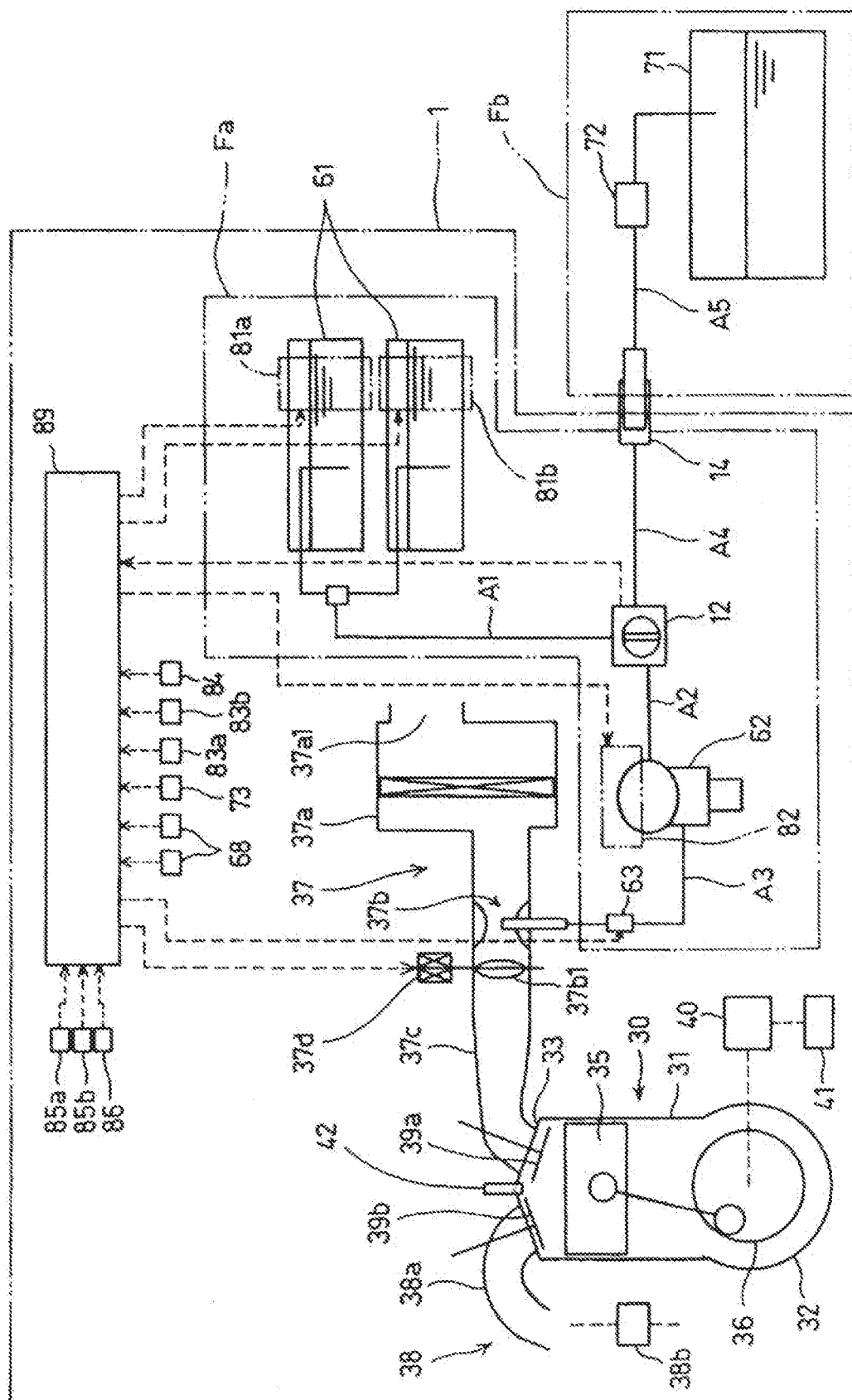
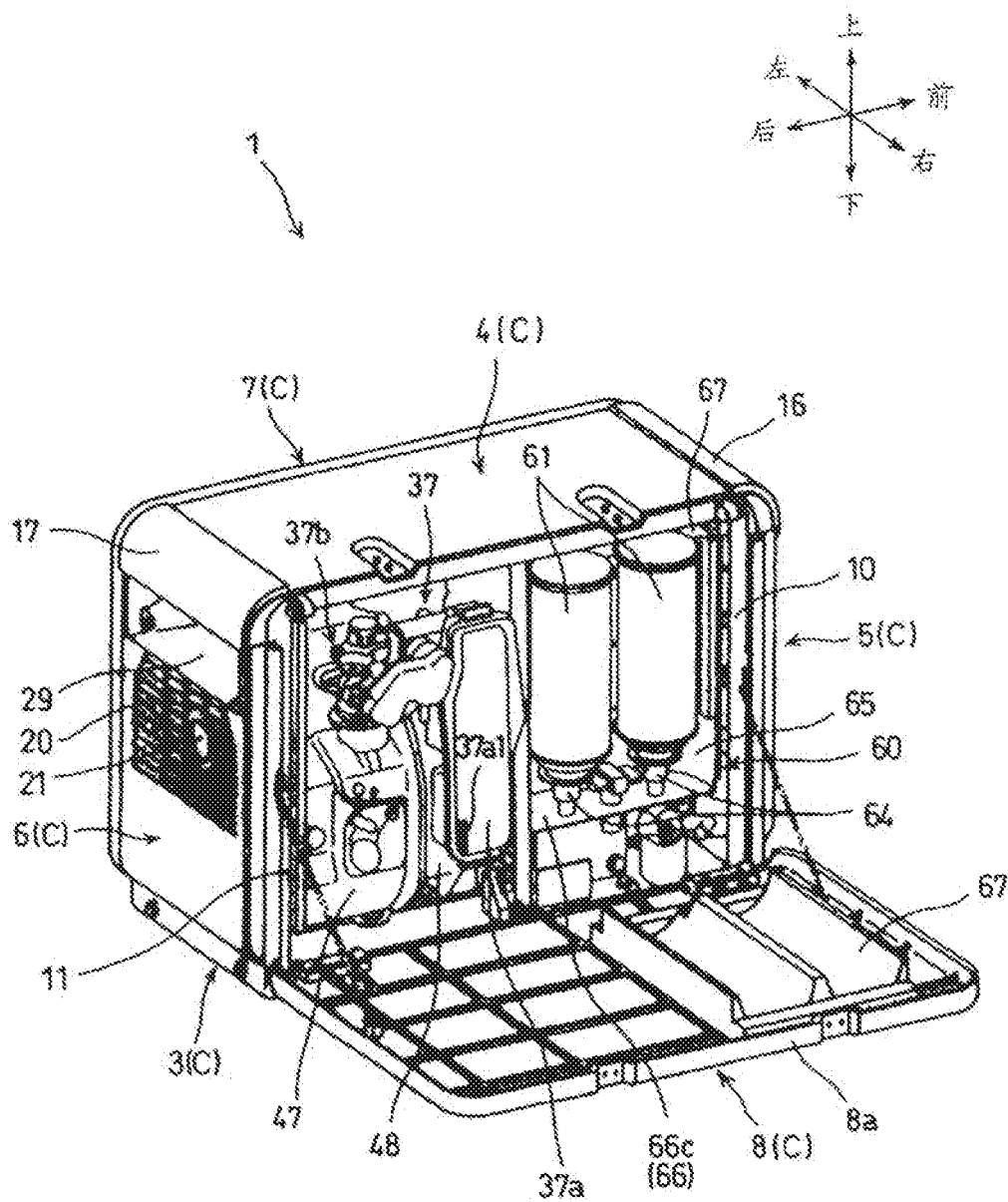






