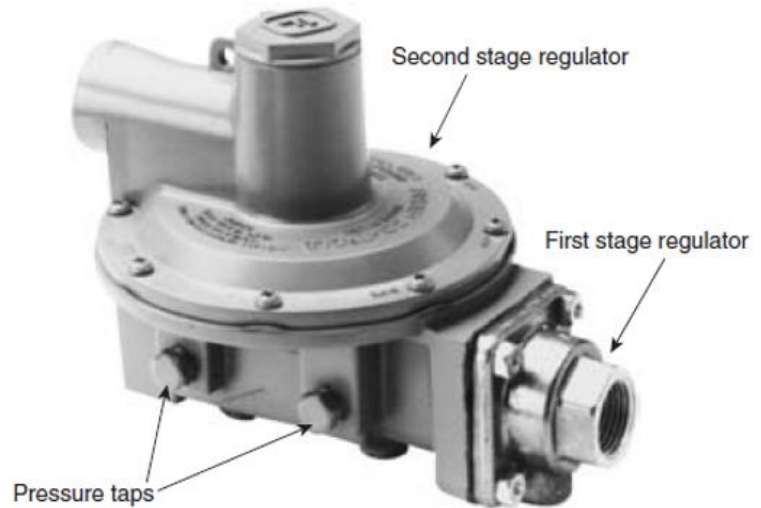


EXHIBIT 5.47 *Integral Two-Stage Regulator. (Courtesy of Fisher Controls Intl, LLC)*

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](#)

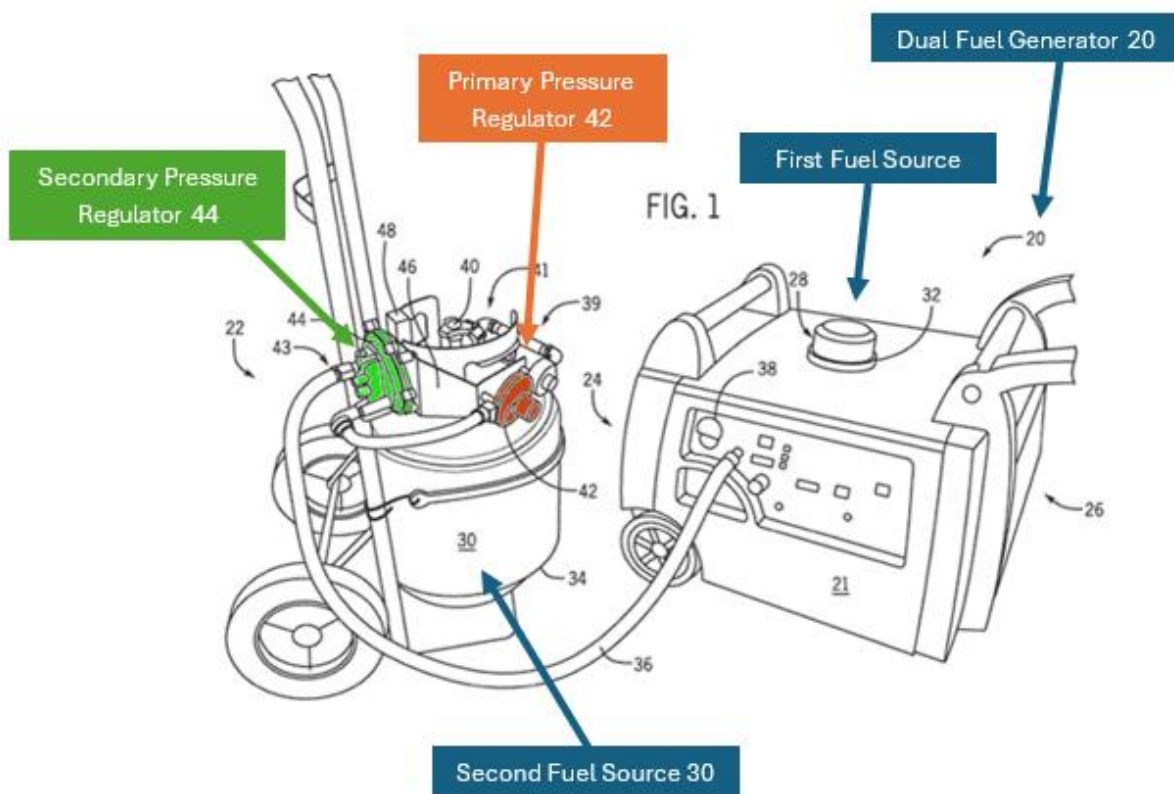
[Add to Wishlist](#) | [Add to Compare](#)

EX1016 (webpage from 2013).

VIII. SUMMARY OF THE '985 PATENT

A. The '985 Patent

43. The '985 Patent is directed to supplying gaseous fuel to engines, including multi-fuel internal combustion engines and generators. EX1001, Abstract, 1:21-55. The '985 Patent acknowledges that multi-fuel combustion engines typically run on liquid fuel (such as gasoline) and an alternative gaseous fuel (such as propane). *Id.*, 1:21-39. Figure 1 of the '985 Patent discloses a perspective view of a generator with such an engine, as shown below:



44. The '985 Patent teaches using two pressure regulators in the gaseous fuel line—a primary regulator coupled to the gaseous fuel source, and a secondary,

downstream regulator to further regulate the pressure of the gaseous fuel as it enters the engine. *Id.*, 4:31-49. The '985 Patent further recognizes that the secondary regulator may be located on the generator or “off-board the generator to reduce size and cost of the generator.” *Id.*, 4:50-59.

B. Prosecution History

45. The '985 Patent is part of a family that includes at least 13 U.S. patents and/or pending applications.¹ The '985 Patent issued from U.S. Application No. 16/783,455, which was filed on February 6, 2020, and claims priority to two prior applications, the earliest of which is U.S. Application No. 14/738,060 (“the '060 Application”), which was filed on June 12, 2015.

46. The '985 Patent’s prosecution history includes multiple rejections and amendments. The Examiner primarily relied on a YouTube video (“Bassguitarist1985”), “Yamaha EF2000iS Tri Fuel Conversion: Overview & Installation Tips,” Jan. 3, 2014, <https://www.youtube.com/watch?=caZawwDaRQg>, and U.S. Patent Pub. No. 2011/0168133 (“Pursifull”) to reject the pending claims prior to issuing the '985 Patent after several amendments. EX1002, 58-63, 103-108.

¹ Family members include U.S. Patent App. Nos. 15/285,215; 14/738,060; 14/925,441; 15/332,264; 16/946,438; 15/285,215; 16/358,822; 16/946,439; 17/937,046; 18/183,734; 18/443,487; and 19/026,996.

47. The Examiner asserted that, *inter alia*, Bassguitarist1985 disclosed off-board dual regulators, which the Applicant subsequently contested on appeal (*id.*,184-185). The PTAB reversed the Examiner, finding that the claim term “located off-board” meant located remotely from the engine. *Id.*, 237-239.

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.

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. Claim 6 of the ’985 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 ’985 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 '985 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, 6:33-45. 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.*, 7:18-31; Figures 2, 4A.

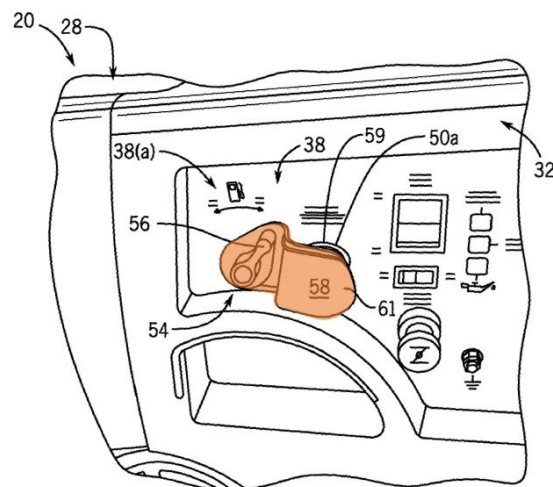


FIG. 2

Id., Fig. 2 (annotated).

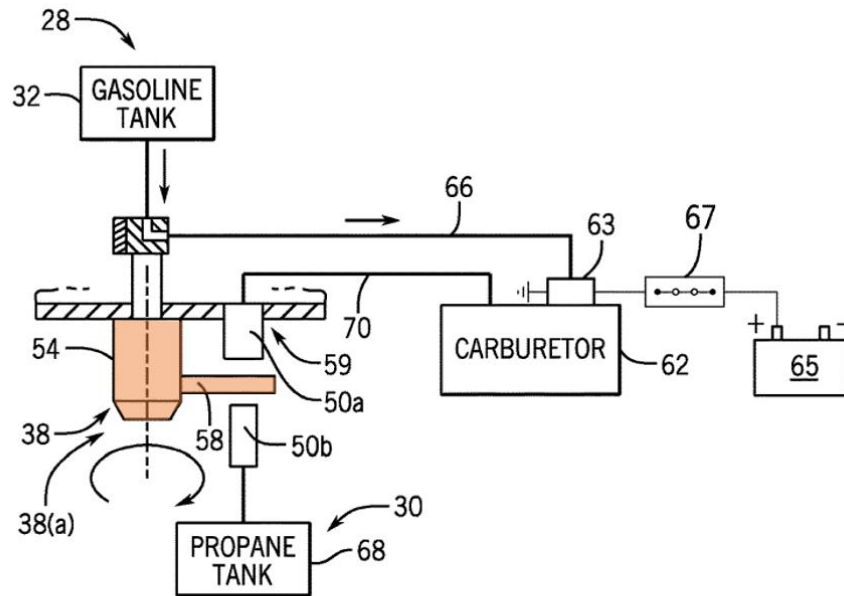
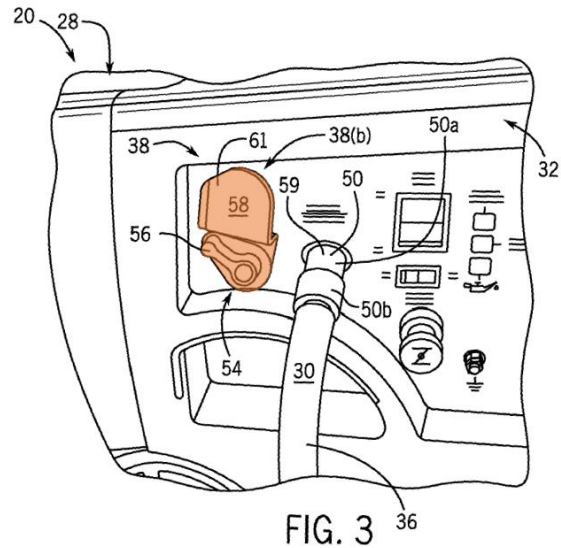


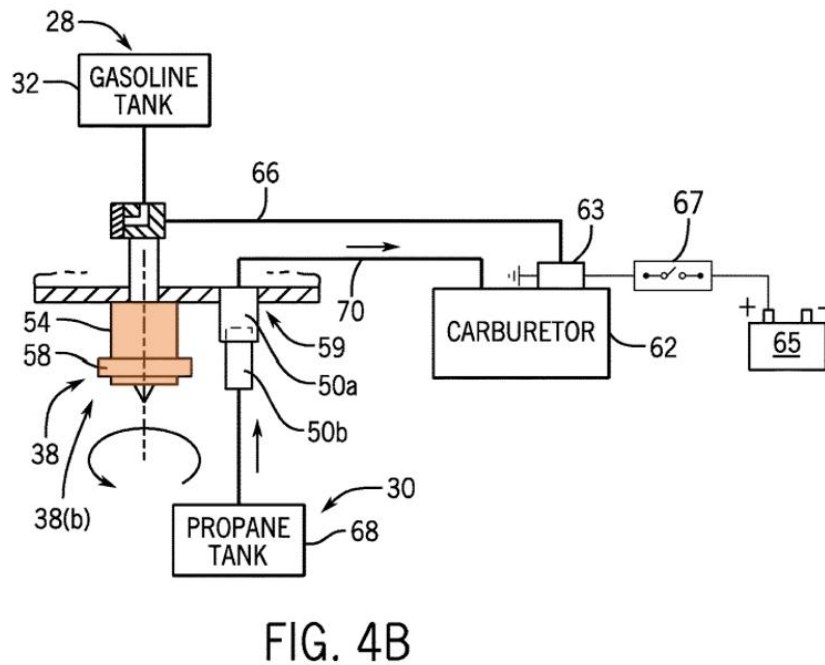
FIG. 4A

Id., Fig. 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.*, 7:32-43; Figures 3, 4B.



Id., Fig. 3 (annotated).



Id., Fig. 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 ’985 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 6 of the ’985 Patent recites:

[A] fuel lockout apparatus coupled to the mechanical fuel valve;

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

wherein, when the mechanical fuel valve is in the 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.

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 ’985 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 '985 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, 8:9-11; *see also Id.*, 5:65-6:10, 6:24-45. Figures 2 and 4A illustrate this:

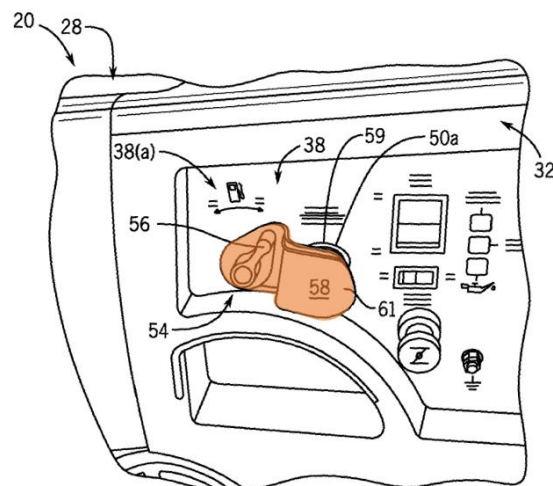


FIG. 2

Id., Fig. 2 (annotated).

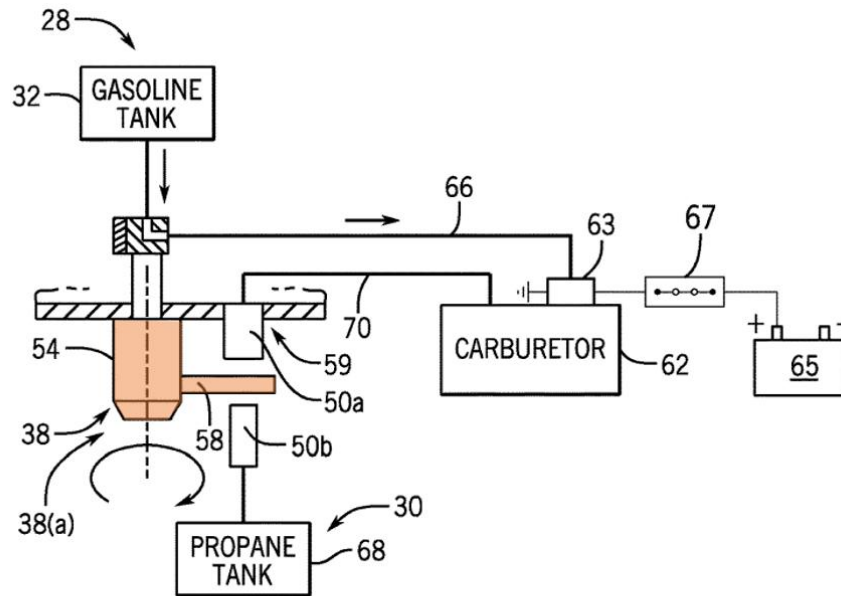
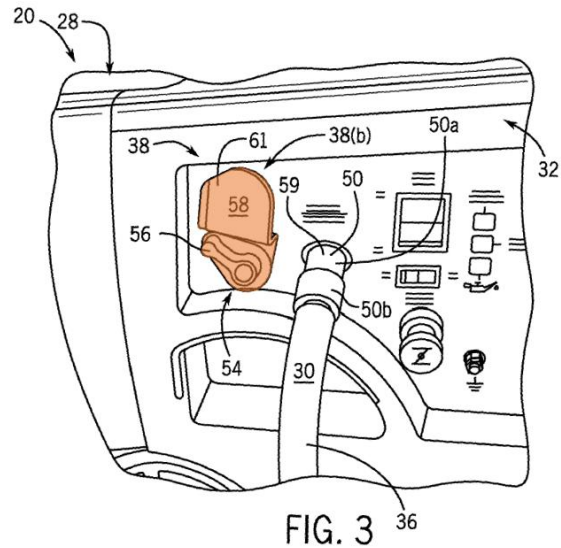


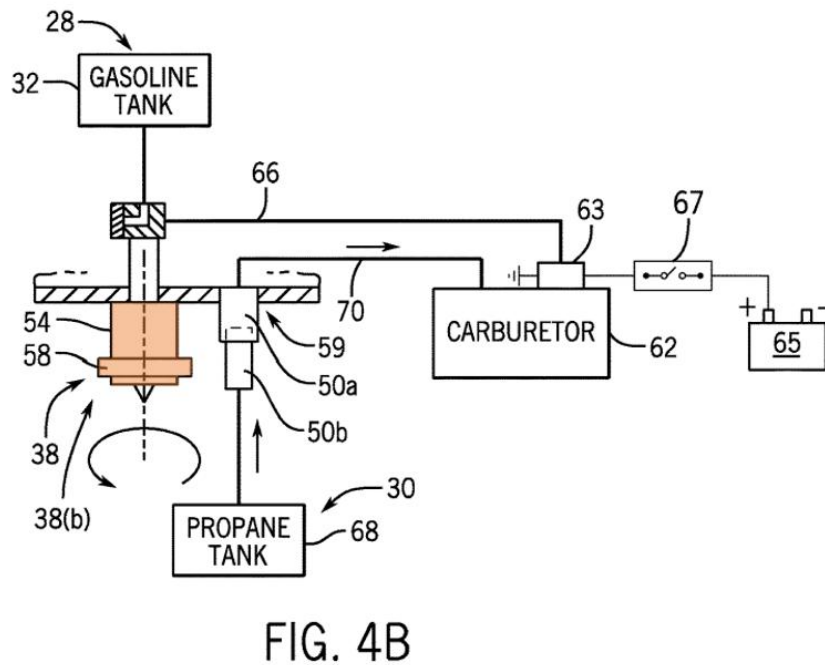
FIG. 4A

Id., Fig. 4A (annotated).

62. The specification of the '985 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.*, 8:12-14; Figures 3, 4B; *see also id.*, 6:46-55, 8:52-62. Figures 3 and 4B illustrate this:



Id., Fig. 3 (annotated).



Id., Fig. 4B (annotated).

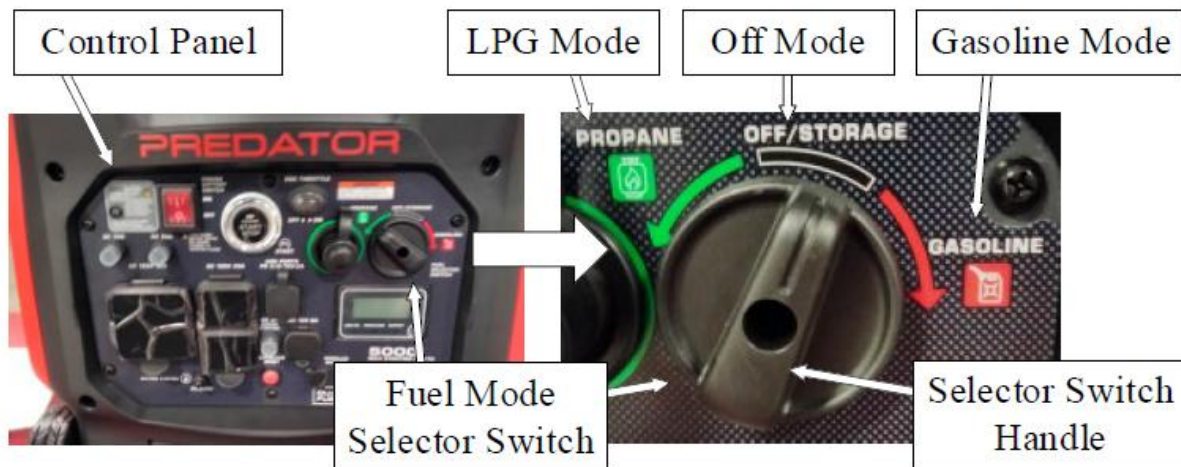
63. Therefore, a POSA would have understood the terms “prevent ... coupling” and “permit ... to couple” to mean “prevent ... attaching” and

“permit ... to attach,” respectively, consistent with how these terms are used in the specification of the ’985 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.*, 8.² By “selector switch,” Patent Owner is referring to the selector knob that switches operation from LPG to gasoline and vice versa:

² EX1018 is Champion’s infringement contentions for related U.S. Patent No. 10,221,780 (“the ’780 Patent”), which has claim language similar to claim 6 of the ’985 Patent (see, e.g., ’780 Patent, claims 1 and 8).



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 claim 6 of the ’985 Patent is invalid as obvious under §103 even under Patent Owner’s proposed construction/application based on the combination of Parlatore and Hallberg, as explained in Ground 8, below.