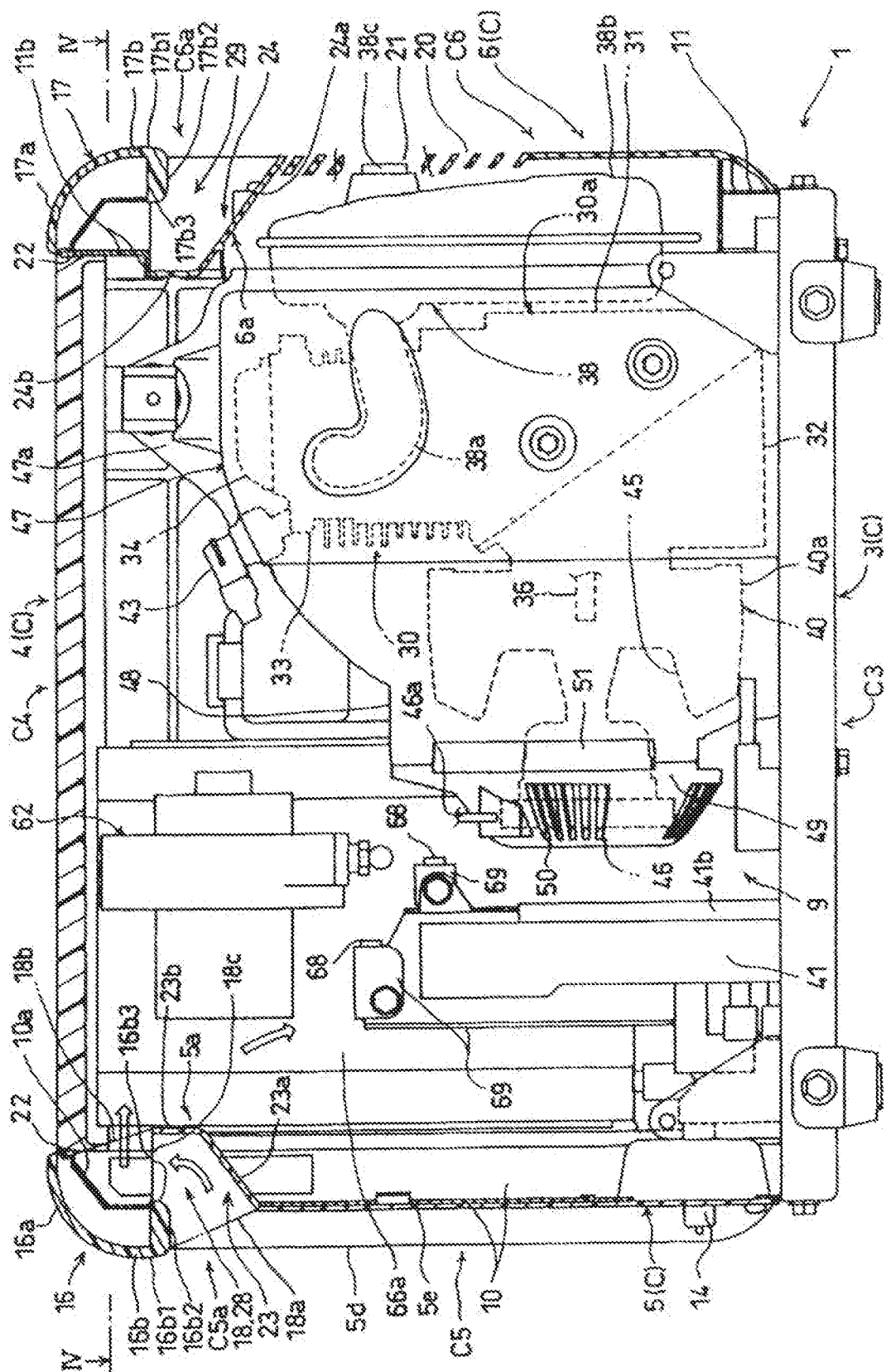


图 3