XI. OVERVIEW OF THE ASSERTED PRIOR ART

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

66. Parlature (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 Parlature’s Figures 1 and 3:

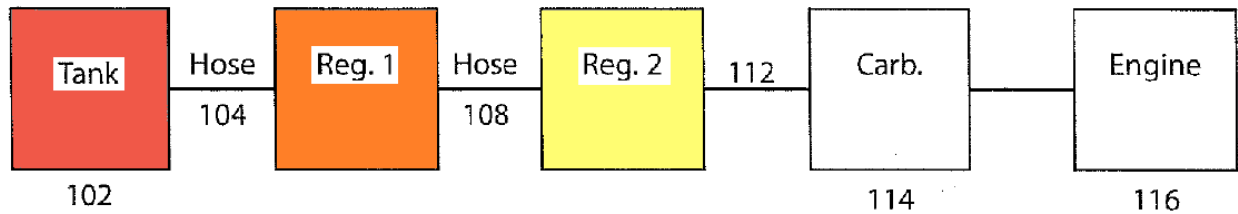


Fig. 1

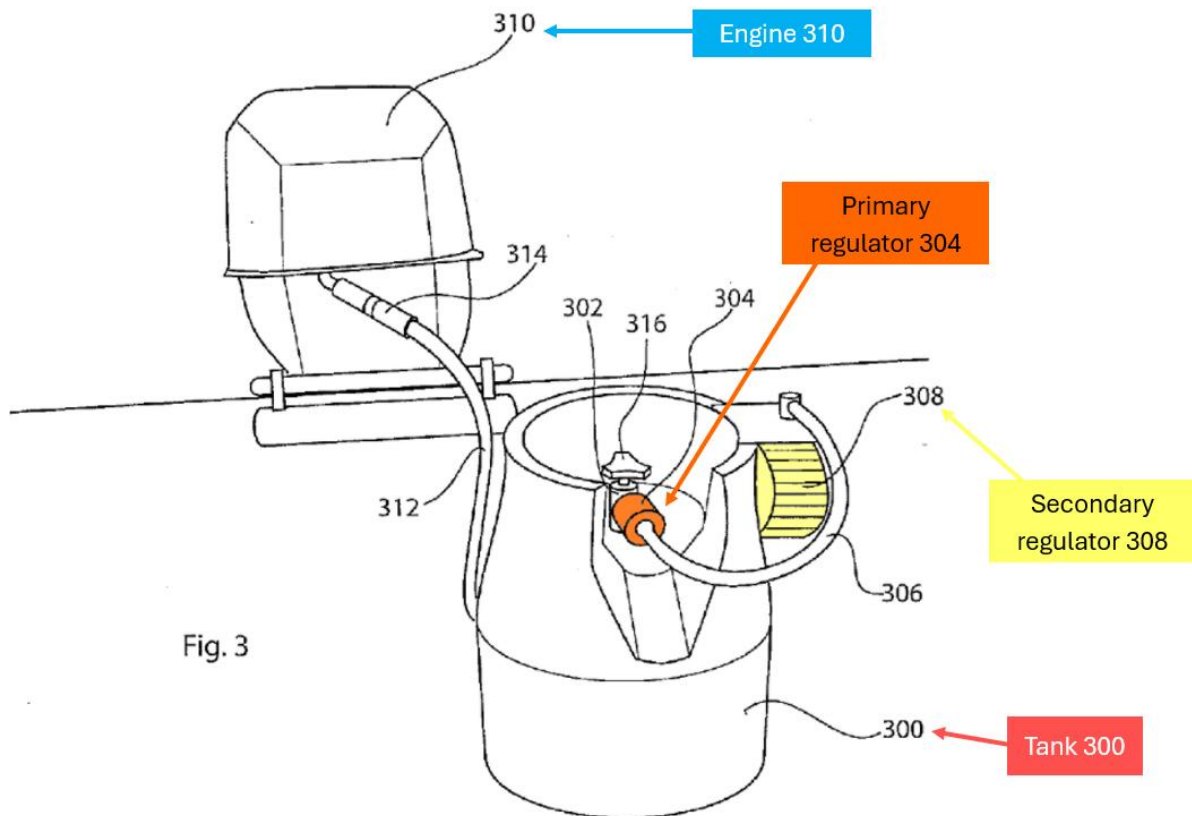


Fig. 3

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

67. Parlatores 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.

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

68. 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.

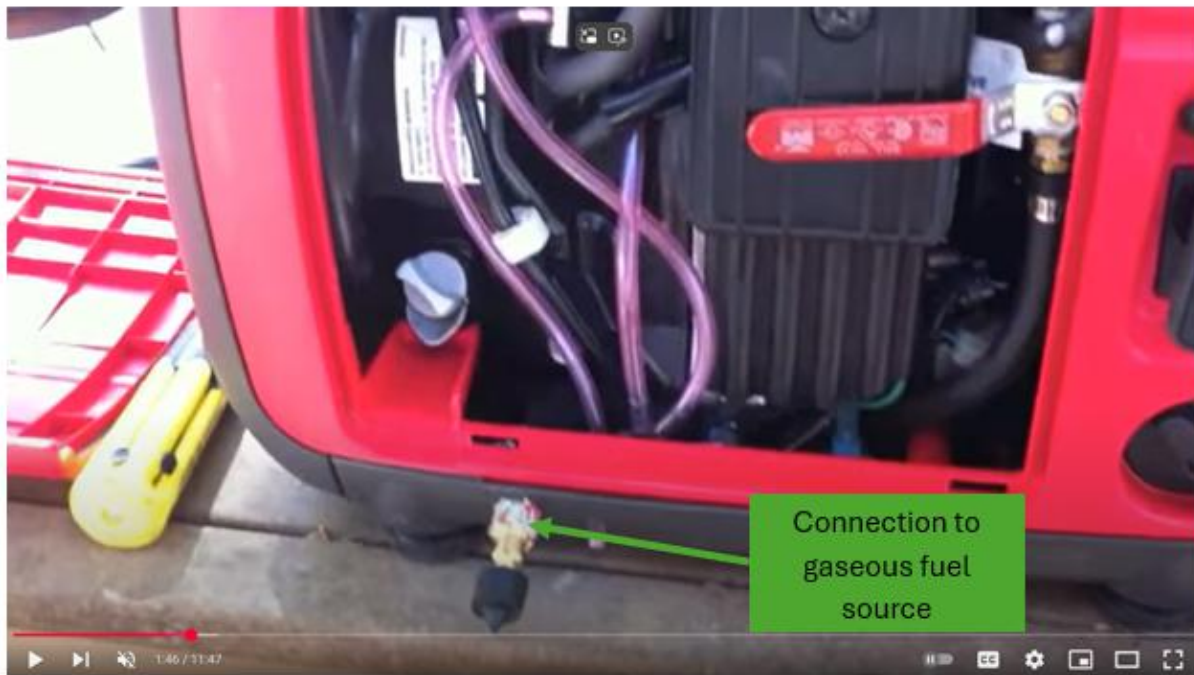
69. The TriFuel Video discloses a Honda generator modified to operate on multiple different fuels. The video shows a modified carburetor for use in the Honda generator so that propane or natural gas can be used to fuel the generator as alternatives to gasoline. The man in the video explains that a hole 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, 0:36–2:00.³



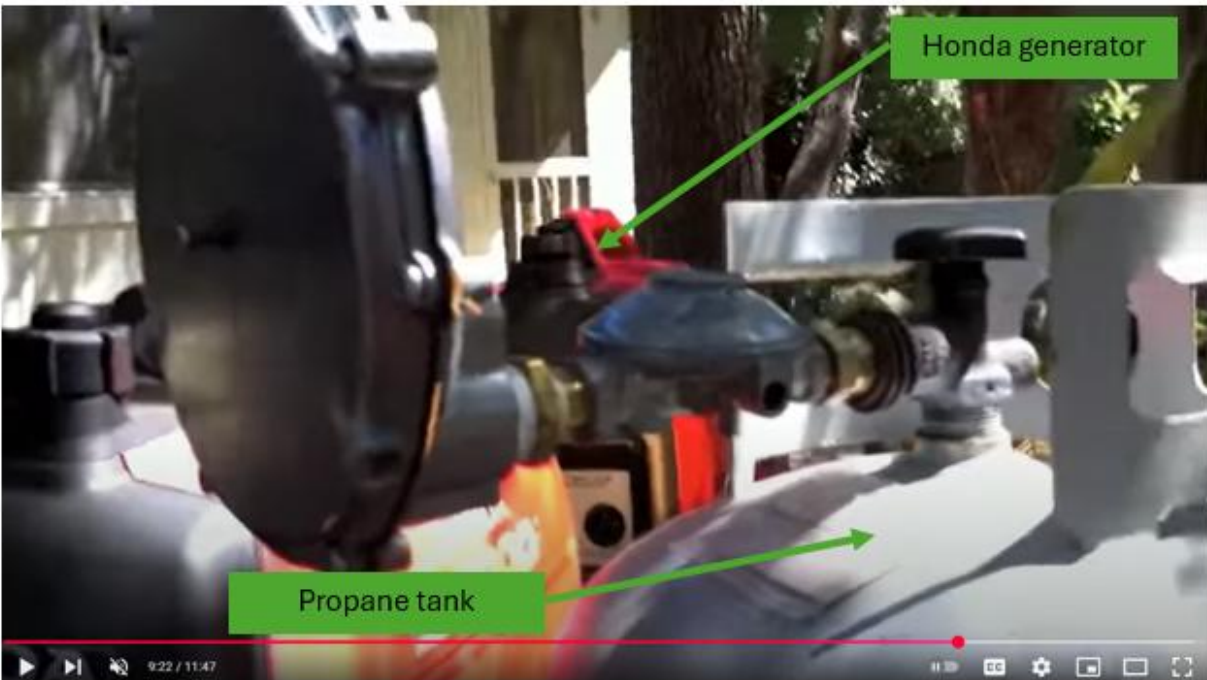
Id., 1:25 (annotations added).

³ Citations to the Tri-Fuel Video refer to the time stamp in the video.

Id., 1:46 (annotation added).



70. 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.

71. 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 ½ 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.

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



Id., 3:38 (annotated).

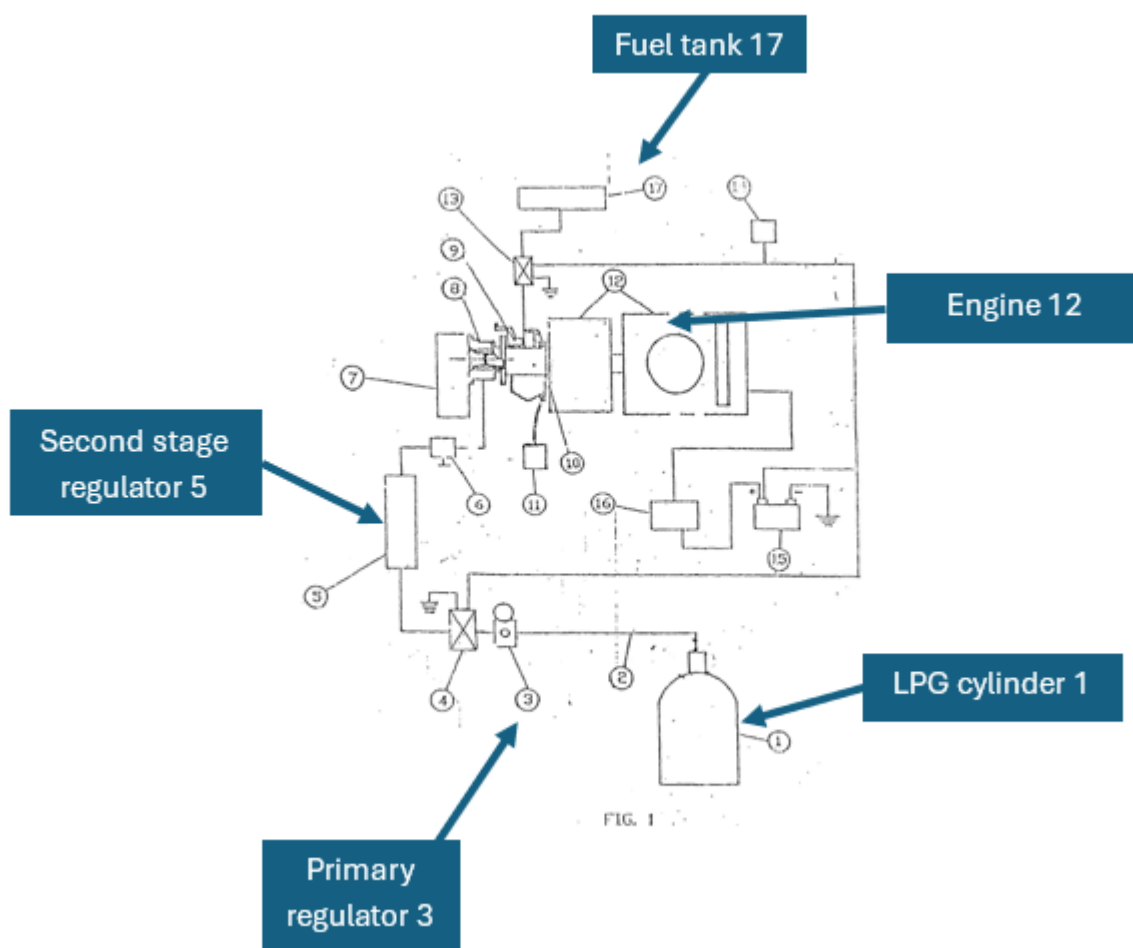
73. Thus, the Tri-Fuel Video shows a generator that has been modified to operate on multiple fuel sources by attaching a separate propane tank to a generator, with primary and secondary pressure regulators located at and attached directly to the propane tank (i.e., “off-board” the generator) to manage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

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

74. 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.*

75. 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., Fig. 1 (annotated)

76. 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.

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

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

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

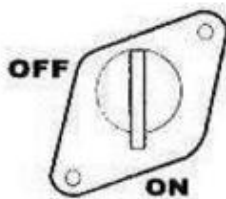


Figure 6 - fuel valve in the "on" position

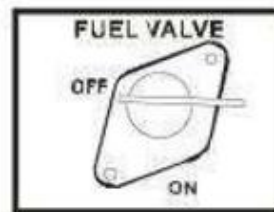


Figure A - Fuel Valve in the "OFF" position

EX1004, 11-12.

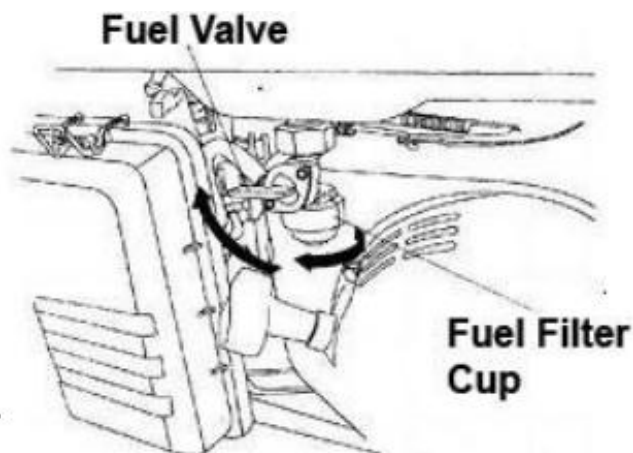
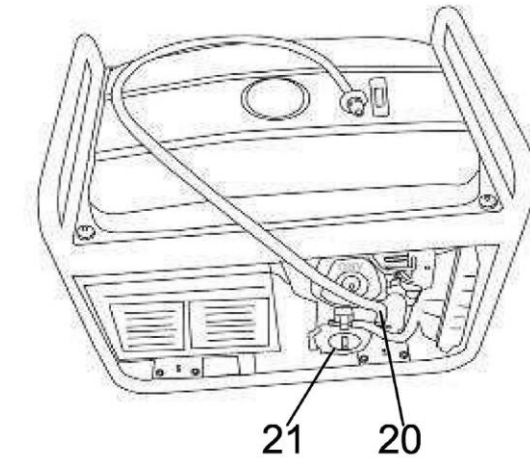


Figure 19 –Removing the Fuel Filter Cup

Id., 20.

79. The generator also includes a LPG fuel inlet.

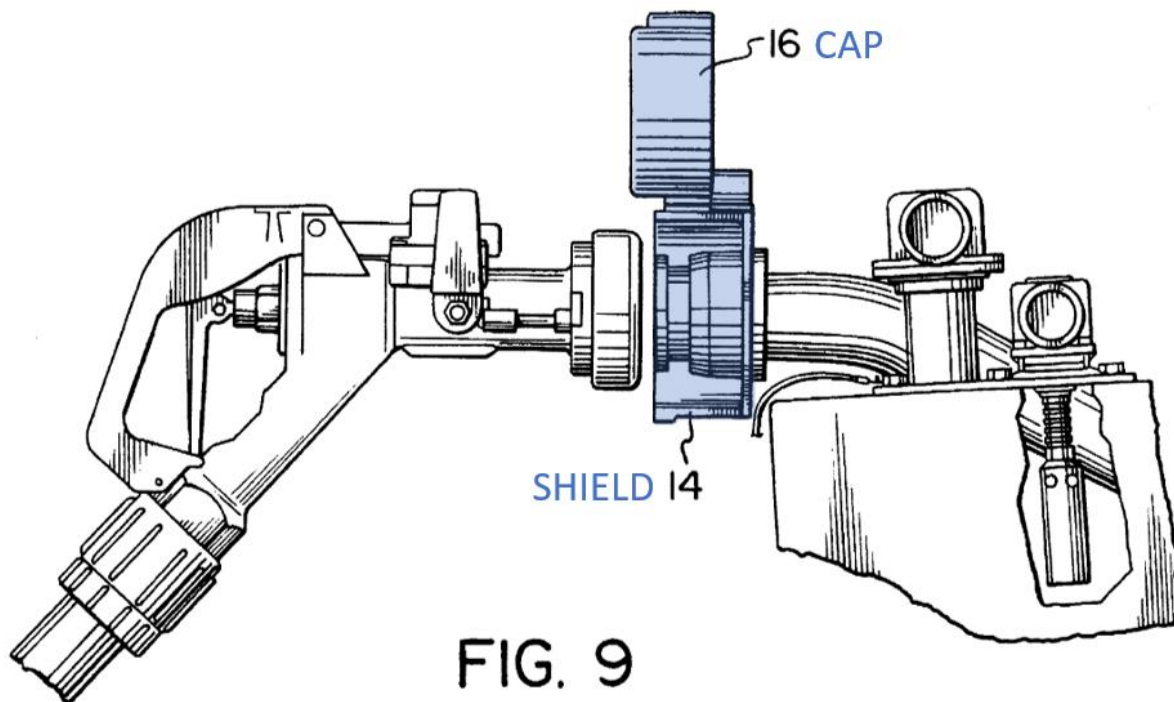


20. Hose connector- Connect liquid propane gas to generator.

Id., 7-8.

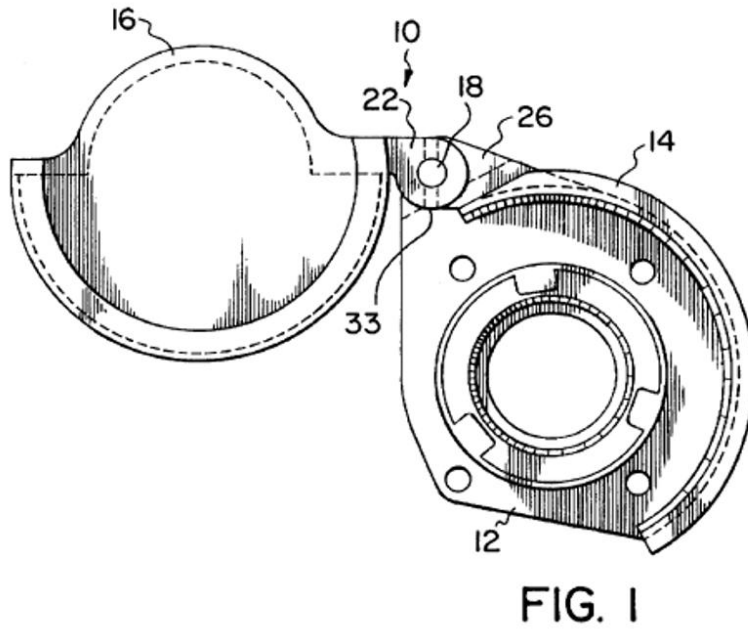
E. U.S. Patent No. 5,718,265 (“Elsdon”)

80. 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, Fig. 9.

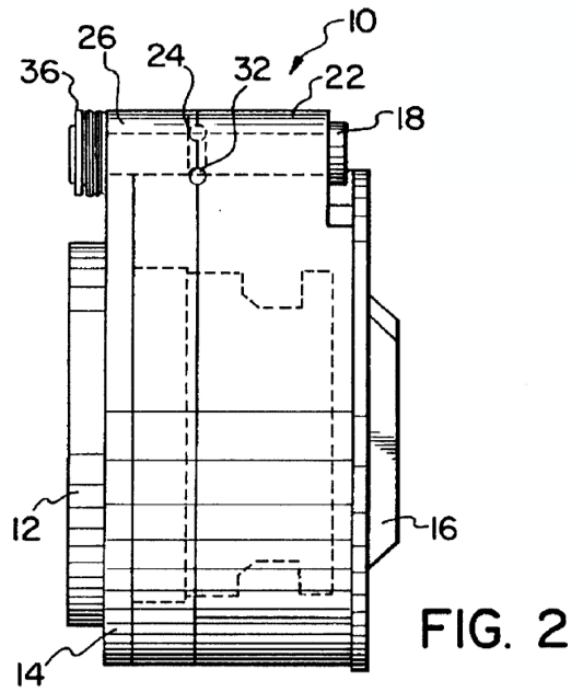


Id., Fig. 9 (annotated).

81. 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.



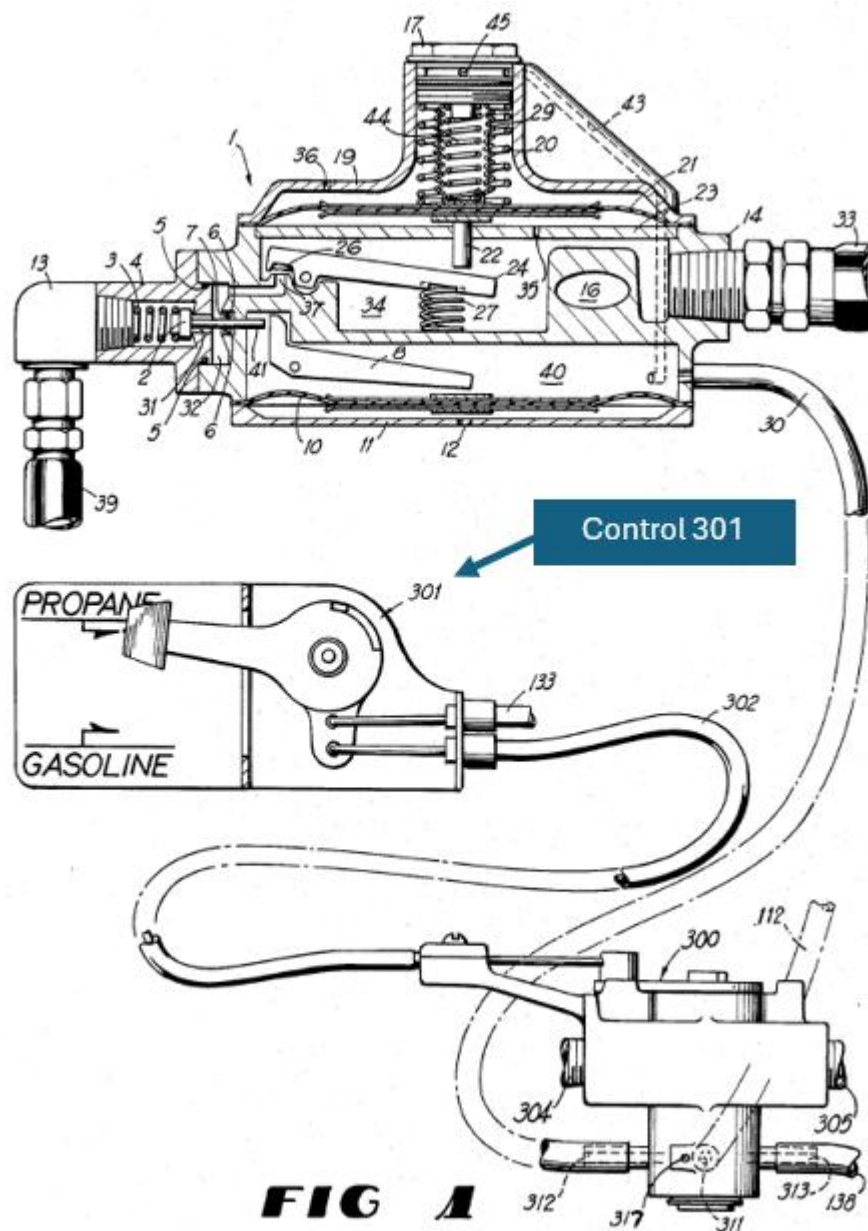
Id., Fig. 1.



Id., Fig. 2.

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

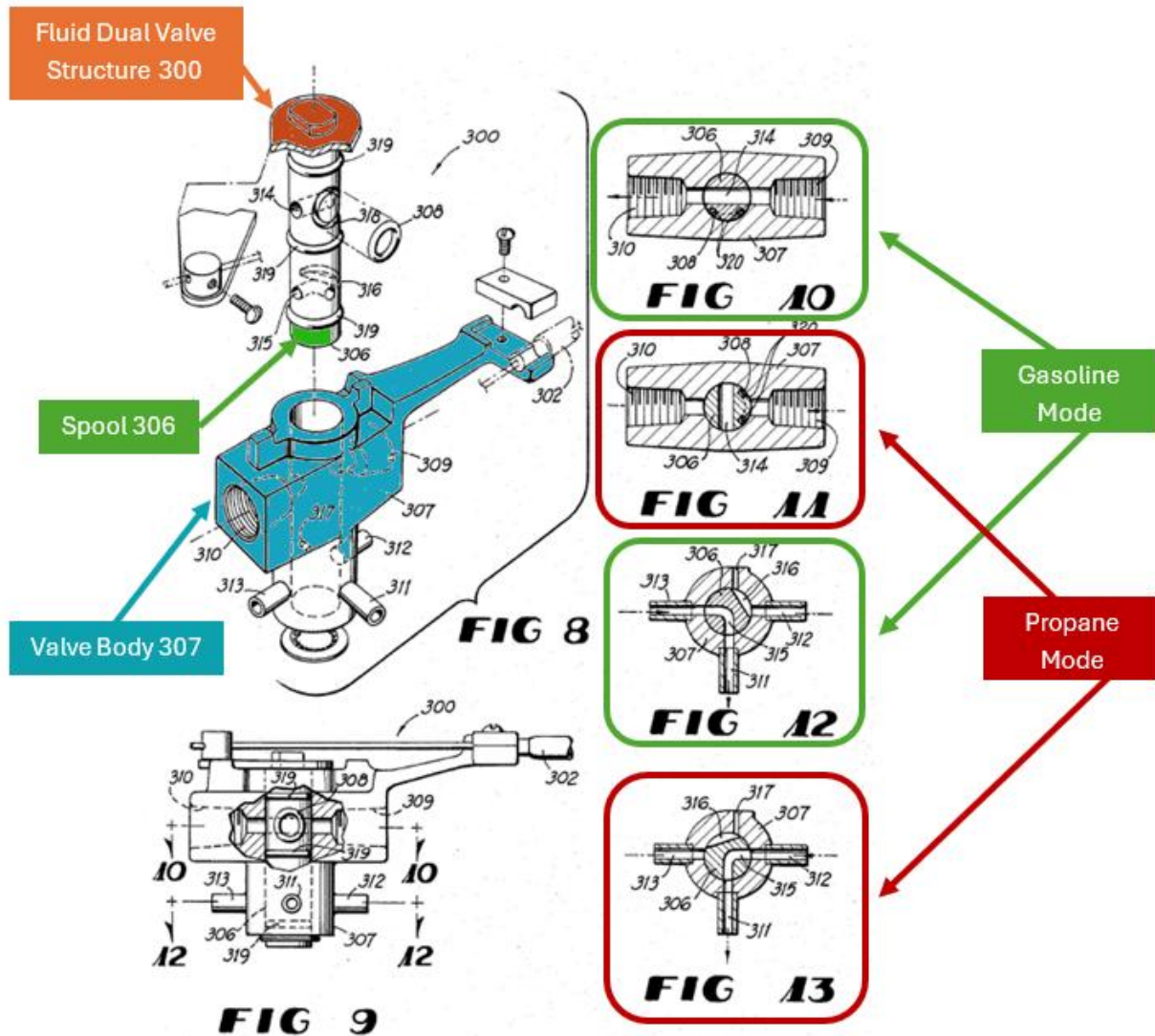
82. Hallberg (EX1006) discloses a dual fuel system for use with internal combustion engines. EX1006, Abstract. The fuel to be utilized is selected by positioning control 301 in one of two positions, either “gasoline” or “propane.” *Id.*, 7:27-29, Fig. 1.



Id.

83. 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.

84. 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. (annotated).

85. 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.

G. LP-Gas Handbook

86. 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.*

87. 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 '985 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.

88. 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 '985 Patent (June 12, 2015).

89. 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.

90. 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 '985 Patent.

XII. THE CHALLENGED CLAIMS ARE UNPATENTABLE

91. In my opinion, the cited prior art references, alone or in combination, disclose the limitations of the Challenged Claims. Grounds 1-8 are directed to the apparatus collectively addressing claims 1-19.

A. Ground 1: Claims 1-3 and 11-13 are anticipated by Parlature or, alternatively, are obvious in view of Parlature

92. In my opinion, claims 1-3 and 11-13 of the '985 Patent are anticipated under 35 U.S.C. §102, or, alternatively, are obvious under §103, for at least the reasons described below.

1. Claim 1

a. Element [1.0]

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

94. Parlature discloses a fuel delivery system, including for use with generators. EX1010, Abstract, ¶[0019].

b. Element [1.1]

95. Element [1.1] recites “a generator free of any pressure regulator and configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line.”

96. Parlature discloses using its fuel delivery system with a generator, and there is no indication the generator has its own regulator. *Id.*, ¶[0019]. In addition, Parlature discloses that the secondary regulator (discussed in detail below) feeds vaporized LPG into the carburetor, further indicating the engines and generators disclosed in Parlature do not have their own pressure regulators. *Id.*, ¶¶[0016], [0018], [0020], Fig. 1.

97. Parlatore discloses an engine configured to operate on a gaseous fuel (LPG) supplied from a pressurized fuel source (LPG tank) through a gaseous fuel line (one or more hoses), as shown below:

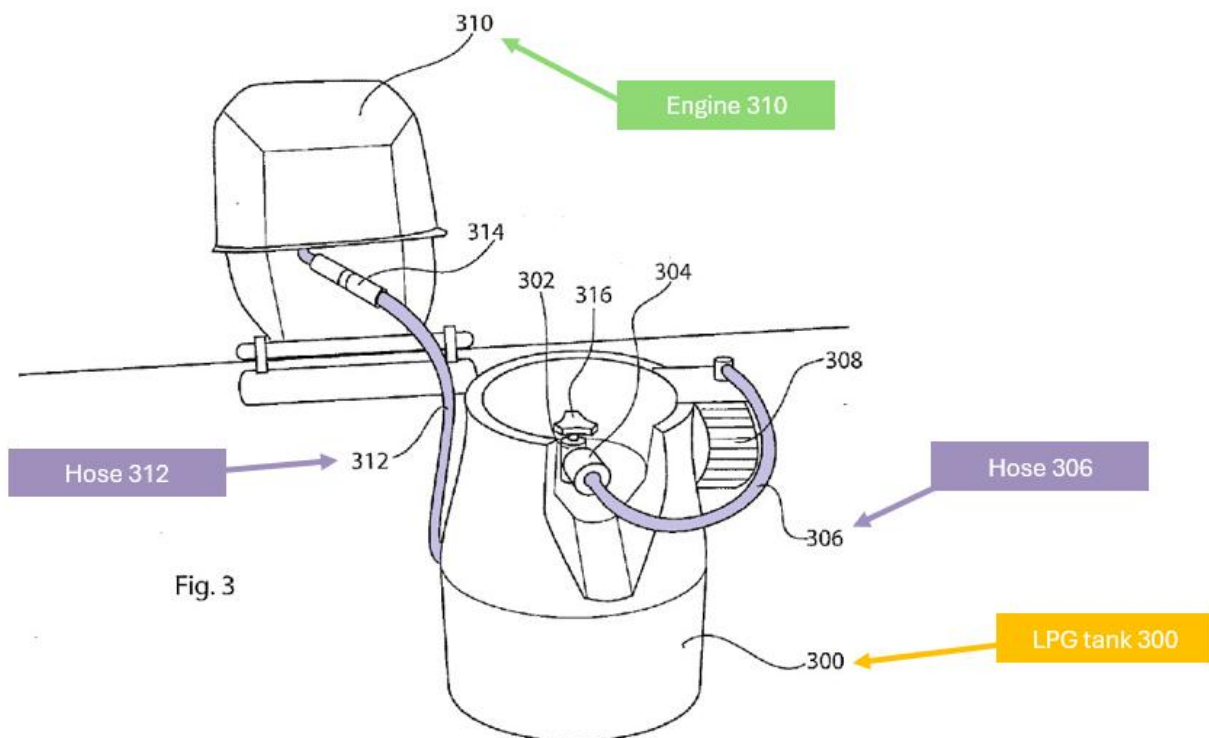


Fig. 3

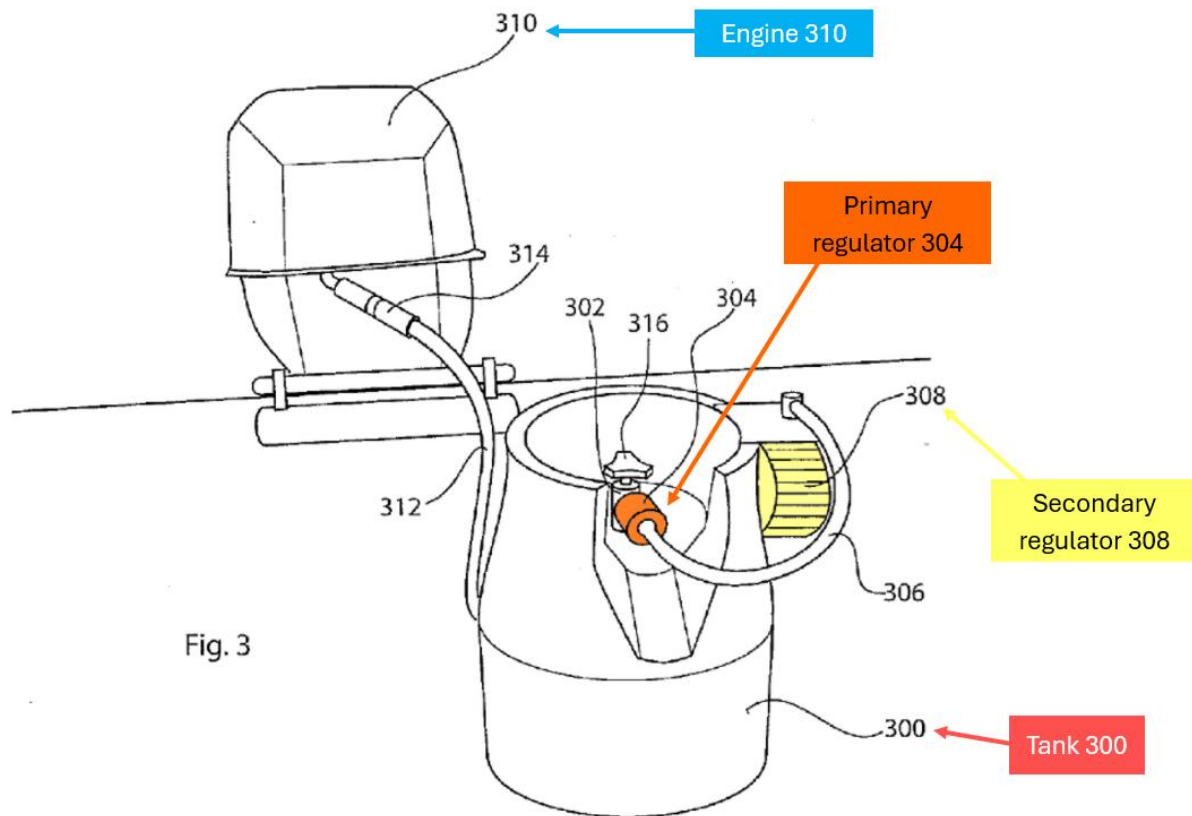
Id., Fig. 3 (annotated); *see also id.*, Figures 1-2, ¶¶[0013]-[0021]. Parlature discloses the LPG tank is pressurized. *Id.*, ¶[0016] (LPG in tank is in a “high pressure state,” which is “approximately 180-250 psi”). The LPG is in gaseous state when delivered to the engine through a gaseous fuel line (one or more hoses). *Id.*, ¶¶[0017] (system lets “fuel vapor flow into the carburetor 114”), [0018] (system feeds “vaporized propane into carburetor 114 through hose 112”), [0022], [0025].

c. Element [1.2]

98. Element [1.2] recites “a fuel regulator system located off-board the generator and comprising a first stage and a second stage.”

99. Parlature 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.

100. Parlature discloses the fuel regulator system may be “off-board” (i.e., “separate” from) the engine:



Id., Fig. 3 (annotated); ¶[0020].

101. 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”).

102. 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].

103. Additionally, it would have been obvious to a POSA to use the Parlatore embodiment shown in Figure 3 with a generator.

i. Motivation/Expectation of Success

104. A POSA would have been motivated by Parlatore’s own teaching to use the embodiment of Figure 3 for “any situation where more fuel may be desired.” *Id.*, ¶[0024]. For example, using tank sizes commonly available in the U.S., it appears that the tank shown in Figure 2 has a capacity of 1 lb. By contrast, the tank shown in Figure 3 would have a much larger capacity (e.g., 10 lbs.). If a POSA had a 4-horsepower generator, they would find that at 75% load, a 1 lb. tank would only run their generator for approximately 0.5 hours. By contrast, a 10 lb. tank would provide

power for 4.5 hours.^{4,5} To power essential appliances during a power outage lasting a few hours, a POSA would know to utilize a larger propane tank, such as the 10 lb. tank considered in this example. A POSA also would have been motivated to use Parlature's off-board configuration of Figure 3 to provide fuel to a generator with a larger engine having greater electricity output, because a larger engine would need more fuel.

105. In addition, tanks like those shown in Parlature's Figure 3 were readily available and common household items at the time of the invention, particularly due to the prevalence of propane exchange programs by hardware stores and other retail outlets.

106. Further, by locating the regulator outside the engine, the risk of over-pressurization, leaks, or explosions near the generator is reduced. This is particularly

⁴ Run time is calculated by multiplying available energy (which is product of the lower heating value and fuel volume) by generator efficiency and dividing by the generator load. Run time will be dependent on tank size (i.e., available energy) and generator load, which relative to the generator rating, determines operational efficiency.

⁵ This calculation assumes: (1) an efficiency curve corresponding to a gasoline generator, (2) a lower heating value of propane of 19,930 BTU/lb, and (3) a propane tank that is 80% filled as per propane tank regulations.

important for generators used in residential or portable settings, where safety is paramount.

107. Placing the regulator outside the generator also reduces the overall size of the generator unit, which is beneficial for portable generators or installations with space constraints.

108. Parlatore shows that a POSA would have had a reasonable expectation of success using an off-board fuel regulator system with a generator. *Id.*, ¶¶[0019]-[0022], [0024], Fig. 3. In addition, it was common to connect appliances, such as BBQ grills, to off-board regulators and propane tanks at the time of the invention and the fuel delivery system of Parlatore would operate the same way regardless of whether the system is mounted to the engine/generator or located off-board the engine/generator.

d. Element [1.3]

109. Element [1.3] recites “regulate the gaseous fuel supplied from the pressurized fuel source in the first stage, the gaseous fuel regulated down to a reduced pressure in the first stage.”

110. Parlatore 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.

e. Element [1.4]

111. Element [1.4] recites “regulate the reduced pressure gaseous fuel in the 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 generator.”

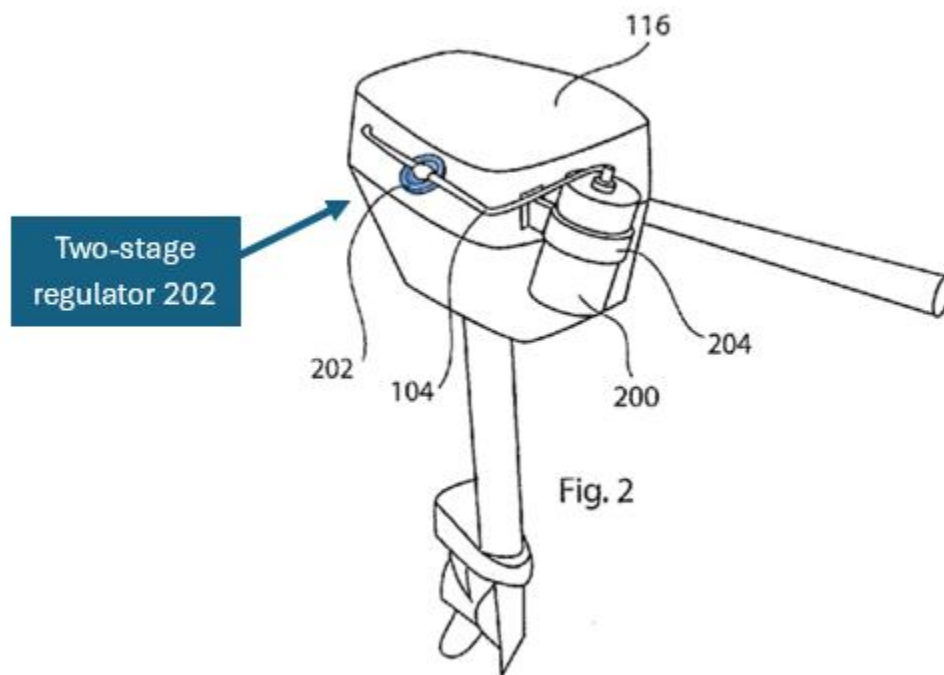
112. Parlatore discloses regulating the reduced pressure gaseous fuel (i.e., LPG that has exited the primary regulator) in the second stage down to a desired pressure in the second stage (i.e., through the secondary regulator) for delivery through the gaseous fuel line (e.g., hose 112) to operate the 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], Fig. 1, 3.