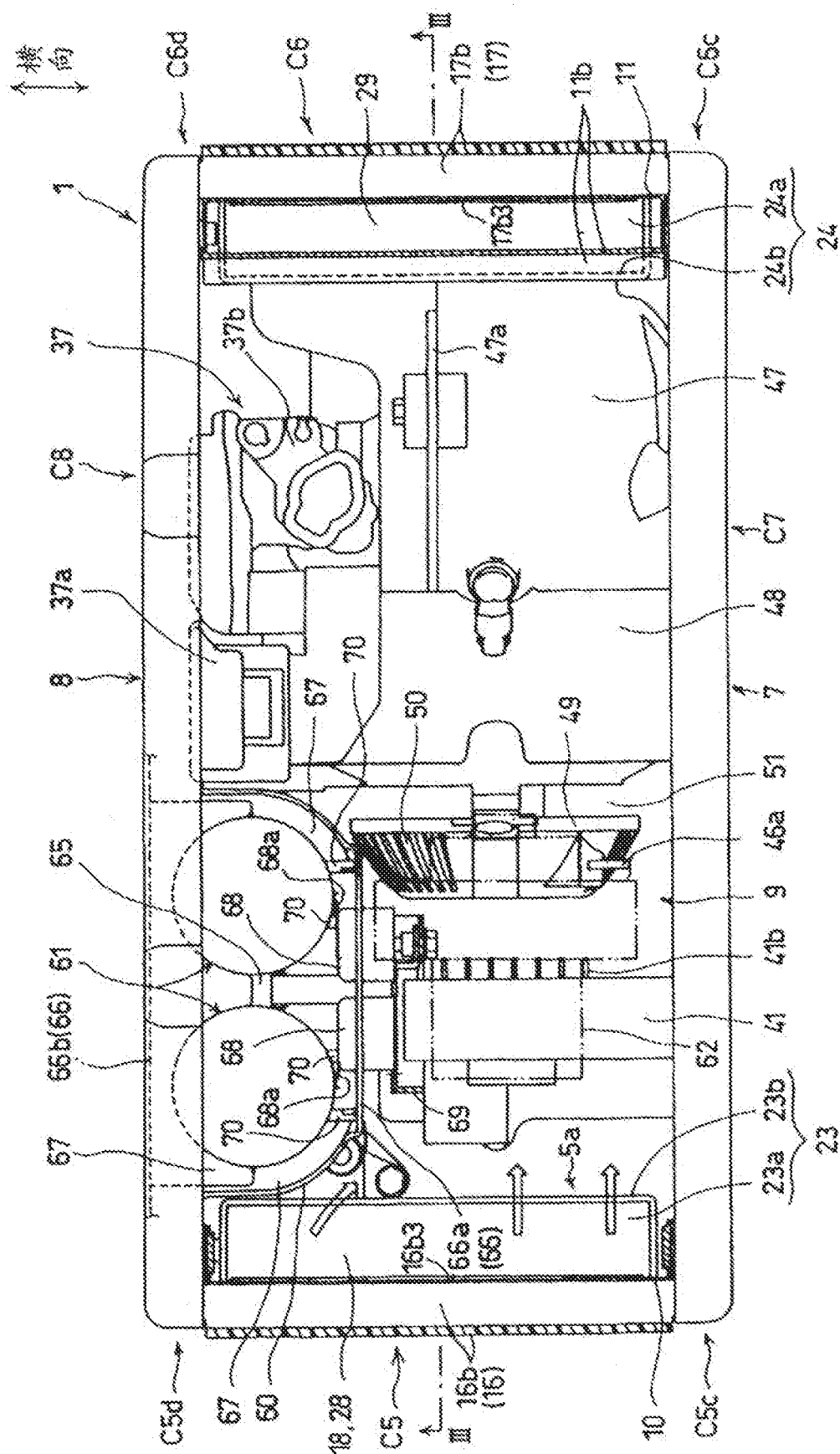


图 4

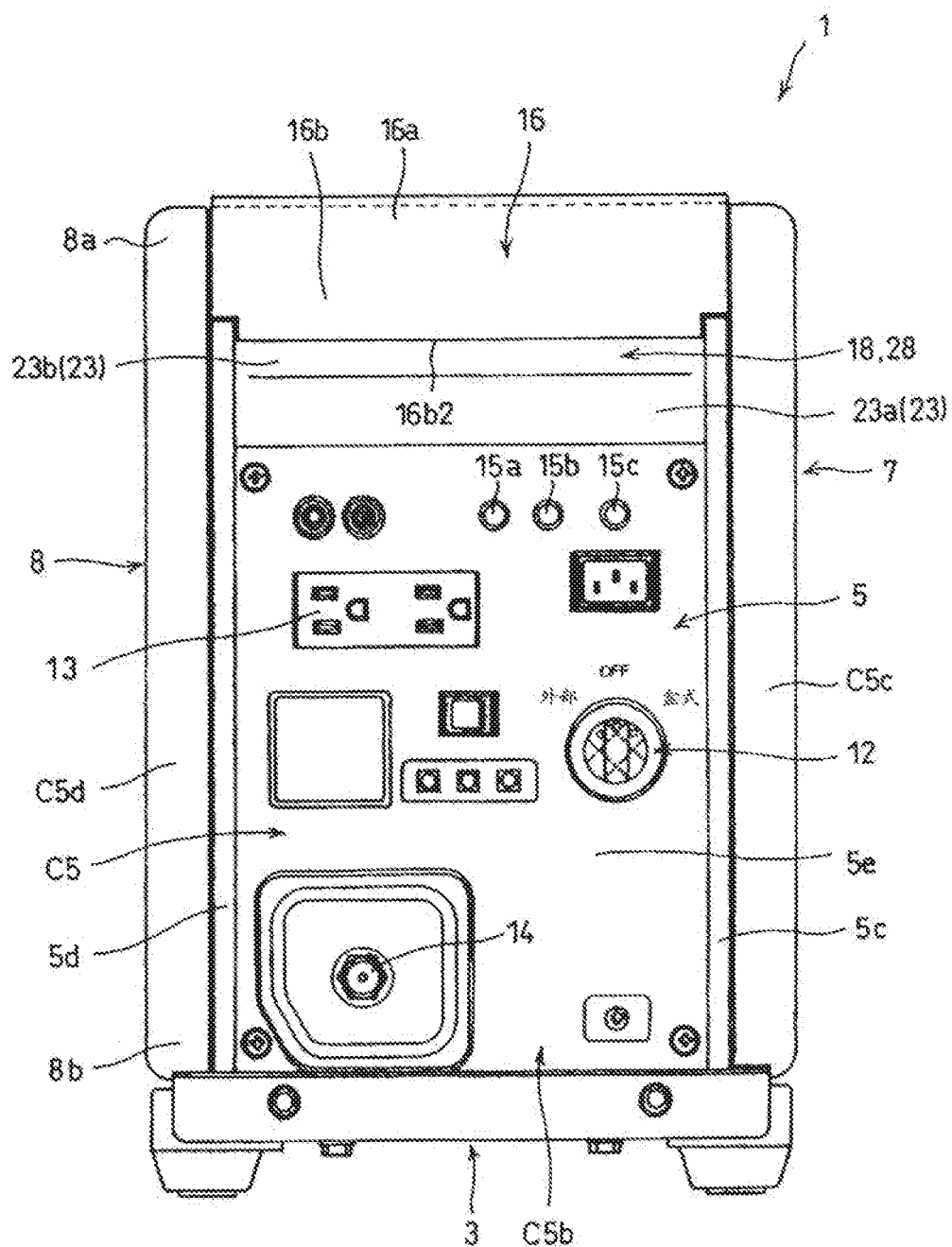
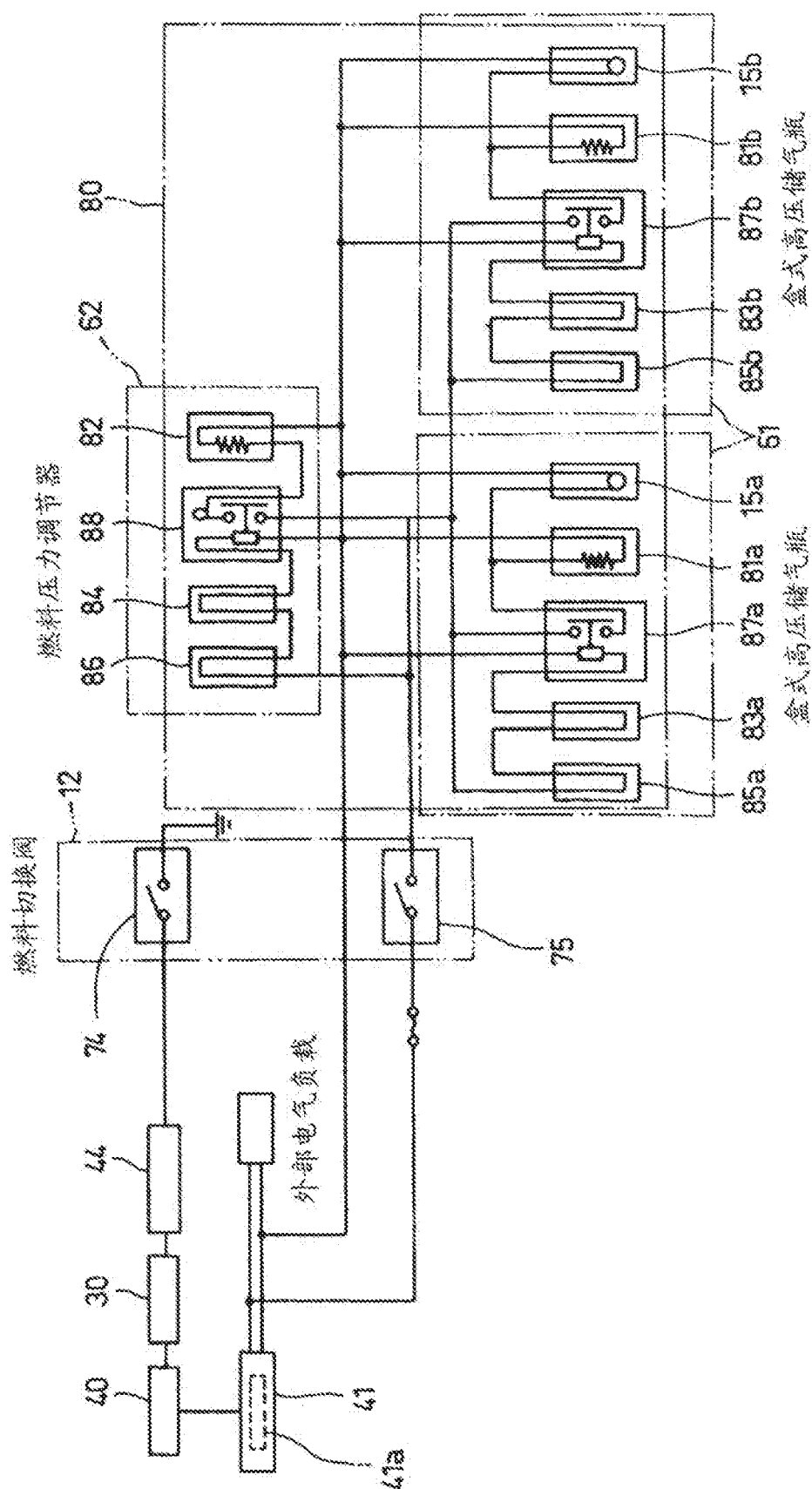