2. Claim 2

113. Claim 2 depends from claim 1, 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.”

114. Parlatores 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, Fig. 2. In this way, the primary regulator and secondary regulator are integral components of a dual stage pressure regulator. *Id.*

115. The combined, two-stage regulator 202 is shown in Figure 2:



Id., Fig. 2 (annotated).

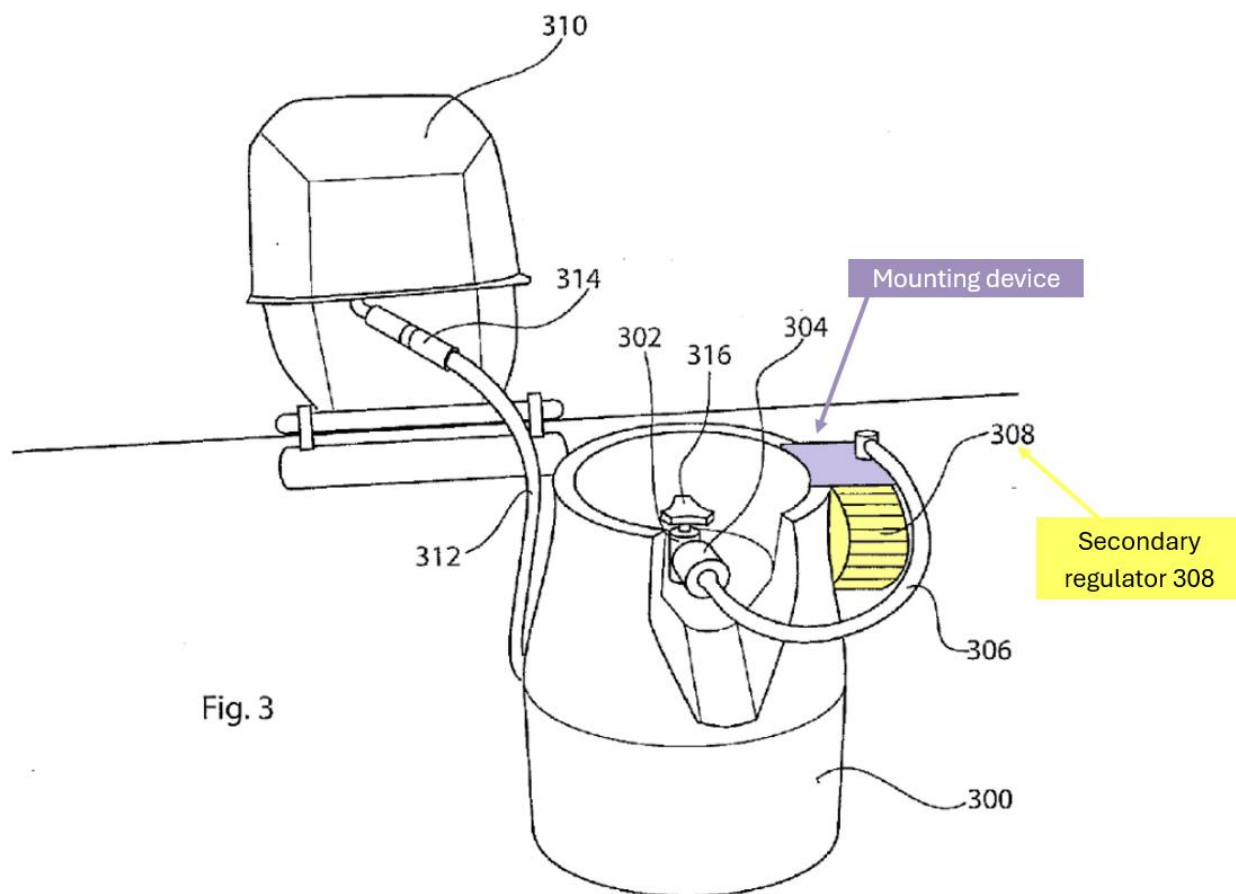
116. Parlatore discloses the combined, two-stage regulator 202 may be used “[i]n further exemplary embodiments,” such that Parlatore also teaches the use of a combined, two-stage regulator with the off-board embodiment shown in Figure 3. *Id.*, ¶[0018].

117. The primary regulator within the combined regulator 202 regulates the gaseous fuel supplied from the pressurized fuel source to a reduced stage. *Id.*, ¶¶[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.*

3. Claim 3

118. Claim 3 depends from claim 2, and further recites “wherein the dual stage regulator is mounted directly onto the pressurized fuel source, off-board from the generator.”

119. Parlatore discloses the secondary pressure regulator can be mounted directly onto the propane tank, off-board the engine:



EX1010, Fig. 3 (annotated).

120. Parlature also discloses the primary and secondary regulators can be combined as a single, two-stage regulator 202. *Id.*, ¶[0018]. Parlature discloses the combined, two-stage regulator 202 may be used “[i]n further exemplary embodiments,” such that Parlature also teaches the use of combined, two-stage regulator with the off-board embodiment shown in Figure 3. *Id.*, ¶[0018]. Using the same mounting arrangement from Figure 3 with the combined regulator 202, the combined, two-stage regulator 202 would be mounted onto the tank, off-board the generator. *Id.*, ¶[0018], Fig. 3.

121. Alternatively, it would have been obvious to a POSA to mount a dual-stage regulator directly to the tank, off-board the generator given Parlatore teaches (1) a dual stage regulator (combined regulator 202) for use with a generator in one embodiment (Figure 2); and (2) mounting the secondary regulator 308 to the tank, off-board an engine, in another embodiment (Figure 3). EX1010, ¶¶[0018]-[0021], Figures 2-3.

a. Motivation/Expectation of Success

122. 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 practical, lighter, and less expensive to use a single component (a dual-stage regulator) rather than two components (separate primary and secondary regulators) to achieve the same purpose. A POSA would have been motivated to mount the dual-stage regulator to the tank (in the same way shown in Figure 3) to avoid straining the connections between the dual-stage regulator and the tank from the weight of the dual-stage regulator.

123. Mounting the dual-stage regulator directly to the tank also 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 and premature

failure. Attaching the regulator to the stationary tank protects it from these vibrations, improving safety and durability.

124. Additionally, mounting the dual-stage 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.

125. Parlature 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, Fig. 3.

4. Claim 11

a. Element [11.0]

126. Element [11.0] recites “a generator and fuel delivery system.”

127. As discussed, Parlature discloses this element. *See above* §§XII.A.1.a, XII.A.1.c.

b. Element [11.1]

128. Element [11.1] recites “a generator comprising an engine configured to operate on a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line.”

129. Parlature discloses this element, including utilizing its fuel delivery system with a variety of engines, including those within a generator. *See above* §XII.A.1.b; EX1010, ¶[0019].

c. Element [11.2]

130. Element [11.2] recites “a fuel regulator system located off-board the generator and comprising a first stage and a second stage.”

131. As discussed, Parlatores discloses this element. *See above* §XII.A.1.c.

d. Element [11.3]

132. Element [11.3] recites that the fuel regulator system be configured to “regulate the gaseous fuel supplied from the pressurized fuel source in the first stage, the gaseous fuel regulated down to a first reduced pressure in the first stage.”

133. As discussed, Parlatores discloses this element. *See above* §XII.A.1.d.

e. Element [11.4]

134. Element [11.4] recites that the fuel regulator system be configured to “regulate the gaseous fuel output from the first stage in the second stage, the first reduced pressure gaseous fuel from the first stage being regulated down to a second reduced pressure in the second stage for delivery through the gaseous fuel line to operate the generator.”

135. As discussed, Parlatores discloses this element. *See above* §XII.A.1.e.

f. Element [11.5]

136. Element [11.5] recites “wherein the fuel regulator system outputs gaseous fuel to the generator for operation of the engine at the second reduced pressure.”

137. Parlature discloses the LPG regulated down to the second stage by the fuel regulator system is used to operate the generator at the second reduced pressure because the LPG flows from the secondary regulator to the carburetor through a hose (such as hose 112). *Id.*, ¶¶[0017]-[0018], Fig. 1.

5. Claim 12

138. Claim 12 depends from claim 11 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.”

139. As discussed, Parlature discloses the elements of this claim. *See above* §XII.A.2.

6. Claim 13

140. Claim 13 depends from claim 12 and further recites “wherein the dual stage regulator is mounted directly onto the pressurized fuel source, off-board from the generator.”

141. As discussed, Parlature discloses the elements of this claim, and additionally, this configuration was obvious. *See above* §XII.A.3.

B. Ground 2: Claims 7-10 are obvious over Parlature in view of LP-Gas Handbook

142. Claims 7-10 of the '985 Patent are obvious for at least the reasons described below.

1. Claim 7

143. Claim 7 depends from claim 1.

a. Element [7.1]

144. Element [7.1] recites “the first stage comprises a primary pressure regulator and the second stage comprises a secondary pressure regulator.”

145. Parlatores disclose a primary regulator 106 for the first stage and a secondary regulator 110 for the second stage (labeled as 304 and 308 in Figure 3). EX1010, ¶¶[0016]-[0021], Figures 1 & 3.

b. Element [7.2]

146. Element [7.2] recites “wherein the generator and fuel delivery system further comprises a quick-connect hose coupling including: a first end coupled to an outlet of the secondary pressure regulator; and a second end coupled to an inlet of the gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line.”

147. Parlatores do not explicitly disclose a which type of coupling it uses. However, LP-Gas Handbook discloses the use of quick-connect couplings in LP-gas systems. EX1017, 40 (commentary on §3.3.62: “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.”).

148. 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.

i. Motivation/Expectation of Success

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

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

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

153. 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 one. A POSA would have been further motivated to provide an 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.

154. 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.

155. Quick connectors also allow users to connect and disconnect the hose with less effort, 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.

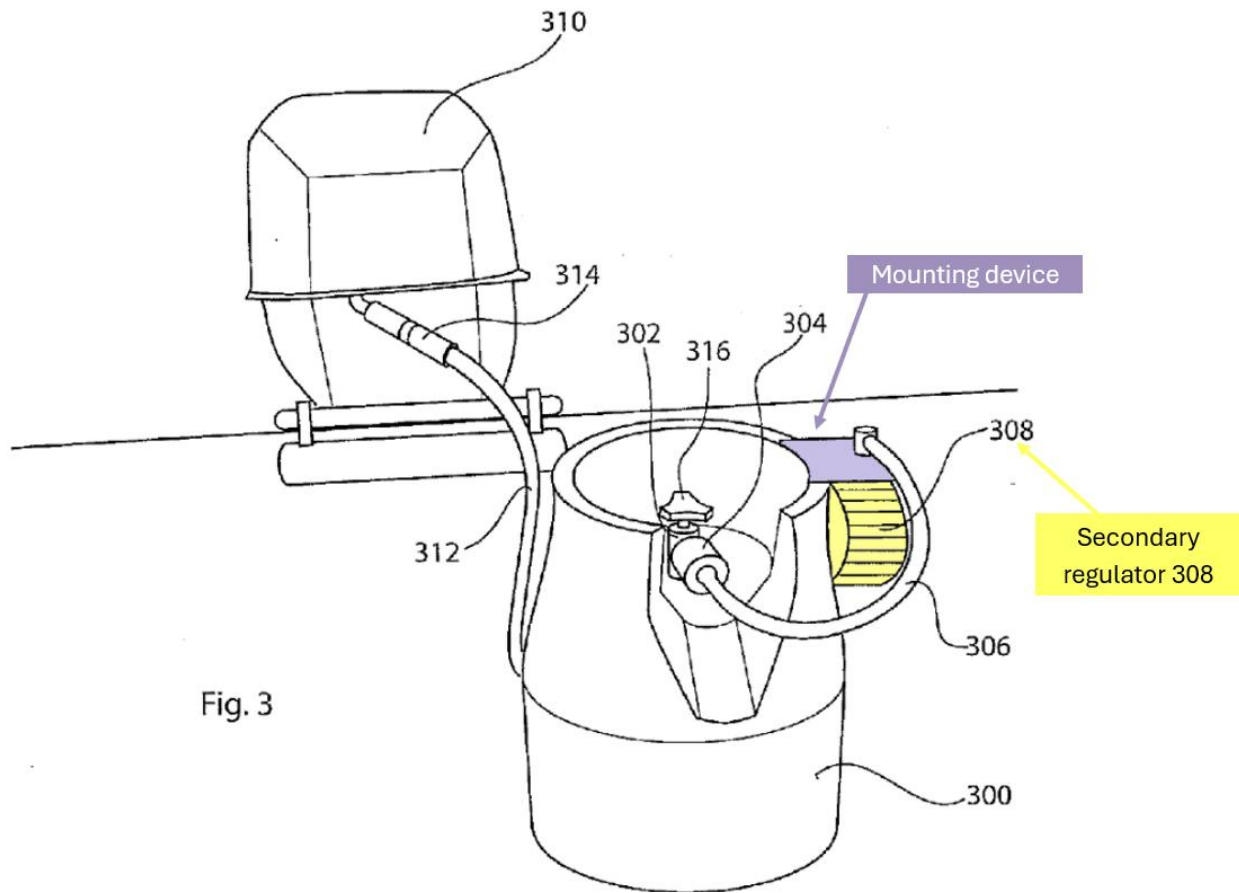
156. A POSA would have had a reasonable expectation of success because quick connectors were commonly used in propane and fuel systems, including portable setups like those described in Parlatore. EX1017, 40 (§3.3.62). The benefits

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 system is. *See* EX1010, Fig. 3.

2. Claim 8

157. Claim 8 depends from claim 7 and further recites “a regulator mounting device secured to the pressurized fuel source with at least the secondary pressure regulator mounted on the regulator mounting device.”

158. Parlatore discloses the secondary pressure regulator 308 is mounted on a mounting device secured to the tank:



Id., Fig. 3 (annotated). It would have been obvious to mount at least the secondary regulator to the tank for the same reasons discussed. *See above* §XII.A.3.

3. Claim 9

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

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

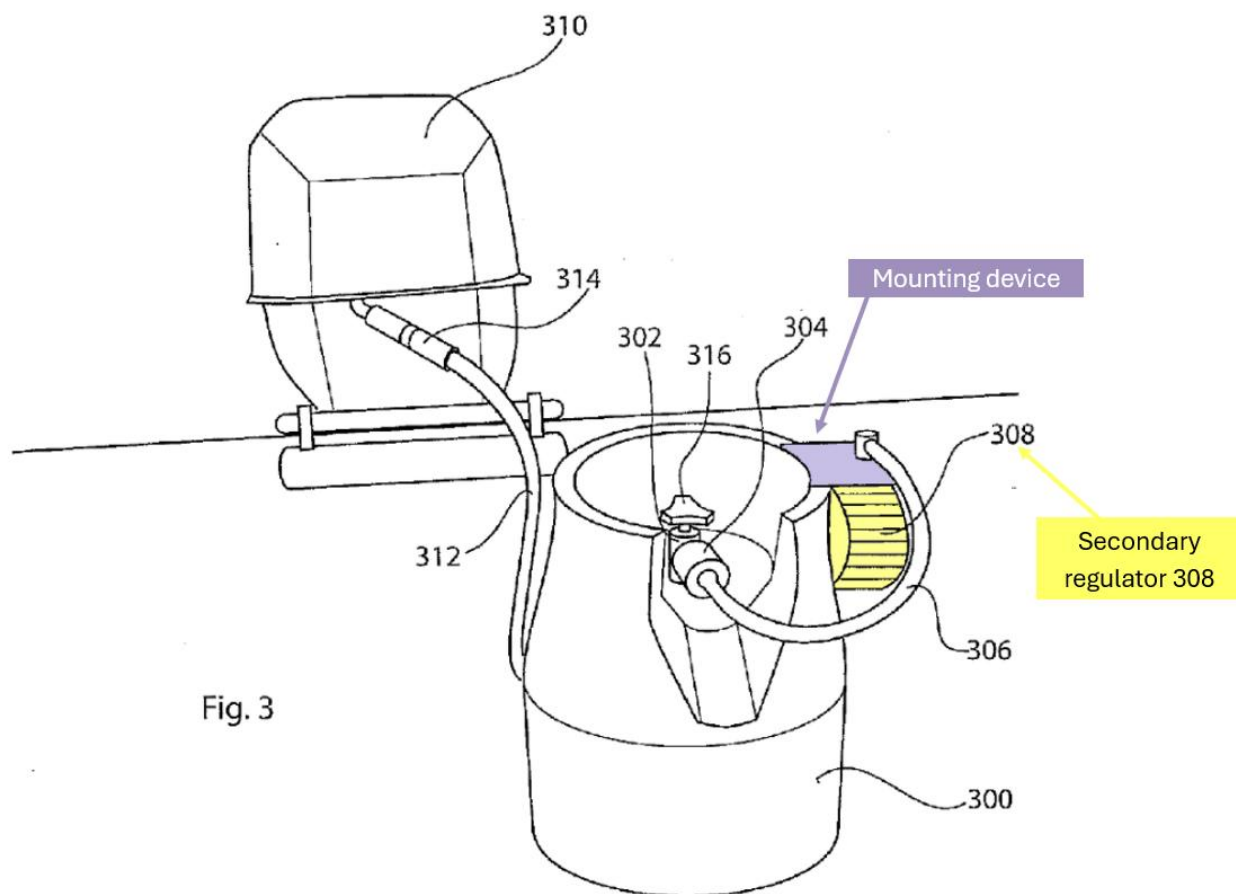


Fig. 3

Id., Fig. 3 (annotated).

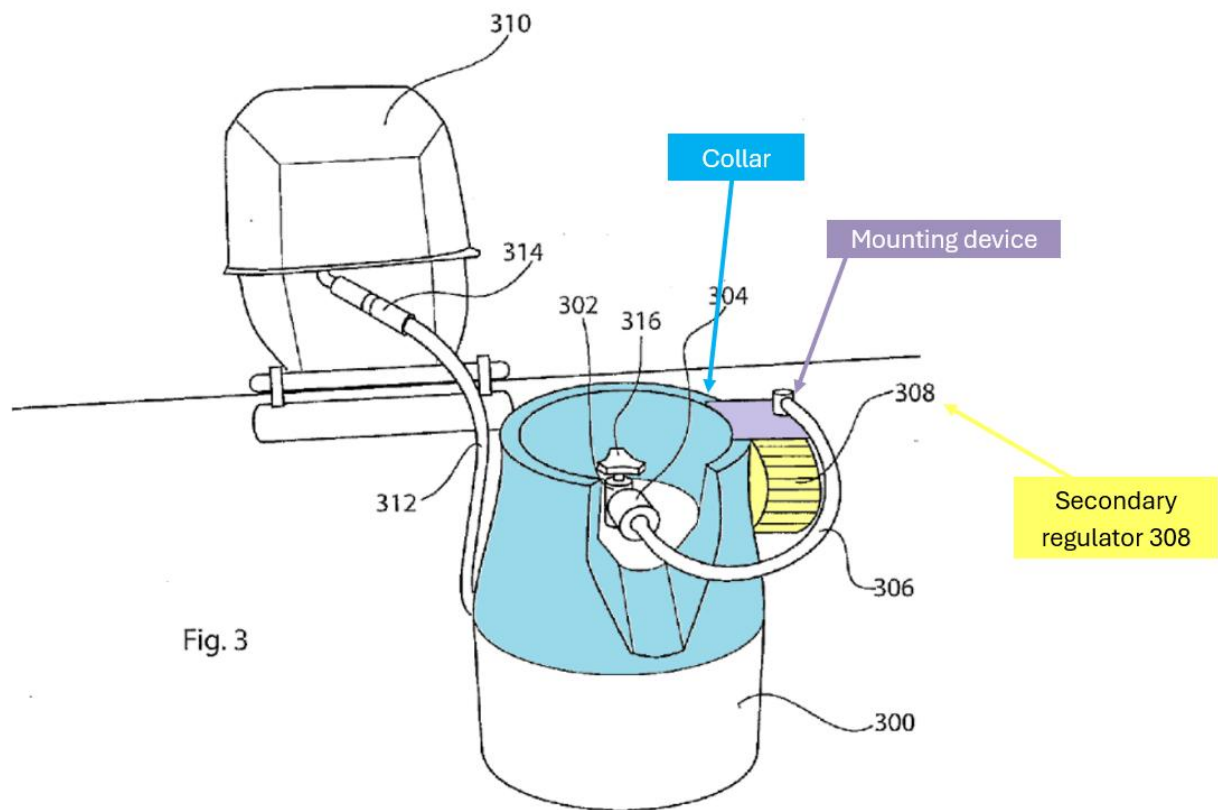
161. Parlature also discloses the primary and secondary regulators can be combined as a single, two-stage regulator. *Id.*, ¶[0018]. Parlature discloses the combined, two-stage regulator 202 may be used “[i]n further exemplary embodiments,” such that Parlature also teaches the use of combined, two-stage regulator with the off-board embodiment shown in Figure 3. *Id.*, ¶[0018]. Using the same mounting arrangement from Figure 3 with the combined regulator 202, the primary pressure regulator would also be mounted on the mounting device. *Id.*, Fig. 3.

162. Alternatively, as discussed, this configuration would have been obvious. §XII.A.3.

4. Claim 10

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

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



Id., Fig. 3 (annotated).

165. 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, both the primary and secondary pressure regulators would also be mounted on the mounting device.

166. Alternatively, as discussed, this configuration would have been obvious. §XII.A.3.

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

C. Ground 3: Claims 1, 4, 7, 11, 14, 16, and 18 are anticipated by the Tri-Fuel Video

168. Claims 1, 4, 7, 11, 14, 16, and 18 of the '985 Patent are anticipated for at least the reasons described below.

1. Claim 1

a. Element [1.0]

169. The Tri-Fuel Video discloses a Honda EU 2000i generator.



EX1007, 0:14.

170. The Tri-Fuel Video also discloses a fuel delivery system. The Tri-Fuel Video explains that the Honda EU 2000i generator shown has been modified to alternatively run on gaseous fuel. Specifically, the Tri-Fuel Video shows that a

propane tank supplies gaseous fuel to the Honda EU 2000i generator via a hose and releasable quick-connection. *Id.*, 1:26-1:58. The fuel from the propane tank is depressurized through a series of two regulators. *Id.*, 2:00-3:23.



Id., 1:58 (annotated).



Id., 3:40 (annotated).



Id., 3:52 (annotated).

b. Element [1.1]

171. The Tri-Fuel Video explains that the Honda EU 2000i generator was modified to run on a separate gaseous fuel source, such as propane, rather than on gasoline only. *Id.*, 0:35-1:05 (explaining that the original carburetor was modified by drilling a hole to “allow the propane or natural gas [to] get inside the carburetor if you want to use them instead of the gasoline”). The video shows that two regulators are attached to a separate propane tank for running the generator on propane. *Id.*, 1:57-2:15 (explaining that you “need two regulators”).



Id., 1:58 (annotated).

172. There is no indication the Honda EU 2000i had a regulator on-board the generator. *See generally* EX1007. This is the case because the unmodified generator operated exclusively on gasoline (which does not require a pressure regulator) and was modified to run on propane or natural gas (hence the name of the YouTube video as “Honda Generator Tri-Fuel, EU2000i Triple-Fuel”). *Id.*, 0:35-1:05 (original carburetor was modified to run on gas), 3:55-4:05 (the choke must be used when running on gasoline), 7:35-8:15 (explanation for running the generator on gasoline).

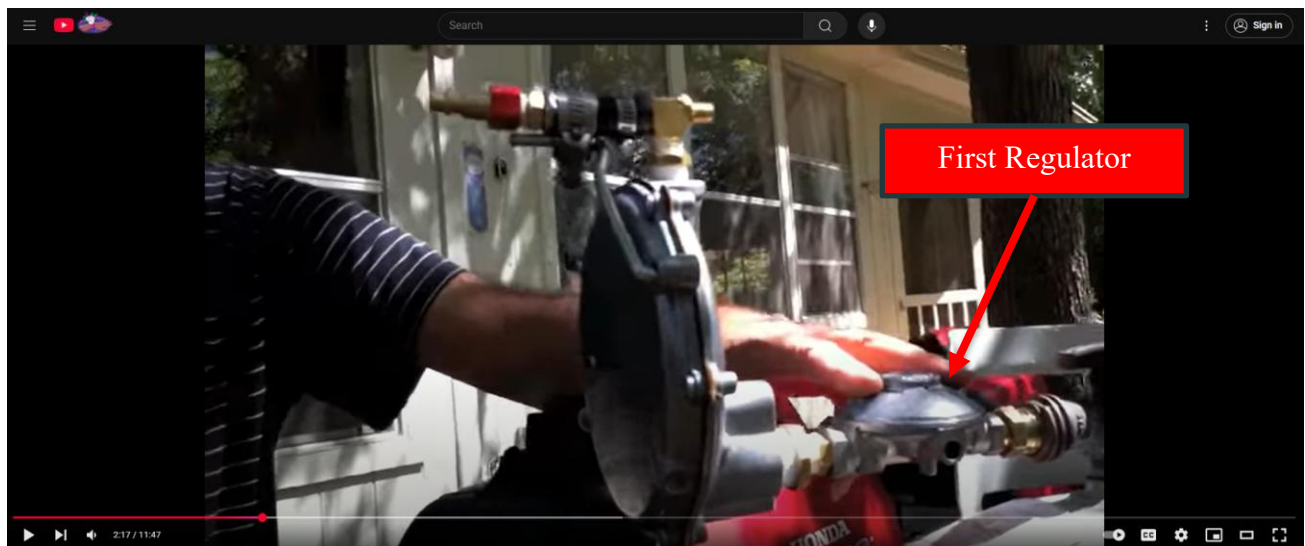
c. Element [1.2]

173. The Tri-Fuel Video explains that you “need two regulators” to adapt the Honda EU 2000i as shown in the video. *Id.*, 1:57-2:15. Specifically, the Tri-Fuel Video explains that the regulators work in stages: a first stage to lower the pressure

of the pressurized gas to 0.5 psi, then a second stage to lower the gas further to around -0.5 water column. *Id.*, 2:13-2:57. The video shows the regulator system is located off-board the generator in that neither regulator is attached to the generator. *Id.*

d. Element [1.3]

174. The Tri-Fuel Video explains that the first regulator in a two-regulator system reduces the pressure of the gas to about 0.5 psi. *Id.*, 2:13-2:24 (“We do need two regulators. One is a small one that is changing the high pressure of the gas to the about ½ a psi out of the first regulator.”).



Id., 2:17 (annotated).

e. Element [1.4]

175. The Tri-Fuel Video discloses a second regulator, as shown.



Id., 2:17 (annotated).

176. The Tri-Fuel video explains that the second regulator further reduces the gaseous fuel that is output from the first regulator. *See id.*, 2:24-3:23. (“The second regulator that is gonna be this one. The maximum input pressure that it can have is something around 11 water column that is gonna be every 27.5 water column is about 1 psi, so it’s approximately $\frac{1}{2}$ psi. The output of the second regulator has a pressure of the -0.5 water column, so it’s all the time is in a vacuum or suction mode. If the vacuum or suction is not exist these regulator automatically shut the gas off so that no gas is going through. So the way that it is right now it has some sort of safety built into it in case the engine or generator goes off or something happens to the hose or disconnected, the suction goes away, and this regulator shutting off the gas flow.”).

177. The Tri-Fuel Video shows that the generator is connected to the output of the second regulator. *Id.*, 3:36-3:53.



Id., 3:40 (annotated).



Id., 3:52 (annotated).

2. Claim 4

178. The Tri-Fuel Video discloses that the Honda EU 2000i is configured to operate on a liquid fuel (gasoline) and was modified to run on a gaseous fuel (either

propane or natural gas). *Id.*, 0:35-1:05 (original carburetor was modified to run on gas), 3:55-4:05 (the choke must be used when running on gasoline), 7:35-8:15 (explanation for running the generator on gasoline). The Tri-Fuel Video discloses a liquid fuel line supplying gasoline to the carburetor:



Id., 8:30-8:40. It is inherent that gasoline is supplied from a liquid fuel source (a tank within the generator body) through this liquid fuel line. The cap for the gasoline tank can be seen in the video:



EX1007, 0:14 (annotated).

3. Claim 7

a. Element [7.1]

179. As discussed, the Tri-Fuel Video discloses this element. *See above* §§XII.C.1.c-XII.C.1.e.

180. As shown below, the Tri-Fuel Video shows a primary pressure regulator and a secondary pressure regulator.



Id., 2:17 (annotated).

181. The Tri-Fuel Video explains that you “need two regulators” to adapt the Honda EU 2000i as shown in the video. *Id.*, 1:57-2:13. Specifically, the Tri-Fuel Video explains that the regulators work in stages: a first stage to lower the pressure of the pressurized gas to 0.5 psi, then a second stage to lower the gas further to around -0.5 water column. *Id.*, 2:13-2:57.

b. Element [7.2]

182. The Tri-Fuel Video discloses a quick-connect hose coupling, as shown below:



Id., 1:43 (annotated).

183. The commentary confirms that the coupling shown above is a “quick connect” coupling. *See id.*, 1:40-1:46 (referring to the component shown above as a “quick-connect”).

184. The Tri-Fuel Video explains that the secondary pressure regulator is connected to the quick-connect coupling using a 25-foot hose. *Id.*, 3:25-3:55.



Id., 3:43 (annotated).



Id., 3:38 (annotated).



Id., 3:51 (annotated). As such, a first end is connected to the outlet of the secondary pressure regulator. *Id.*

185. The Tri-Fuel Video explains that the “new carburetor” is connected to a “hose” that goes to the “gas valve,” and then down to the “quick-connect.” *Id.*, 1:25-1:46.



Id., 1:25 (annotated). As such, the second end is connected to the inlet of the gaseous fuel line to couple the secondary regulator to the gaseous fuel line. *Id.*

4. Claim 11

a. Element [11.0]

186. As discussed, the Tri-Fuel Video discloses this element. *See above* §XII.C.1.a.

b. Element [11.1]

187. The Tri-Fuel Video discloses this element, including a generator comprising an engine. *See above* §XII.C.1.b.; EX1007, 9:40-10:10 (turning engine off).

c. Element [11.2]

188. As discussed, the Tri-Fuel Video discloses this element. *See above* §XII.C.1.c.

d. Element [11.3]

189. As discussed, the Tri-Fuel Video discloses this element. *See above* §XII.C.1.d.

e. Element [11.4]

190. As discussed, the Tri-Fuel Video discloses this element. *See above* §XII.C.1.e.

f. Element [11.5]

191. The Tri-Fuel Video shows and explains that the secondary pressure regulator is connected to the Honda EU 2000i generator through a hose, thereby

outputting the gaseous LPG to the generator for operation of the engine at the second reduced pressure. *Id.*, 3:25-3:55.



Id., 3:43 (annotated).



Id., 3:38 (annotated).



Id., 3:51 (annotated).

5. Claim 14

192. Claim 14 depends from claim 11 and further recites “wherein the generator comprises a dual fuel generator configured to operate on the gaseous fuel and on a liquid fuel, the liquid fuel supplied from a liquid fuel source through a liquid fuel line.”

193. As discussed, the Tri-Fuel Video discloses this element. *See above* §XII.C.2.

6. Claim 16

a. Element [16.0]

194. Element [16.0] recites “a dual fuel generator and fuel delivery system.”

195. The Tri-Fuel Video discloses this element, including a dual fuel generator. *See above* §XII.C.1.a.

b. Element [16.1]

196. Element [16.1] 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.”

197. The Tri-Fuel Video discloses a dual fuel generator configured to operate on a liquid fuel (gasoline) supplied from a liquid fuel source through a liquid fuel line (*see above* §XII.C.2) and a gaseous fuel supplied from a pressurized fuel source (LPG tank) through a gaseous fuel line (*see above* §XII.C.1.b).

c. Element [16.2]

198. Element [16.2] recites “a fuel regulator system located off board the dual fuel generator.”

199. As discussed, the Tri-Fuel Video discloses this element. *See above* §XII.C.1.c.

d. Element [16.3]

200. Element [16.3] recites that the fuel regulator system comprise “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 first reduced pressure.”

201. The Tri-Fuel Video discloses this element, including coupling the primary pressure regulator to a service valve of the LPG tank. *See above* §XII.C.1.d. The coupling of the primary pressure regulator to a service valve of the tank is shown

below:



EX1007, 1:55-2:05.

e. Element [16.4]

202. Element [16.4] recites that the fuel regulator system comprise “a secondary pressure regulator coupled to the primary pressure regulator and configured to regulate the gaseous fuel supplied from the primary pressure regulator down from the first reduced pressure to a second reduced pressure for delivery through the gaseous fuel line to operate the dual fuel generator.”

203. As discussed, the Tri-Fuel Video discloses this element. *See above* §XII.C.1.e.

f. Element [16.5]

204. Element [16.5] recites “wherein the fuel regulator system outputs gaseous fuel to the dual fuel generator for operation thereof at the second reduced pressure.”

205. As discussed, the Tri-Fuel Video discloses this element. *See above* §XII.C.4.f

7. Claim 18

206. Claim 18 depends from claim 16 and further recites “a quick-connect hose coupling including: a first end coupled to an outlet of the secondary pressure regulator; and a second end coupled to an inlet of the gaseous fuel line to couple the secondary pressure regulator to the gaseous fuel line.”

207. As discussed, the Tri-Fuel Video discloses these elements. *See above* §§XII.C.3.a-XII.C.3.b.

D. Ground 4: Claims 2-3, 8-10, 12-13, 17, and 19 are obvious over the Tri-Fuel Video in view of Parlatores and LP-Gas Handbook

208. Claims 2-3, 8-10, 12-13, 17, and 19 of the '985 Patent are obvious for at least the reasons described below.

1. Claim 2

209. As discussed, the Tri-Fuel Video discloses the elements of claim 1. *See above* §XII.C.1.

210. It would have been obvious to a POSA to use a combined, two-stage regulator with a dual-fuel generator system disclosed in the Tri-Fuel Video, as opposed to using the two, separate regulators shown in the video.

211. As discussed, Parlatores discloses a two-stage pressure regulator having the elements of this claim in that the primary and secondary regulators are combined as integral components of a dual stage pressure regulator. EX1010, ¶[0018], Fig. 2; *see above* §XII.A.2.

212. LP-Gas Handbook also discloses integral two-stage regulators:

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.



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

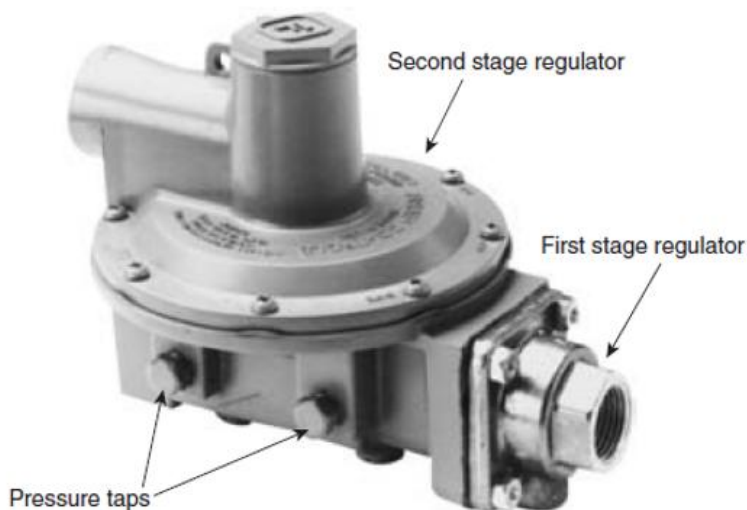


EXHIBIT 5.47 *Integral Two-Stage Regulator. (Courtesy of Fisher Controls Intl, LLC)*

EX1017, 40-41 (§3.3.64) (annotated), 41 (Ex. 3.12), 120 (Ex. 5.47).

a. Motivation/Expectation of Success

213. A POSA would have been motivated to use a combined, dual stage regulator, such as Parlatore's combined regulator 202, rather than the two, separate regulators, as shown in the Tri-Fuel Video. A POSA would have been motivated to use a combined, dual stage regulator because it was (and is) readily available, less expensive, more compact, and easier to replace than two, separate regulators. They are particularly advantageous in portable generator applications, where minimizing the physical footprint simplifies design and installation.

214. 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.

215. A POSA would have had a reasonable expectation of success replacing the two, separate regulators of the Tri-Fuel Video with a combined, dual stage regulator (such as Parlature's combined regulator 202 or the two-stage regulators disclosed in the LP-Gas Handbook) 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.

2. Claim 3

216. As discussed, Parlature discloses a mounting device for the secondary regulator secured to the collar of the LPG tank. *See above* §XII.B.4. Parlature also discloses the primary and secondary regulators can be combined as a single, two-stage regulator 202. *Id.* As discussed, using the same mounting arrangement from

Figure 3 with Parlature's combined regulator 202, the dual stage regulator would be mounted directly onto the LPG tank, which would be off-board the generator. *Id.*

217. Alternatively, as discussed, mounting a dual stage regulator directly to the tank, off-board the generator, would have been obvious. *See above* §XII.A.3.

3. Claim 8

218. As discussed, Parlature discloses the secondary pressure regulator 308 is mounted on a mounting device secured to the tank. *See above* §XII.B.2. It would have been obvious to mount the Tri-Fuel Video's secondary pressure regulator in the same way for the reasons discussed above. *See above* §XII.A.3.

4. Claim 9

219. As discussed, Parlature discloses a mounting device for the secondary regulator secured to the LPG tank. *See above* §XII.B.2. Parlature also discloses the primary and secondary regulators can be combined as a single, two-stage regulator 202 and it would have been obvious to use a single, two-stage regulator with the generator of the Tri-Fuel Video (*see above* §§XII.B.3, XII.D.1). As discussed, using the same mounting arrangement from Figure 3 with Parlature's combined regulator 202, the primary pressure regulator would also be mounted via the mounting device. *Id.*

220. Alternatively, as discussed, this configuration would have been obvious. §XII.A.3.

5. Claim 10

221. As discussed, Parlatore discloses a mounting device for the secondary regulator secured to the collar of the LPG tank. *See above* §XII.B.4. Parlatore also discloses the primary and secondary regulators can be combined as a single, two-stage regulator 202 and it would have been obvious to use a single, two-stage regulator with the generator of the Tri-Fuel Video. *See above* §§XII.B.4, XII.D.1. As discussed, using the same mounting arrangement from Figure 3 with Parlatore's combined regulator 202, the primary and secondary pressure regulators would also be mounted via the mounting device. *See above* §§XII.B.4.

222. Alternatively, as discussed, this configuration would have been obvious. §XII.A.3.

223. In this configuration, the primary and secondary pressure regulators would be positioned adjacent each other along an outer periphery of the collar. *See above* §XII.B.4.

6. Claim 12

224. As discussed, it would have been obvious to a POSA to use a dual fuel regulator (such as Parlatore's combined regulator 202 or the integral two-stage regulators disclosed by the LP-Gas Handbook) with the dual-fuel generator disclosed in the Tri-Fuel Video, as opposed to using the two, separate regulators shown in the video. *See above* §XII.D.1.

225. As discussed, Parlature discloses a two-stage pressure regulator having the elements of this claim in that the primary and secondary regulators are combined as integral components of a dual stage pressure regulator. EX1010, ¶[0018], Fig. 2; *see above* §XII.A.2.

7. Claim 13

226. As discussed, it would have been obvious to mount the dual stage regulator directly to the tank, which is off-board the generator. §§XII.A.3, XII.D.2.

8. Claim 17

227. Claim 17 depends from claim 16 and further recites “wherein the primary and secondary pressure regulators are integral components of a dual stage pressure regulator.”

228. As discussed, the Tri-Fuel Video discloses the elements of claim 16. *See above* §XII.C.6.

229. As discussed, it would have been obvious to a POSA to use a dual fuel regulator (such as Parlature’s combined regulator 202 or the integral two-stage regulators disclosed by the LP-Gas Handbook) with the dual-fuel generator disclosed in the Tri-Fuel Video, as opposed to using the two, separate regulators shown in the video. *See above* §XII.D.1.

230. As discussed, Parlature discloses a two-stage pressure regulator having the elements of this claim in that the primary and secondary regulators are combined

as integral components of a dual stage pressure regulator. EX1010, ¶[0018], Fig. 2; *see above* §XII.A.2.

9. Claim 19

231. Claim 19 depends from claim 16 and further recites “the pressurized fuel source comprises a pressurized fuel container having a collar; and wherein a regulator mounting device secures to the collar so that the primary and secondary pressure regulators are positioned adjacent each other along an outer periphery of the collar.”

232. As discussed, Parlatores discloses a mounting device for the secondary regulator secured to the collar of the LPG tank. *See above* §XII.B.4. Parlatores also discloses the primary and secondary regulators can be combined as a single, two-stage regulator 202 and it would have been obvious to use a single, two-stage regulator with the generator of the Tri-Fuel Video. *See above* §§XII.B.4, XII.D.1. As discussed, using the same mounting arrangement from Figure 3 with the combined regulator 202, the primary and secondary pressure regulators would also be mounted via the mounting device. *See above* §§XII.B.4.