图 5



	燃料切换阀		
	第 1 位置	停止位置	第 2 位置
向发动机的 气体 燃料供给状态	盒式高压储气瓶 的气体燃料 (丁烷) 的供给	供给停止	外部气体容器 的气体燃料 (丙烷) 的供给
点火装置的 动作状态	动作 (断流开关断开)	非动作 (断流开关接通)	动作 (断流开关断开)
加热装置的 动作状态	动作 (加热器的 主开关接通)	非动作 (加热器的 主开关断开)	非动作 (加热器的 主开关断开)

图 7

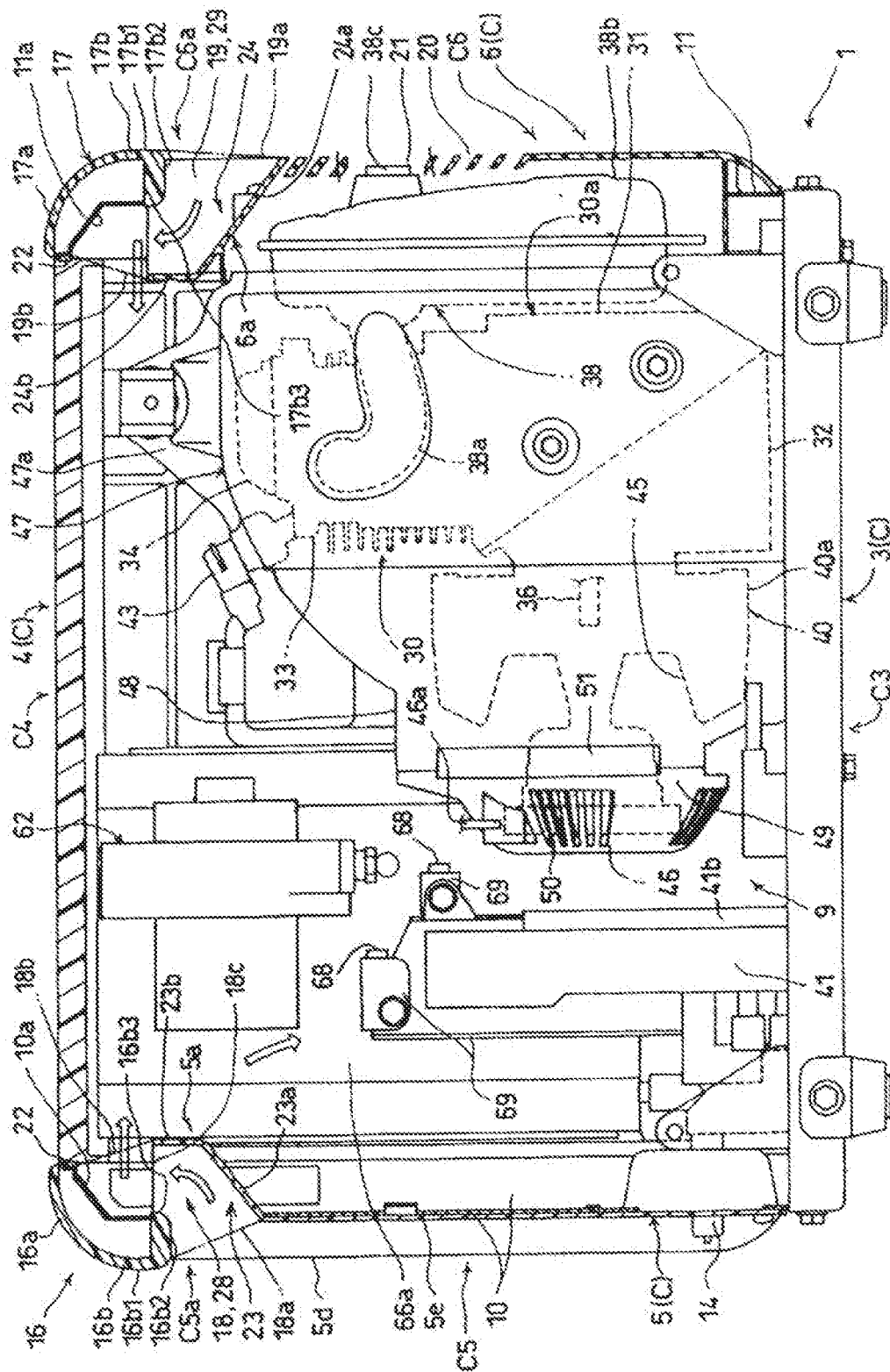
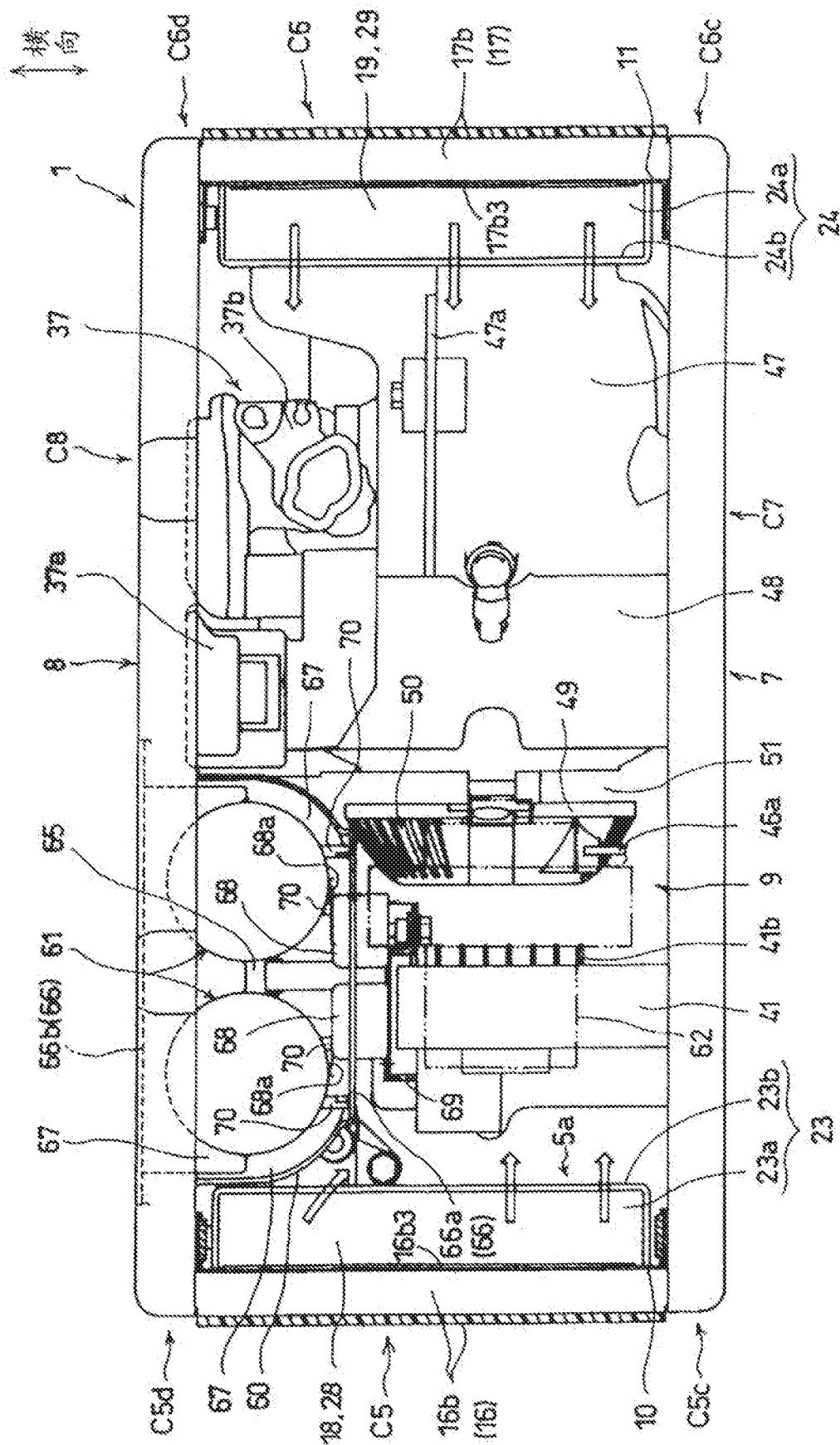