233. Alternatively, as discussed, this configuration would have been obvious. §XII.A.3.

234. In this configuration, the primary and secondary pressure regulators would be positioned adjacent each other along an outer periphery of the collar. *See above* §XII.B.4.

E. Ground 5: Claims 1, 4, 11, 14, and 16 are anticipated by Chaudhari

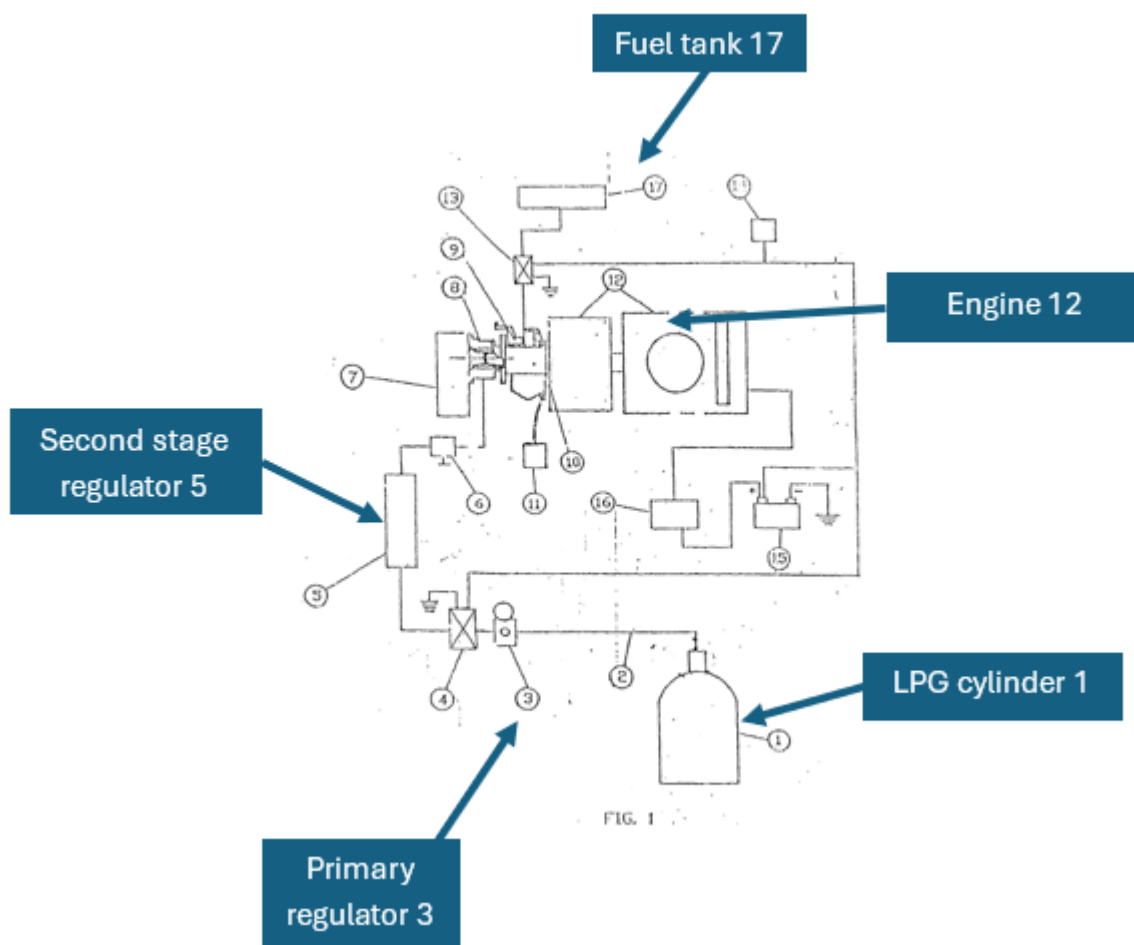
235. Claims 1, 4, 11, 14, and 16 of the '985 Patent are anticipated for at least the reasons described below.

1. Claim 1

a. Element [1.0]

236. 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.

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

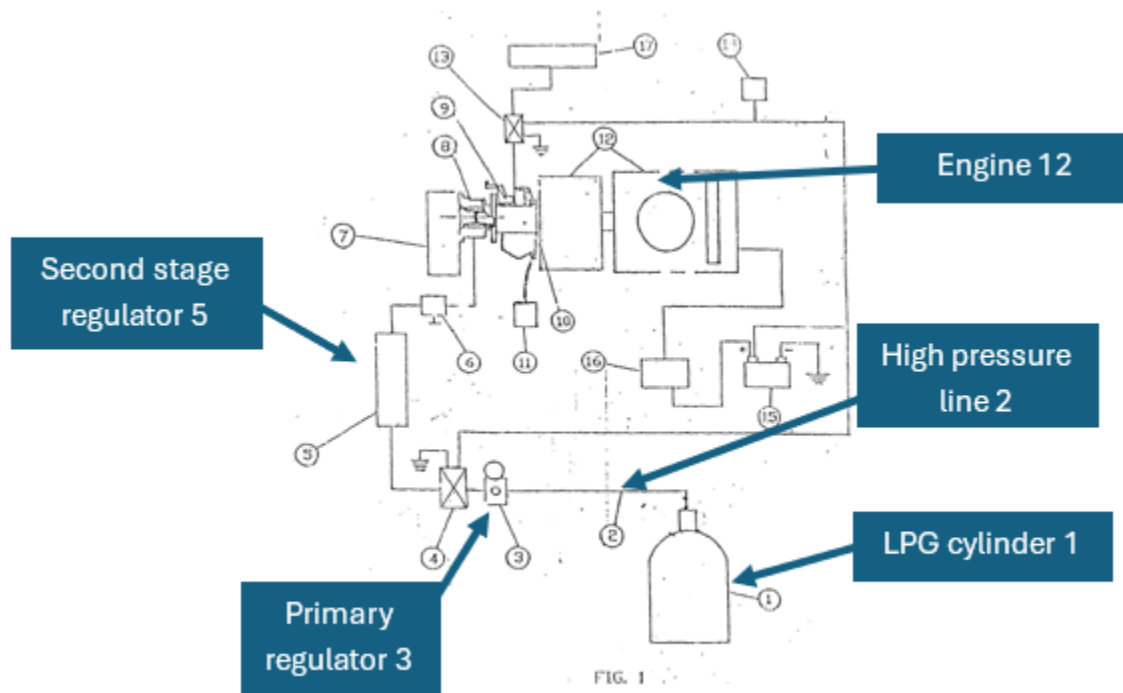


Id. Fig. 1 (annotated).

b. Element [1.1]

238. Chaudhari discloses an improved “Add-On” fuel supply system for use with an existing generator. *Id.*, 4-5. Chaudhari does not disclose a regulator on-board the generator, which is logical because the generator (without the add-on) operates on kerosene or gasoline, which do not require pressure regulation. *Id.*, 7-9. The only regulators disclosed in Chaudhari are part of the “Add-On” fuel supply system, which is separate from the generator. *Id.*, 7, Fig. 1.

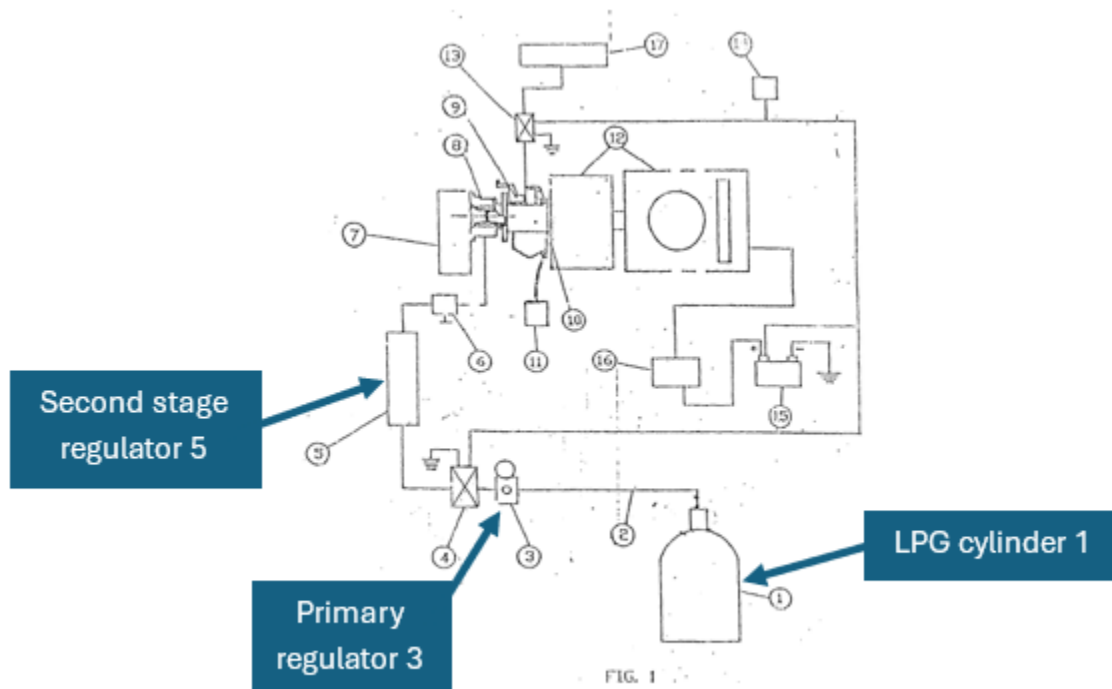
239. Chaudhari discloses the engine 12 of the generator is configured to operate on a gaseous fuel (LPG) supplied from a pressurized fuel source (LPG cylinder) when connected to the fuel supply system. *Id.* The LPG is supplied through a gaseous fuel line, including high pressure line 2. *Id.* It is inherent that the LPG source is pressurized because: (1) LPG cylinders are pressurized, as acknowledged in claim 1 requiring “a fuel cylinder for storing a predetermined quantity of Liquefied Petroleum Gas under pressure,” and (2) Chaudhari discloses the use of pressure regulators and a high-pressure line to reduce the pressure of LPG from the cylinder. *Id.*



Id., Fig. 1 (annotated).

c. Element [1.2]

240. Chaudhari discloses a fuel regulator system located off-board the generator. *Id.*, 4-5 (describing the fuel delivery system as an improved “Add-On” system), Fig. 1. Chaudhari discloses a first stage regulator 3 and second stage regulator 5. *Id.*, 7-8, Fig. 1.



Id., Fig. 1 (annotated).

d. Element [1.3]

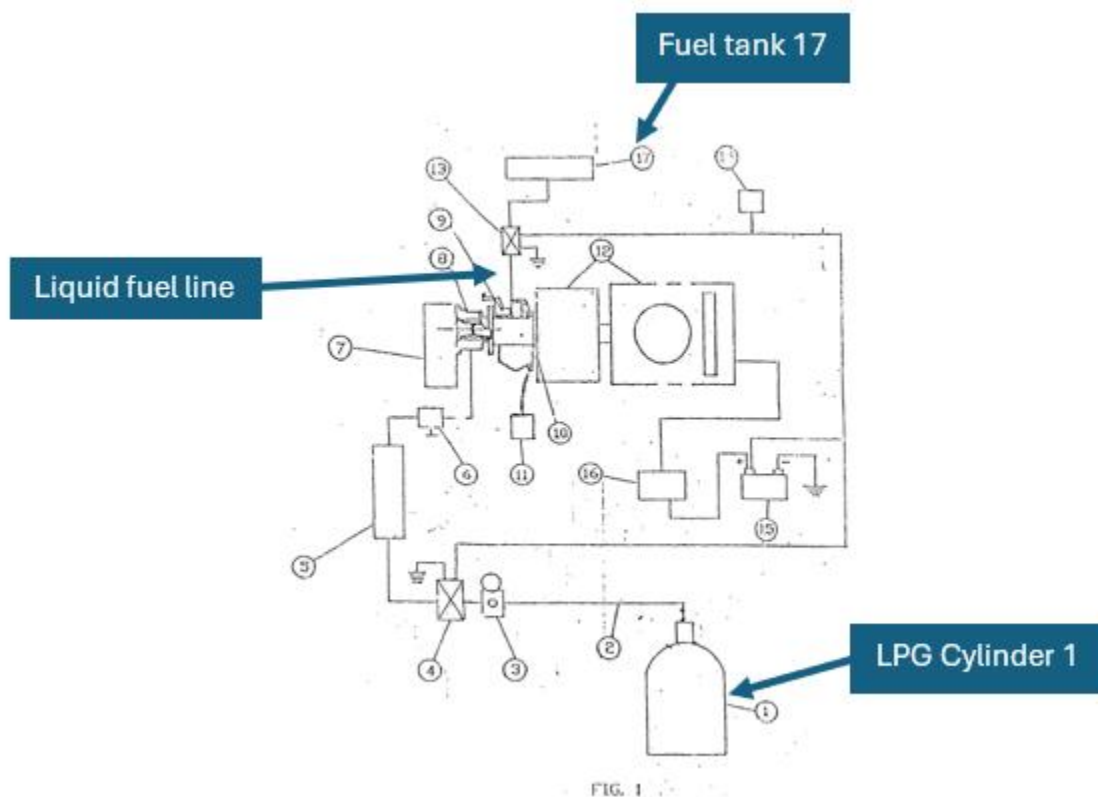
241. Chaudhari discloses the first stage regulator 3 regulates LPG supplied from the LPG cylinder to a reduced pressure. *Id.*, 7, Fig. 1.

e. Element [1.4]

242. Chaudhari discloses the second stage regulator 5 regulates LPG from the first stage regulator 3 down to a desired pressure for supply through the gaseous fuel line (the line connecting the second stage regulator to the engine) to operate the generator. *Id.*, 7, Fig. 1.

2. Claim 4

243. Chaudhari discloses a generator that operates on liquid fuel (kerosene or gasoline) that is configured to also operate on gaseous fuel (LPG). *Id.*, 7-8. The liquid fuel is supplied from a tank 17 through a liquid fuel line. *Id.*, 7, Fig. 1.



Id., Fig. 1 (annotated).

3. Claim 11

a. Element [11.0]

244. As discussed, Chaudhari discloses this element. *See above* §XII.E.1.a.

b. Element [11.1]

245. Chaudhari discloses this element, including a generator comprising an engine. *See above* §§XII.E.1.b; EX1008, 7-8, Fig. 1.

c. Element [11.2]

246. As discussed, Chaudhari discloses this element. *See above* §XII.E.1.c.

d. Element [11.3]

247. As discussed, Chaudhari discloses this element. *See above* §XII.E.1.d.

e. Element [11.4]

248. As discussed, Chaudhari discloses this element. *See above* §XII.E.1.e.

f. Element [11.5]

249. Chaudhari discloses the fuel regulator system outputs the gaseous LPG to the generator for operation of the engine at the second reduced pressure. EX1008, 6-7. Chaudhari discloses the second stage regulator (5) is

connected to the inlet of a power screw (6). The outlet of the power screw (6) is connected to the inlet of a gas-air mixer (8). The gas-air mixer (8) supplies air-fuel mixture through a carburetor (9) to an engine (12) coupled to a generator.

Id., 7; *see also id.*, Fig. 1.

4. Claim 14

250. As discussed, Chaudhari discloses the elements of this claim. *See above* §XII.E.2.

5. Claim 16

a. Element [16.0]

251. As discussed, Chaudhari discloses this element, including a dual fuel generator. *See above* §XII.E.1.a.

b. Element [16.1]

252. As discussed, Chaudhari discloses a dual fuel generator configured to operate on gaseous fuel (LPG) supplied from a pressurized fuel source (LPG cylinder) through a gaseous fuel line and on a liquid fuel (gasoline or kerosene) supplied from a liquid fuel source (tank 17) through a liquid fuel line. *See above* §§XII.E.1.b, XII.E.2.

c. Element [16.2]

253. As discussed, Chaudhari discloses this element. *See above* §XII.E.1.c.

d. Element [16.3]

254. Chaudhari discloses this element, including coupling the primary pressure regulator to regulate a service valve of the LPG tank. *See above* §XII.E.1.d.; EX1008, 7. Chaudhari discloses the primary regulator is coupled to a service valve, which is a needle valve mounted on the LPG cylinder 1. EX1008, 7.

e. Element [16.4]

255. As discussed, Chaudhari discloses this element. *See above* §XII.E.1.e.

f. Element [16.5]

256. As discussed, Chaudhari discloses this element. *See above* §XII.E.3.f.

F. Ground 6: Claims 4, 14, and 16-19 are obvious over Parlature in view of Chaudhari and/or LP-Gas Handbook

257. Claims 4, 14, and 16-19 of the '985 Patent are obvious for at least the reasons described below.

1. Claim 4

258. As discussed, Parlature discloses the elements of claim 1. *See above* §XII.A.1.

259. It would have been obvious to a POSA to use Parlature's fuel delivery system with a dual fuel generator, as suggested by Chaudhari. *See above* §§XII.E.1.a-XII.E.1.b. As discussed, Chaudhari discloses a dual fuel engine coupled to a generator and configured to operate on gaseous fuel and liquid fuel. *See above* §XII.E.2. Chaudhari's liquid fuel is supplied from a tank 17 through a liquid fuel line. *Id.*, 7, Fig. 1.

a. Motivation/Expectation of Success

261. Given the benefits of alternative fuels, such as lower emissions (e.g., it was and is well known that propane burns much cleaner, producing less emissions, than gasoline), a POSA would have been motivated to use a dual fuel generator (as

opposed to single fuel generator), to provide the user with the option of alternatively using gasoline or LPG to generate electricity.

262. Multi-fuel generators, such as Chaudhari's, were recognized as especially useful because, for example, in certain power outages (such as major storms), the user may not have access to gasoline if the gasoline stations are out of service. Alternatively, the user may not have LPG on hand, but may have gasoline on hand for other uses, making it a readily available fuel source. Enabling the option of using gasoline or LPG makes the generator more versatile.

263. A POSA would have had a reasonable expectation of success in using Parlatore's fuel regulator system with the dual fuel engine in Chaudhari because using the fuel regulator system to deliver gaseous LPG to the LPG line of a dual fuel engine would be no different than delivering gaseous LPG to the LPG line of a single fuel engine, as taught by Parlatore. EX1010, ¶¶[0016]-[0021], Figures 1-3. The dual stage regulator, which reduces high-pressure fuel to a usable level in two steps, performs this core function effectively in both single fuel and dual fuel engines.

2. Claim 14

264. As discussed, Chaudhari discloses a dual fuel engine coupled to a generator configured to operate on a gaseous fuel (LPG) and on a liquid fuel (gasoline or kerosene) supplied from a liquid fuel source (tank 17) through a liquid fuel line. *See above* §XII.F.1.

3. Claim 16

a. Element [16.0]

265. As discussed, Chaudhari discloses a dual fuel engine coupled to a generator and fuel delivery system. *See above* §XII.E.1.a.

b. Element [16.1]

266. As discussed, Chaudhari discloses a dual fuel engine coupled to a generator configured to operate on the gaseous fuel (LPG) and on a liquid fuel (gasoline or kerosene) supplied from a liquid fuel source (tank 17) through a liquid fuel line. *See above* §§XII.E.1.b, XII.E.2.

c. Element [16.2]

267. As discussed, Parlature discloses a fuel regulator system located off-board a generator or, alternatively, it would have been obvious to a POSA to use Parlature's off-board configuration with a generator. *See above* §XII.A.1.c. It would have been obvious to a POSA to use Parlature's off-board configuration with a dual fuel generator for the same reasons discussed with respect to a single fuel generator. *Id.*

d. Element [16.3]

268. As discussed, Parlature discloses a primary pressure regulator configured to regulate fuel from a pressurized fuel source (tank) to a first reduced pressure. *See above* §XII.A.1.d. Parlature discloses a connector 302 for coupling the

primary pressure regulator to a service valve (shut off valve 316) of a propane tank. EX1010 ¶[0023], Fig. 3.

e. Element [16.4]

270. As discussed, Parlature discloses a secondary pressure regulator coupled to the primary pressure regulator and configured to regulate the gaseous fuel supplied from the primary pressure regulator down from the first reduced pressure to a second reduced pressure for delivery through the gaseous fuel line to operate an engine, including a generator when combined with Chaudhari (which discloses a dual fuel generator). *See above* §XII.A.1.e.

f. Element [16.5]

271. As discussed, the secondary regulator of Parlature outputs gaseous fuel to a generator for operation at the second reduced pressure. *See above* §XII.A.4.f. Combined with Chaudhari, Parlature would output gaseous fuel to the Chaudhari dual fuel generator for operation at the second reduced pressure.

4. Claim 17

272. As discussed, Parlature discloses its primary and secondary pressure regulators can be combined into a two-stage regulator 202. *See above* §XII.A.2.

5. Claim 18

273. As discussed, it would have been obvious to use a quick connector at the end of the Parlature hose as coupling 314. *See above* §XII.B.1.b.