图 8



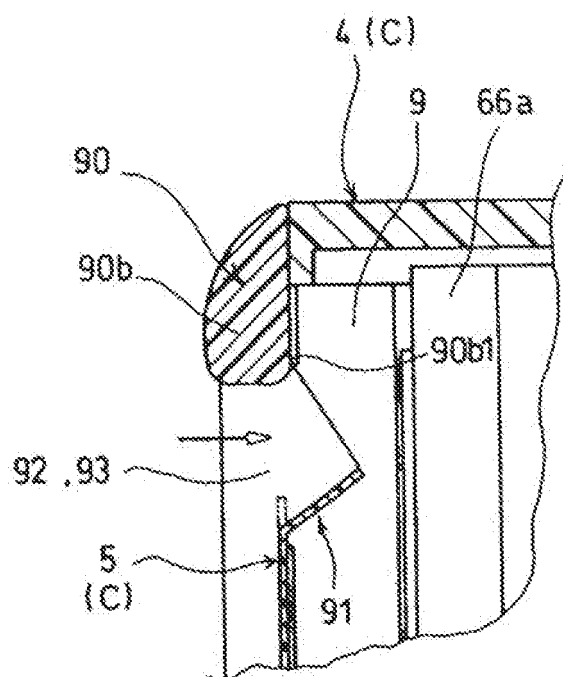


图 10

Electronic Acknowledgement Receipt

EFS ID:	32782949
Application Number:	15285215
International Application Number:	
Confirmation Number:	2429
Title of Invention:	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE
First Named Inventor/Applicant Name:	Kendall J. Collie
Customer Number:	26629
Filer:	Kevin Roger Rosin./Robyn Templin
Filer Authorized By:	Kevin Roger Rosin.
Attorney Docket Number:	CET1090.044
Receipt Date:	01-JUN-2018
Filing Date:	04-OCT-2016
Time Stamp:	14:51:51
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
------------------------	----

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	SupplIDS.pdf	1034263	no	4
			64f45047fab9a7fe9ded1981d3dfadc46ba94ac0		

Champion - EX2092, Page 219 of 387

Warnings:

Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.

IPR2025-01121

Information:					
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2	Transmittal Letter	IDSCertificationStatement.pdf	100734	no	1
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Warnings:					
Information:					
3	Foreign Reference	FPD1-CN1981121A.pdf	7320128	no	40
			7958455bc3c299daabda6566d34902d733ecf318		
Warnings:					
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Total Files Size (in bytes):			8455125		
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Customer No. 26629
Confirmation No. 2429

Patent
Attorney Docket No. CET1090.044

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of : Collie et al.
Serial No. : 15/285,215
Filed : October 4, 2016
For : FUEL SYSTEM FOR A MULTI-FUEL INTERNAL
COMBUSTION ENGINE
Group Art No. : 3747
Examiner : Long T Tran

CERTIFICATION UNDER 37 CFR 1.8(a) and 1.10

I hereby certify that, on the date shown below, this correspondence is being:

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☐ deposited with the US Postal Service in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

37 CFR 1.8(a)

37 CFR 1.10

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☒ transmitted by EFS-WEB addressed to Examiner Long T Tran at the Patent and Trademark Office.

Date: May 2, 2018

/Robyn L. Templin/
Signature

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT/RESPONSE TO OFFICE ACTION
MAILED FEBRUARY 2, 2018

Dear Sir:

Responsive to the Office Action mailed February 2, 2018, please amend the Application as follows:

In the Claims

1. (Original) A multi-fuel engine comprising:
an engine operable on a liquid fuel and a gaseous fuel;
a liquid cutoff solenoid coupled to open and close a liquid fuel path to the engine;
a gaseous cutoff solenoid coupled to open and close a gaseous fuel source to the engine; and
a switch coupling a power source to the liquid cutoff solenoid and the gaseous cutoff solenoid to switch between fuel sources on-the-fly during engine operation.
2. (Original) The multi-fuel engine of claim 1, further comprising a carburetor attached to an intake of the engine to mix air and fuel and connect a liquid fuel source to the intake; and
wherein the liquid cutoff solenoid is coupled to the carburetor to open and close the liquid fuel path downstream from a float bowl in the carburetor; and
further wherein the gaseous cutoff solenoid couples the gaseous fuel source to the intake to control flow of the gaseous fuel to the engine.
3. (Original) The multi-fuel engine of claim 1 wherein the switch actuates the liquid cutoff solenoid and the gaseous cutoff solenoid to change engine operation between the liquid fuel and the gaseous fuel so as to prevent fuel flow from a liquid fuel source and the gaseous fuel source simultaneously and allow switching between fuel sources on-the-fly during engine operation.
4. (Original) The multi-fuel engine of claim 1 wherein the switch actuates the gaseous cutoff solenoid and the liquid cutoff solenoid in succession to provide fuel overlap when changing engine operation between the liquid fuel and the gaseous fuel.
5. (Currently Amended) The multi-fuel engine of claim 1 wherein the ~~multi-fuel~~ engine is a dual fuel engine that operates on gasoline from a liquid fuel source and LPG from the gaseous fuel source.

6. (Original) The multi-fuel engine of claim 2 further comprising a liquid fuel valve coupling the liquid fuel source to the carburetor, actuated by the switch coupled to the power source.

7. (Original) The multi-fuel engine of claim 6 wherein the switch opens the liquid fuel valve to fill the float bowl with liquid fuel prior to switching operation to liquid fuel.

8. (Currently Amended) The multi-fuel engine of claim 1, wherein the engine is a multi-fuel engine that operates on the liquid fuel, the gaseous fuel from the gaseous fuel source, and is operable on a second gaseous fuel from a second gaseous fuel source; and

further comprising a second gaseous cutoff solenoid coupling the engine to ~~a~~the second gaseous fuel source to control flow of the second gaseous fuel to the engine.

9. (Original) The multi-fuel engine of claim 8 wherein the switch changes operation of the engine among the liquid fuel, the gaseous fuel, and the second gaseous fuel while the engine remains running.

10. (Original) The multi-fuel engine of claim 8 wherein the liquid fuel is gasoline, the gaseous fuel is LPG, and the second gaseous fuel is NG.

11. (Original) The multi-fuel engine of claim 8 further comprising a 2-way branched fitting coupling the gaseous fuel source and the second gaseous fuel source to a carburetor, wherein the 2-way branched fitting is located downstream from the gaseous cutoff solenoid and the second gaseous cutoff solenoid.

12. (Original) The multi-fuel engine of claim 11 wherein the 2-way branched fitting comprises:

a first gaseous fuel jet sized for the gaseous fuel coupled to the gaseous fuel source, and

a second gaseous fuel jet sized for the second gaseous fuel coupled to the second gaseous fuel source.

13. (Original) A multi-fuel generator and fuel delivery system comprising:

a multi-fuel internal combustion engine configured to operate on a liquid fuel supplied from a liquid fuel source through a liquid fuel line and a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line;

an alternator driven by the multi-fuel internal combustion engine;

a fuel regulator system comprising:

a primary pressure regulator coupled to a service valve of the pressurized fuel source to regulate fuel supplied from the pressurized fuel source to a reduced pressure, and

a secondary pressure regulator coupled to the primary pressure regulator to regulate fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the engine; and

an electro-mechanical valve system coupled to the engine and operated by an electrical switch powered by one of the alternator, a battery, and a magneto that controls fuel flow to the engine from the liquid fuel source and the pressurized fuel source.

14. (Original) The multi-fuel generator and fuel delivery system of claim 13 wherein the electro-mechanical valve system is configured to switch operation of the generator from multiple fuel sources while the generator is running.

15. (Original) The multi-fuel generator and fuel delivery system of claim 13 wherein the electro-mechanical valve system is configured to prevent simultaneous delivery of the liquid fuel and the gaseous fuel to the engine.

16. (Original) The multi-fuel generator and fuel delivery system of claim 13 wherein the electro-mechanical valve system comprises:

a carburetor cutoff solenoid coupled to a carburetor to control liquid fuel flow to the engine, and

a gaseous fuel cutoff solenoid coupled to the gaseous fuel line to control flow of the gaseous fuel to the engine.

17. (Original) The multi-fuel generator and fuel delivery system of claim 16 further comprising a liquid fuel cutoff solenoid coupled to the liquid fuel line to control flow of the liquid fuel to the carburetor.

18. (Original) The multi-fuel generator and fuel delivery system of claim 13 wherein the pressurized fuel source comprises a pressurized fuel container located off-board the generator having a regulator mounting device to secure at least the secondary pressure regulator thereto.

19. (Original) The multi-fuel generator and fuel delivery system of claim 13 wherein a dual stage pressure regulator comprises the primary pressure regulator and the secondary pressure regulator.