274. When using a quick connector as the coupling 314 of Parlature, 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 of the engine to couple the secondary pressure regulator to the gaseous fuel line of the appliance (e.g., a dual fuel generator, as suggested by Chaudhari). *Id.*

6. Claim 19

275. As discussed, Parlature discloses a mounting device for the secondary regulator secured to the collar of the LPG tank. *See above* §XII.B.4. Parlature also discloses the primary and secondary regulators can be combined as a single, two-stage regulator 202. *Id.* As discussed, using the same mounting arrangement from Figure 3 with Parlature's combined regulator 202 and tank, the combined regulator would also be mounted on the mounting device. *Id.*

276. Alternatively, as discussed, this configuration would have been obvious. §XII.A.3.

277. In this configuration, the primary and secondary pressure regulators would be positioned adjacent each other along an outer periphery of the collar. *See above* §XII.B.4.

G. Ground 7: Claims 4-6 and 14-15 are obvious over Parlature in view of DuroMax and Elsdon

278. Claims 4-6 and 14-15 of the '985 Patent are obvious for at least the reasons described below.

1. Claim 4

279. As discussed, each and every element of claim 1 is disclosed by Parlature or obvious. *See above* §§XII.A.1.a-XII.A.1.e.

280. As discussed, it would have been obvious to use Parlature's fuel regulator system with a dual fuel generator. *See above* §XII.F.1. For those same reasons, it would have been obvious to use Parlature's fuel regulator system with the DuroMax dual fuel generator.

281. DuroMax discloses a dual fuel generator in which either LPG or gasoline may be selected for operation of the generator. EX1004, 11-12. DuroMax discloses the liquid fuel (gasoline) is supplied from a liquid fuel source (tank) through a liquid fuel line. *Id.*, 9, 20-21; *see also*, 30-31 (parts diagram and parts list depicting liquid fuel line as (Part No. 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.

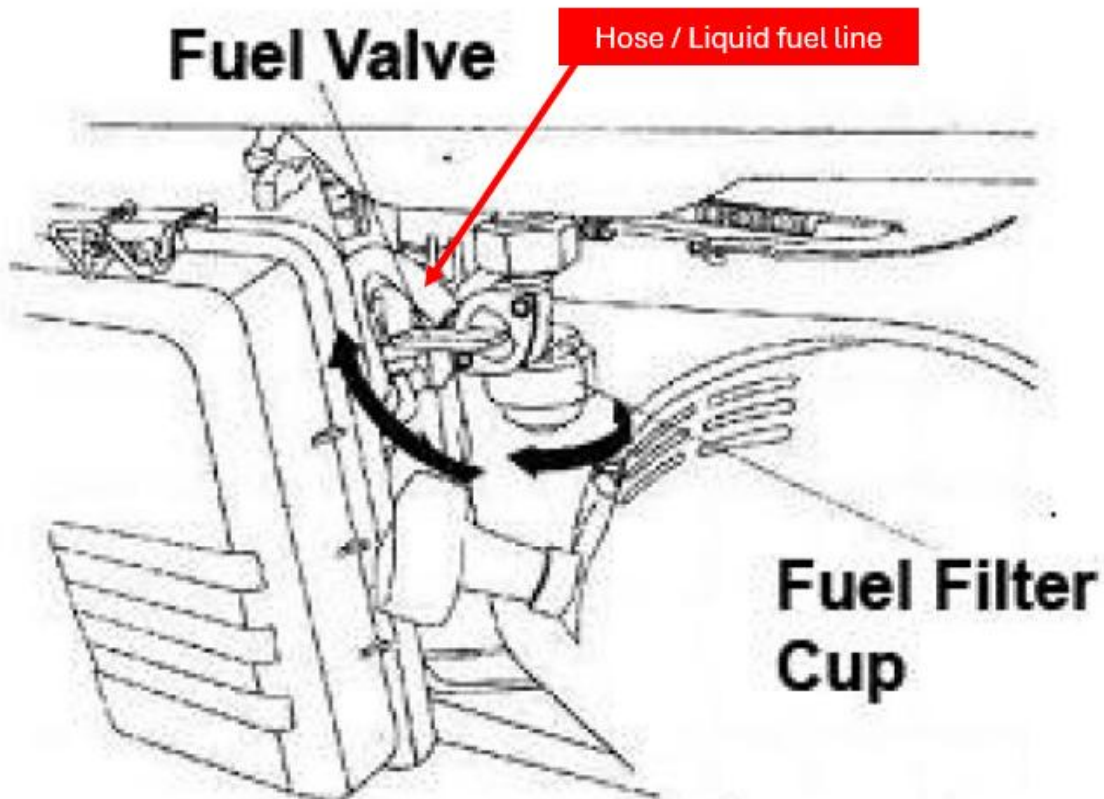


Figure 19 –Removing the Fuel Filter Cup

Id., 20 (annotated).

282. DuroMax's generator had one pressure regulator off-board (attached to the off-board hose, as show 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.

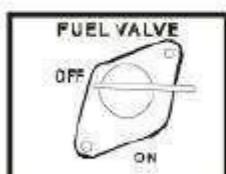


Figure A - Fuel Valve in the "OFF" position



Figure C-Connect Valve

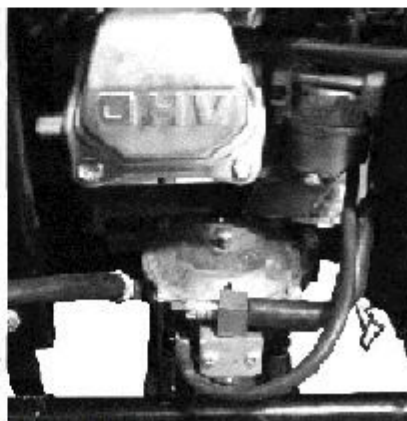


Figure B - Connect the Hose

Id., 12.

283. 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.

a. Motivation/Expectation of Success

284. 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).

285. It would have been obvious to a POSA to use the off-board fuel regulator system disclosed in Parlatore because Parlatore discloses the use of 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”).

286. Parlatore shows that a POSA would have had a reasonable expectation of success using an off-board fuel regulator system. *Id.*, ¶¶[0019]-[0021], [0024]-[0025], Fig. 3.

2. Claim 5

287. Claim 5 depends from claim 4 and further 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.”

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

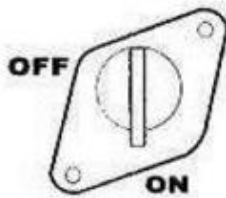


Figure 6 - fuel valve in the "on" position

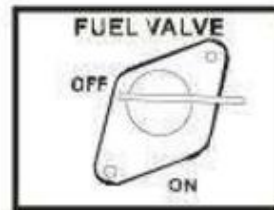
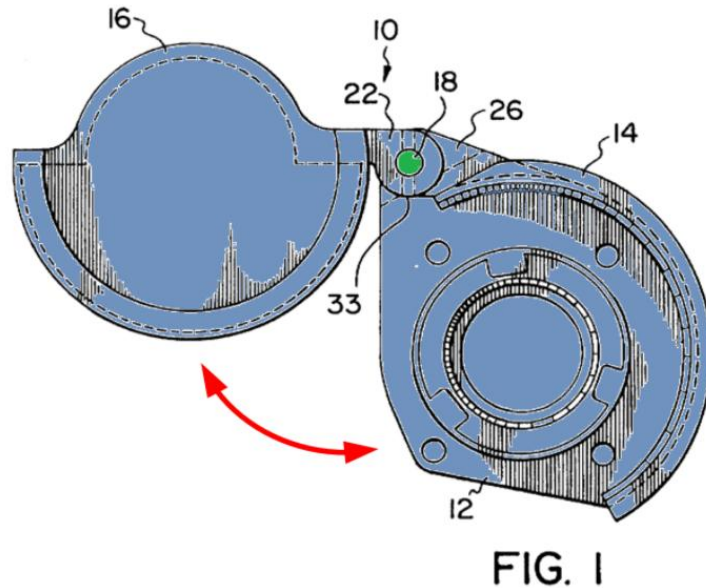


Figure A - Fuel Valve in the "OFF" position

EX1004, 11-12.

289. Elsdon discloses a fuel conduit coupler 12, shield 14, and cap 16 that, when closed, prevent the 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., Fig. 1 (annotated).

290. It would have been obvious to a POSA to combine the Elsdon fuel conduit coupler cap with the gasoline fuel valve of DuroMax 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. *Id.* This combination would appear and function the same way as Figures 2-4B of the '985 Patent.

a. Motivation to Combine

291. 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 running gasoline fuel.

292. 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.

293. A POSA would understand 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.

294. Elsdon explicitly recognizes 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.

295. 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.” *Id.*, 2:7-9.

b. Expectation of Success

296. 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. *Id.*, 2:10-12, 2:27-31, 5:11-14. Elsdon utilizes a simple connection arrangement, in which cap 16 rotates around the axis of the shaft 18.

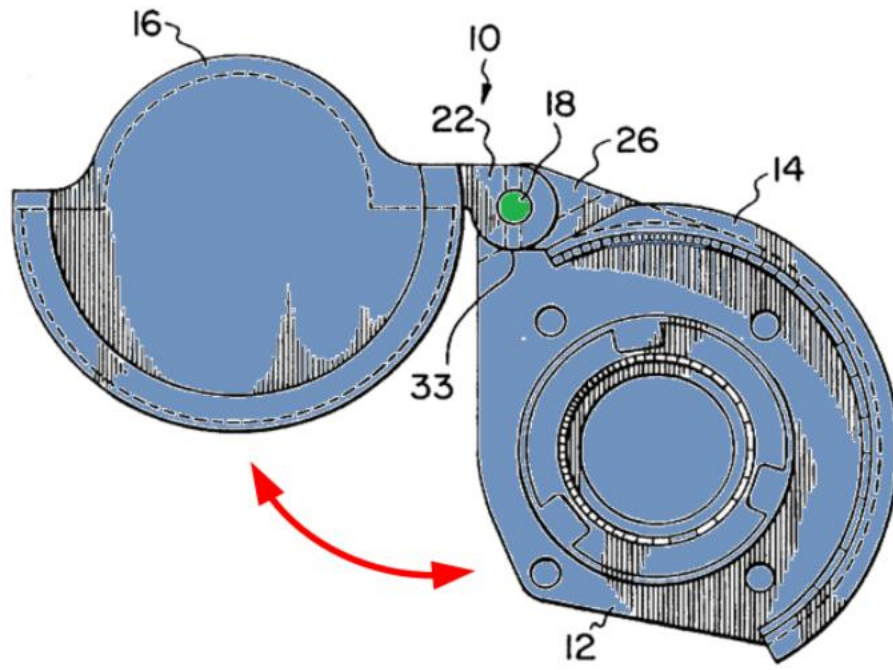


FIG. 1

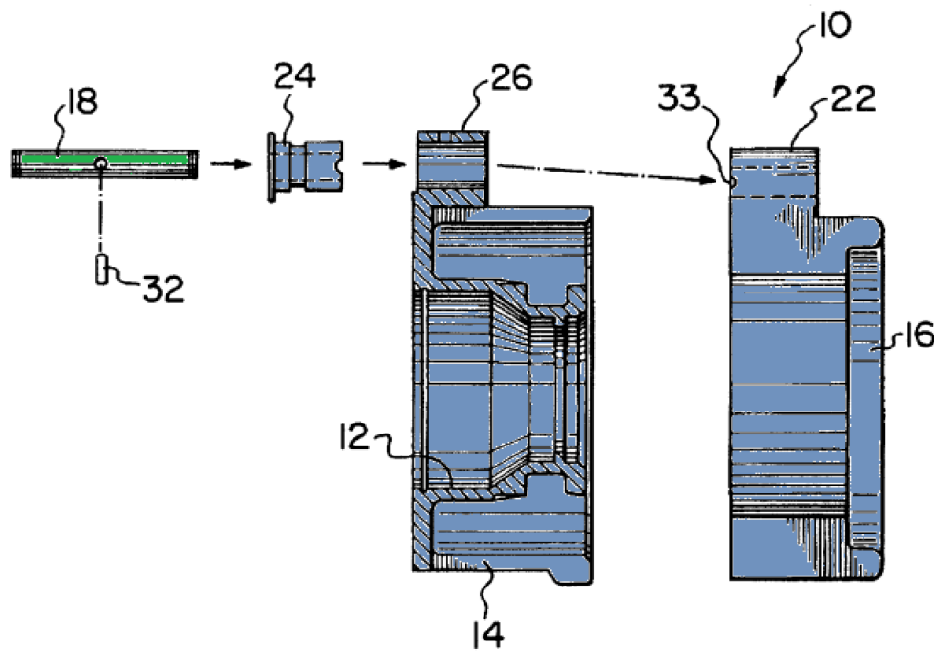


FIG. 3

Id., Figures 1 & 3 (annotated).

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

298. 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.

299. 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.

3. Claim 6

Claim 6 depends from claim 5.

a. Element [6.1]

300. Element [6.1] recites “a fuel lockout apparatus coupled to the mechanical fuel valve.”

301. The term “fuel lockout apparatus” should be construed as a means-plus-function term covering items 58 and 61 in Figures 2, 3, 4A, 4B, as described at EX1001, 5:50-6:10; 6:24-45; 6:56-7:31; 8:1-14; 8:63-9:11, and equivalents thereof. *See above* §V.A.

302. As discussed, 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. *See above* §XII.G.2.

b. Element [6.2]

303. Element [6.2] 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 wherein, when the mechanical fuel valve is in the 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.”

304. 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 above* §XII.G.2. 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 above* §XII.G.2.

4. Claim 14

305. As discussed, Parlatore discloses each and every element of claim 11. *See above* §§XII.A.1.a-XII.A.1.e, XII.A.4.a-XII.A.4.f.

306. As discussed, it would have been obvious to use Parlatore’s fuel regulator system with a dual fuel generator, such as the DuroMax dual fuel generator. *See above* §§XII.D.1, XII.G.1.

307. As discussed, DuroMax discloses a dual fuel generator configured to operate on gaseous fuel (LPG) and liquid fuel (gasoline) and the gasoline is supplied from a liquid fuel source (a tank) through a liquid fuel line. *See above* §XII.G.1.

5. Claim 15

308. As discussed, it would have been obvious to a POSA to combine the Elsdon fuel conduit coupler cap with the gasoline fuel valve of DuroMax 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). *See above* §XII.G.2. By blocking and unblocking the LPG inlet, this combined apparatus would selectively control the flow of LPG through the LPG fuel line. *Id.*

H. Ground 8: Claims 4-6 and 14-15 are obvious over Parlatore in view of Hallberg

309. Claims 4-5 and 14-15 of the '985 Patent are obvious for at least the reasons described below.

310. Under Patent Owner's proposed construction and application of "fuel lockout apparatus," claim 6 of the '985 Patent is also obvious for at least the reasons described below.

1. Claim 4

311. As discussed, Parlatore discloses each and every element of claim 1. *See above* §§XII.A.1.a-XII.A.1.e.

312. Parlature discloses using its fuel delivery system with “any desired form of engine,” including an engine for generators. EX1010, ¶¶[0025], [0019]. As discussed, it would have been obvious to a POSA to use Parlature’s fuel regulator system with a dual-fuel generator. *See above* §XII.F.1. Hallberg discloses an example of a dual fuel engine that could be used as a generator.

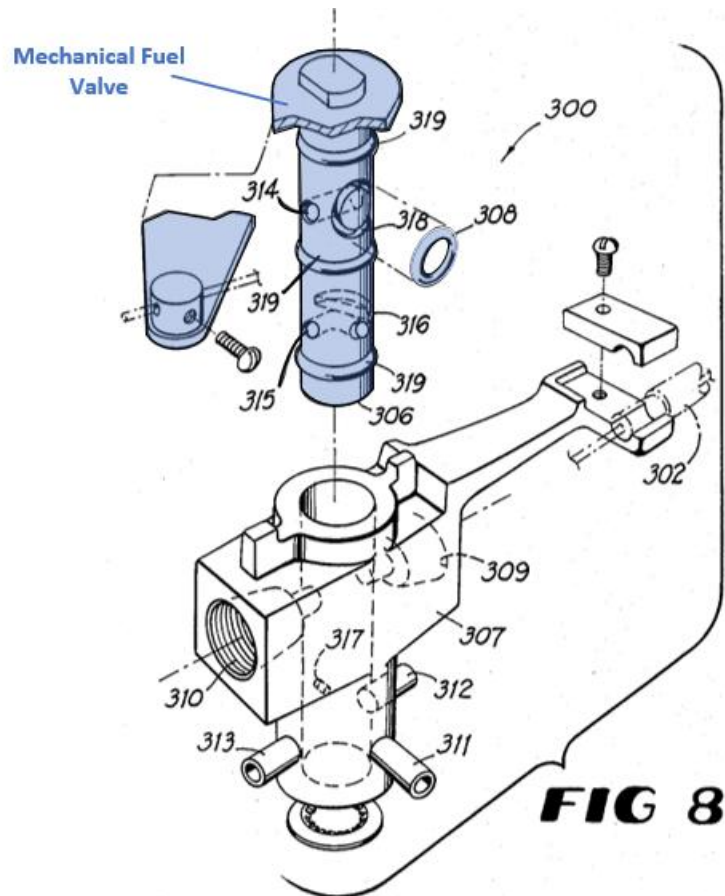
313. The engine of Hallberg is configured to operate on gaseous fuel (propane) and on a liquid fuel (gasoline). EX1006, 7:27-29, Fig. 1. Hallberg discloses that the liquid fuel is supplied from a liquid fuel source through a liquid fuel line. *Id.*, 7:27-44, Fig. 1, claim 17.

314. Hallberg discloses a LPG regulator system but does not indicate whether the regulator system is “off-board.” *See generally id.*, *see also id.*, 6:65-7:8, 8:31-9:61. A POSA would have been motivated to use Parlature’s “off-board” regulator system shown in Figure 3 with a generator having Hallberg’s dual-fuel engine.

315. As discussed, a POSA would have been motivated to use Parlature’s off-board regulator system for use with a generator and would have had a reasonable expectation of success. *See above* §XII.A.1.c. This same reasoning applies to a dual fuel generator, because a POSA would have recognized the user may have only LPG available at any given time, thus the user would want a large, off-board tank to run the generator for a sufficient period of time, such as a long outage due to a storm.

2. Claim 5

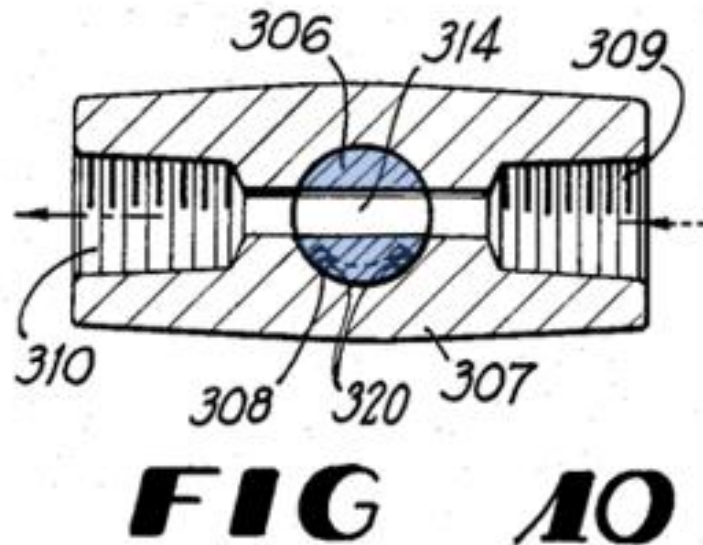
316. Hallberg discloses a mechanical fuel valve as shown in Figure 8 below (“[i]n the figures ... 300 is the fluid dual valve structure.” EX1006, 7:5-7).



Id., Fig. 8 (annotated).

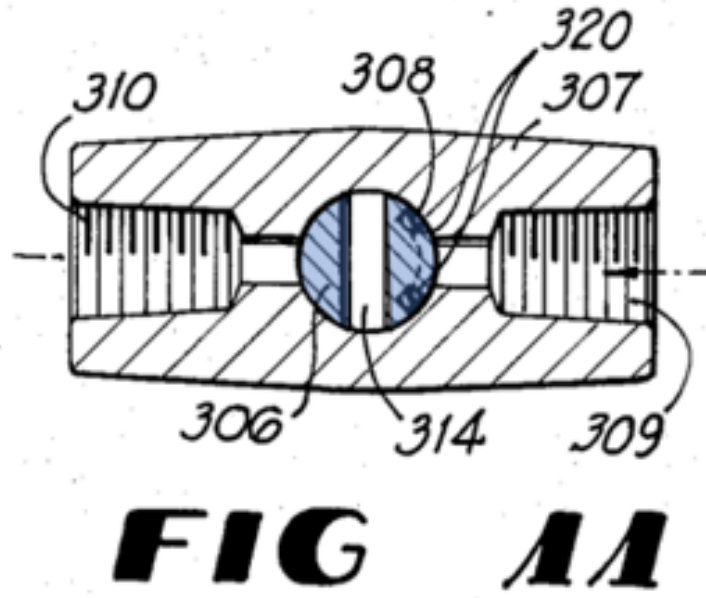
317. Positioning of control 301 in “gasoline” mode acts through control cable 302 to rotate spool 306 within valve body 307 such that gasoline from gasoline supply line 304 is supplied to carburetor 110 and the flow of propane is locked out. *Id.*, 7:27-40. As shown in Figure 10 below, when the mechanical fuel valve is in gasoline mode, liquid inlet opening 309 and liquid outlet opening 310 communicate

through tunnel 314. *Id.*, 7:40-7:43. 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.



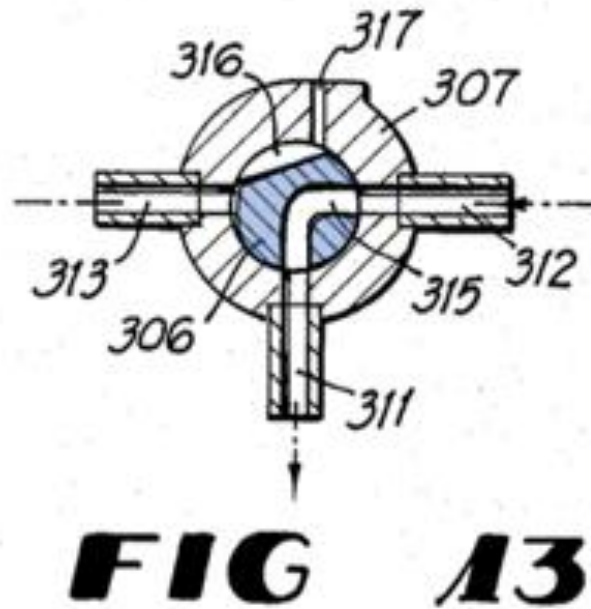
Id., Fig. 10 (annotated).

318. 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. *Id.*, 8:3-7. Forming a seal between the spool 306 and valve body 307 prohibits the flow of gasoline to carburetor 110. *Id.*, 8:7-10.



Id., Fig. 11 (annotated).

319. 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. *Id.*, 8:23-26, Fig. 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, via intake manifold line 112. *Id.*, 8:26-30.



Id., Fig. 13 (annotated).

320. When the engine is started, a vacuum is created in line 30, urging diaphragm 10 upward against liquid inlet lever 8. *Id.*, 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.

321. 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 a first fuel source through a first fuel line and a second fuel source through a second fuel line as recited in claim 5.

322. Combined with Parlature, the mechanical fuel valve 300 of Hallberg would selectively control the flow of fuel to the dual fuel generator (the Parlature generator with the Hallberg dual fuel engine).

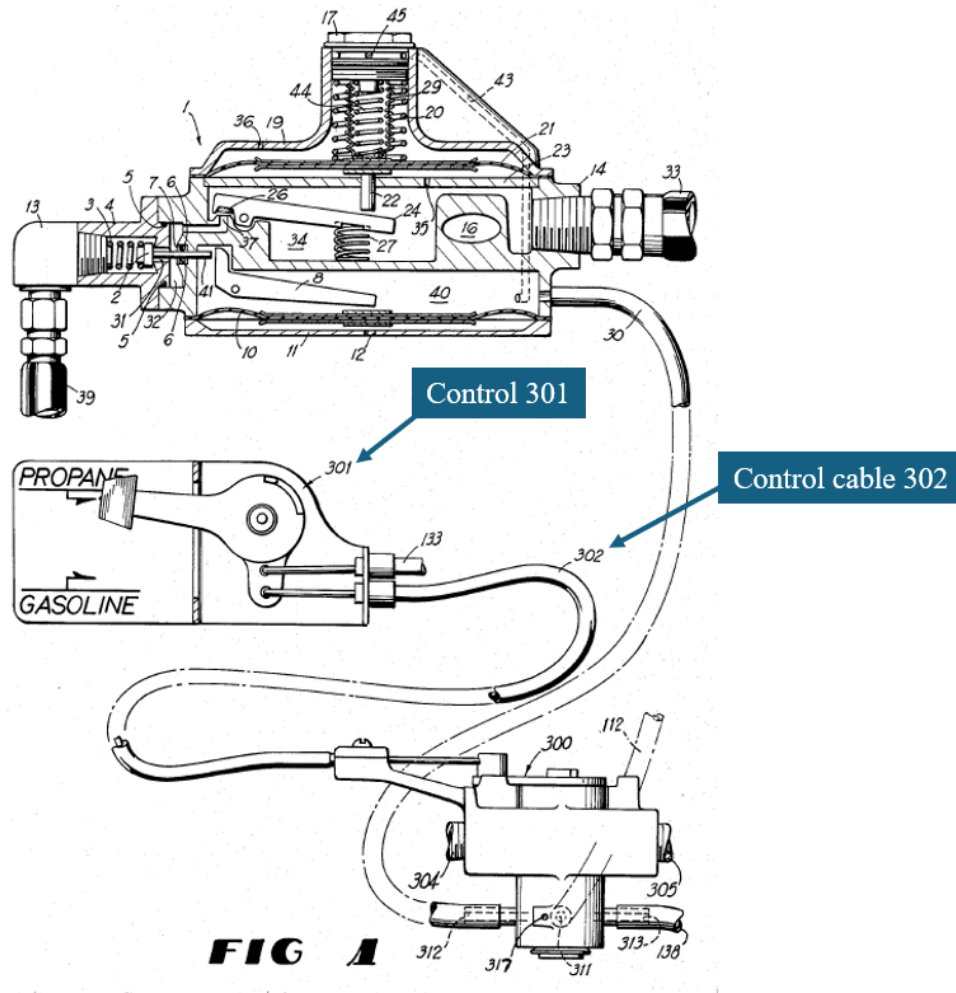
3. Claim 6

323. 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 6 is obvious for at least the reasons described below.

a. Element [6.1]

324. As discussed, Hallberg discloses a mechanical fuel valve. *See above*, §XII.H.2. Hallberg also discloses two structures, each of which teaches a fuel lockout apparatus coupled to the mechanical fuel valve (fluid dual valve structure 300), the fuel lockout apparatus being configured to perform the function described in claim 6 (*see below* §XII.H.3.b).

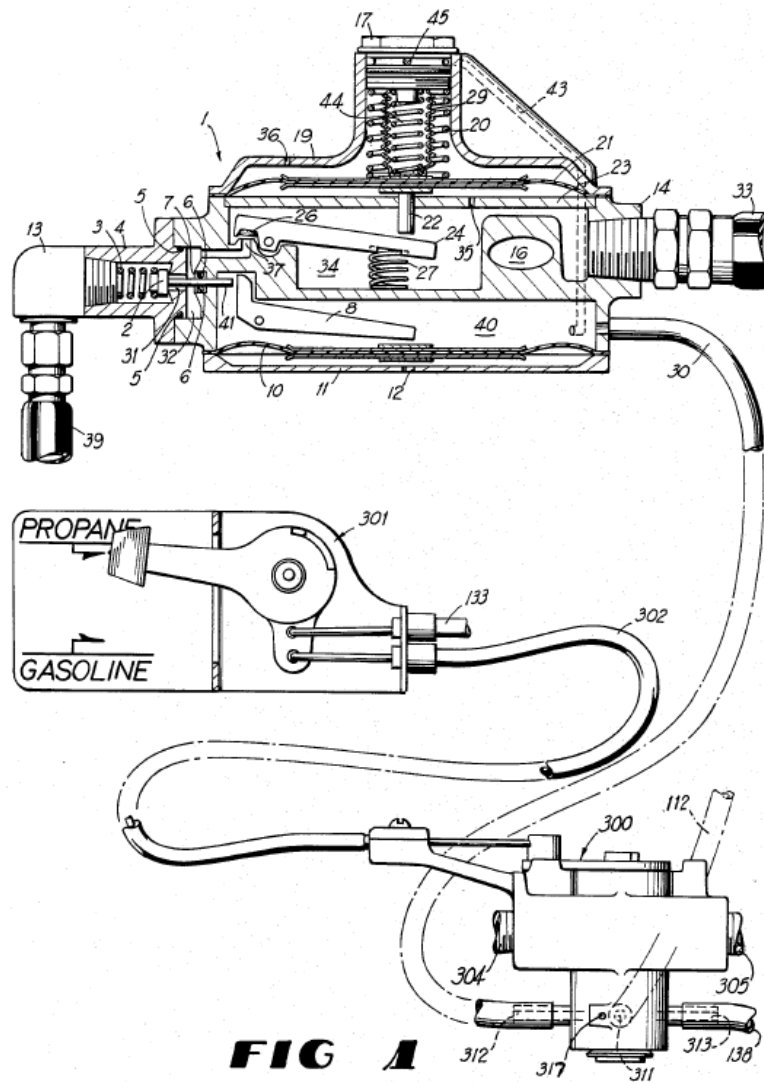
325. First, Hallberg discloses a fuel lockout apparatus comprising control 301 and control cable 302. EX1006, 7:27-44. As shown in Figure 1 (below), the fuel lockout apparatus comprising control 301 and control cable 302 is coupled to fluid dual valve 300. *Id.*, 7: 30-36, 8:3-9. Positioning control 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 above*, §XII.H.2. 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.*



Id., Fig. 1 (annotated).

326. 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. *Id.*, 8:23-40. Upon opening inlet valve 2,

propane flows through the inlet valve orifice 31 into liquified fuel passage 32 and into the mixer 100. *Id.*, 8:40-57.

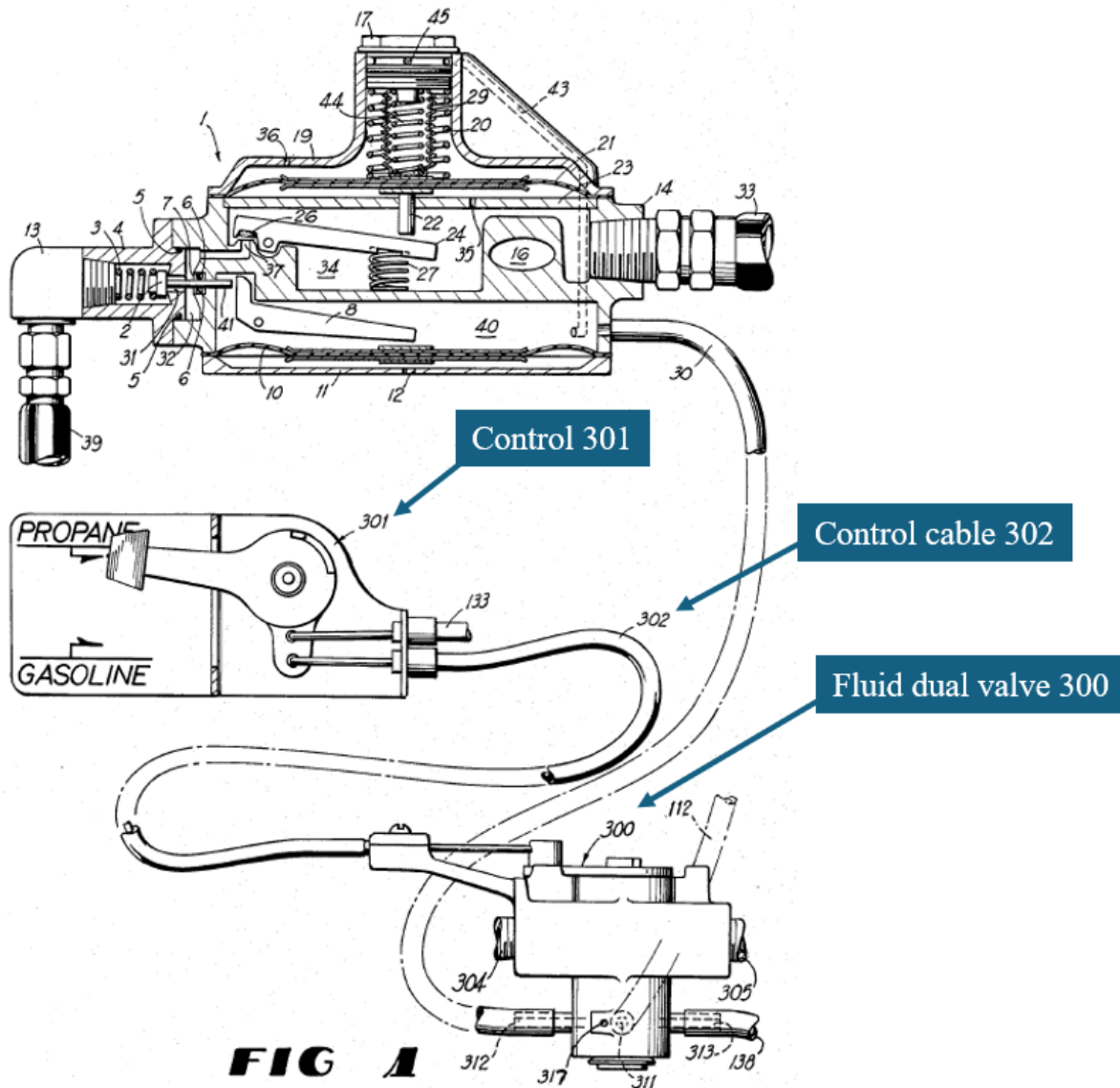


Id., Fig. 1.

327. A POSA would have understood that the components of the fuel lockout apparatus (liquified fuel inlet valve 2, lever 8, a fuel inlet shaft 41, a diaphragm 10, and a chamber 40) can be actuated and/or engaged to allow propane to flow through

propane supply 39 to the internal combustion engine. A POSA would have also 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.

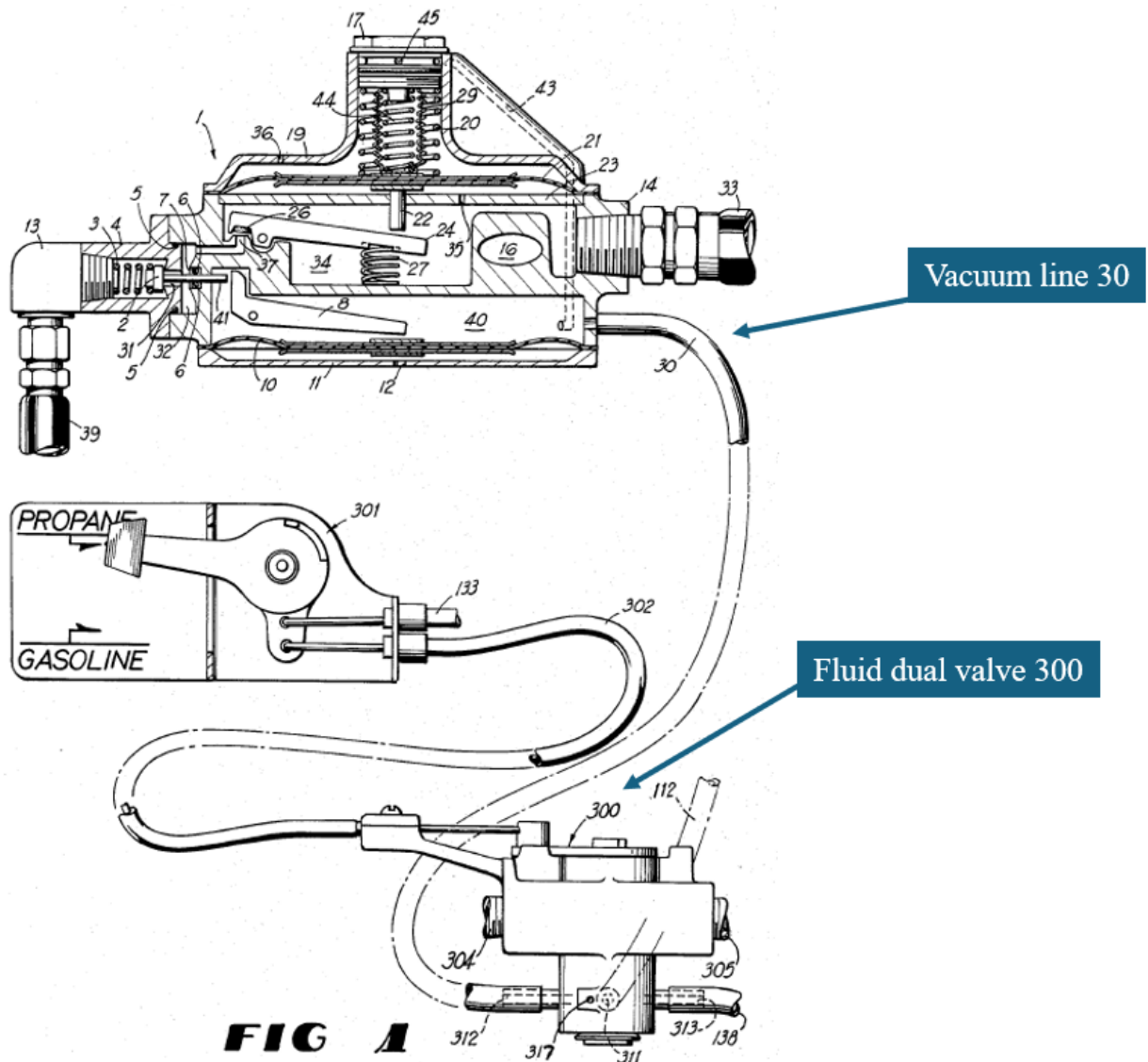
328. Hallberg also discloses that the fuel lockout apparatus is coupled to the mechanical fuel valve. As shown in Figure 1 (below), control cable 302 couples the fuel lockout apparatus comprising control 301 and control cable 302 to the mechanical fuel valve. Without control cable 302, the control 301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



Id., Fig. 1 (annotated).

329. 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. *Id.*, 8:23-42.

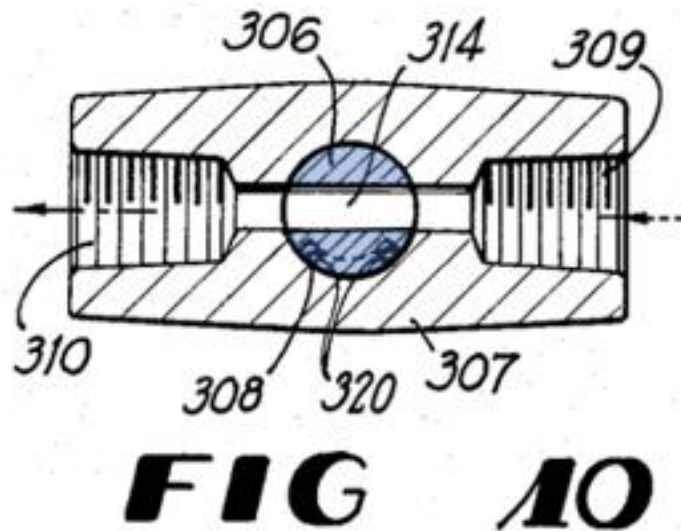


Id., Fig. 1 (annotated).

b. Element [6.2]

330. 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. *Id.*, 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.



Id., Fig. 10 (annotated).

331. During gasoline mode, the fuel lockout apparatus prevents the flow of propane to the internal combustion engine. *See above* §§XII.H.2, XII.H.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 first fuel source to the dual fuel engine and prevents communication between the second fuel source and the dual fuel engine.

332. When propane mode is selected on the control 301, propane is provided to the dual fuel engine. *Id.*, 8:3-30. As discussed (*see above* §§XII.H.2, XII.H.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 communicates the second fuel source to the dual fuel engine and interrupts the first fuel source communication with the dual fuel engine.

333. Accordingly, a POSA would have understood that Hallberg teaches a system whereby the fuel lockout apparatus: communicates the first fuel source to the dual fuel engine and prevents communication between the second fuel source and the dual fuel engine when the mechanical fuel valve is in the first position, and communicates the second fuel source to the dual fuel engine and interrupts the first fuel source communication with the dual fuel engine when in the second position; and as recited in Element [6.2].

4. Claim 14

334. As discussed, Parlatore discloses each and every element of claim 11. *See above* §§XII.A.1.a-XII.A.1.e, XII.A.4.a-XII.A.4.f

335. As discussed, it would have been obvious to a POSA to use Parlatore's fuel regulator system with a dual-fuel generator, and Hallberg discloses an example of a dual fuel engine that could be used with a generator. *See above* §§XII.F.1,

XII.H.1. The engine of Hallberg is configured to operate on the gaseous fuel (propane) and on a liquid fuel (gasoline). *Id.* Hallberg discloses the liquid fuel is supplied from a liquid fuel source through a liquid fuel line. *Id.*

5. Claim 15

337. As discussed, 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. *See above* §XII.H.2.

338. Combined with Parlatore, the mechanical fuel valve 300 of Hallberg would selectively control the flow of fuel to the dual fuel generator (the Parlatore generator with the Hallberg dual fuel engine). *Id.*

XIII. CONCLUSION

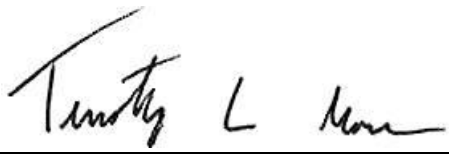
339. For at least the foregoing reasons, in my opinion, claims 1-19 of the '985 Patent are invalid.

* * * * *

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: July 30, 2025

Respectfully submitted,

By: 

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

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National Science Foundation Fellowship, 2004-2008

National Defense Science and Engineering Graduate Fellowship, 2004-2007

Tau Beta Pi Engineering Honor Society, 2002

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Licenses and Certifications

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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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