20. (Original) A multi-fuel internal combustion engine comprising:
an engine operable on liquid fuel supplied through a liquid fuel line from a liquid fuel source and gaseous fuel supplied through a gaseous fuel line from a pressurized fuel source;
a switch to change operation of the engine from liquid fuel to gaseous fuel and from gaseous fuel to liquid fuel while the engine is running;
a liquid fuel cutoff solenoid coupled to control fuel flow through the liquid fuel line and engage engine operation on liquid fuel upon actuation of the switch from gaseous fuel to liquid fuel; and
a gaseous fuel cutoff solenoid coupled to control fuel flow through the gaseous fuel line and engage engine operation on gaseous fuel upon actuation of the switch from liquid fuel to gaseous fuel.

21. (Original) The multi-fuel internal combustion engine of claim 20 wherein the liquid fuel cutoff solenoid is a carburetor cutoff solenoid coupled to a carburetor.

22. (Original) The multi-fuel internal combustion engine of claim 20 wherein the liquid fuel cutoff solenoid is coupled along the liquid fuel line.

23. (Original) The multi-fuel internal combustion engine of claim 20 wherein the switch institutes a predefined delay between actuating the liquid fuel cutoff solenoid and the gaseous fuel cutoff solenoid.

24. (Original) The multi-fuel internal combustion engine of claim 20 wherein the switch operates the liquid fuel cutoff solenoid and the gaseous fuel cutoff solenoid to

substantially prevent simultaneous fuel delivery of the liquid fuel and the gaseous fuel to the engine.

25. (Original) The multi-fuel internal combustion engine of claim 20 wherein the gaseous fuel cutoff solenoid and the liquid fuel cutoff solenoid operate as normally closed solenoid valves.

26. (Original) The multi-fuel internal combustion engine of claim 20 further comprising:

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

an alternator driven by the engine to form a generator; and

a fuel regulator system located off-board the generator and comprising:

a primary pressure regulator coupled to a service valve of the pressurized fuel source to regulate the fuel supplied from the pressurized fuel source to a reduced pressure, and

a secondary pressure regulator coupled to the primary pressure regulator to regulate the gaseous fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the engine.

REMARKS

Claims 1-26 are pending in the present application. In the Office Action mailed February 2, 2018, the Examiner rejected claims 5 and 8-12 under 35 U.S.C. §112(b) or 35 U.S.C. §112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention. The Examiner next rejected claims 1-7 and 20-25 under 35 U.S.C. §102(a)(2) as being anticipated by Poehlman (USP 4,489,699). Claims 13-15, 18, and 19 were rejected under 35 U.S.C. §103 as being unpatentable over Kern et al. (US Pub. 2004/0139943) in view of Graf (USP 5,450,832). Claims 16 and 17 were rejected under 35 U.S.C. §103 as being unpatentable over Kern et al. in view of Poehlman. Claim 26 was rejected under 35 U.S.C. §103 as being unpatentable over Poehlman in view of Kern et al. and Graf.

Rejection under 35 U.S.C. §112(b) or 35 U.S.C. §112 (pre-AIA), second paragraph

The Examiner rejected claims 5 and 8-12 under 35 U.S.C. §112(b) or 35 U.S.C. §112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention. In rejecting claims 5 and 8-12, the Examiner stated that “Applicant claims the multi-fuel engine in Claim 5 is a dual fuel engine,” “[h]owever, claims 8-12 refer to a third fuel – a second gaseous fuel.” *Office Action*, February 2, 2018, p. 2.

The Examiner then asserted that “[t]his renders the claims unclear as to whether the engine is a dual fuel or the more generic multi-fuel engine.” *Id.* While Applicant does not necessarily agree with the rejection, Applicant has amended claim 8 to further clarify the scope of the claim.

With regard to the rejection, Applicant would note that claims 5 and 8 are alternate embodiments of the invention, such that there should be no clarity issues amongst the claims regarding what is called for therein. That is, claim 5 is directed to a dual-fuel engine operable on gasoline and LPG, while claim 8 is directed to a multi-fuel engine operable on a liquid fuel, gaseous fuel, and second gaseous fuel. Applicant believes that the separately claimed embodiments are clear on their face based on the language in claims 5 and 8, and that the claims as presented are not rendered “unclear” based on the language therein.

In light of at least the above, Applicant respectfully requests withdrawal of the rejection of claims 5 and 8-12 under 35 U.S.C. §112(b) or 35 U.S.C. §112 (pre-AIA), second paragraph.

Rejection under 35 U.S.C. §102(a)(2) as being anticipated by Poehlman**Claim 1**

The Examiner rejected claim 1 under 35 U.S.C. §102(a)(2) as being anticipated by Poehlman (USP 4,489,699).

Claim 1 calls for a multi-fuel engine includes an engine operable on a liquid fuel and a gaseous fuel. The multi-fuel engine also includes a liquid cutoff solenoid coupled to open and close a liquid fuel path to the engine, and a gaseous cutoff solenoid coupled to open and close a gaseous fuel source to the engine. A switch couples a power source to the liquid cutoff solenoid and the gaseous cutoff solenoid to switch between fuel sources on-the-fly during engine operation.

In rejecting claim 1, the Examiner stated (in part) that Poehlman discloses “a liquid cutoff solenoid (43) coupled to open and close a liquid fuel path to the engine; a gaseous cutoff solenoid (45) coupled to open and close a gaseous fuel source to the engine; and a switch (51) coupling a power source (59) to the liquid cutoff solenoid and the gaseous cutoff solenoid to switch between fuel sources on-the-fly during engine operation.” *Office Action*, supra at 3. Applicant respectfully disagrees with the rejection. Specifically, Poehlman does not anticipate that which is called for in claim 1, as anticipation under pre-AIA 35 U.S.C. §102(a)(2) requires that “[t]he identical invention must be shown [in the reference] in as complete detail as is contained in the ... claim.” *MPEP §2131* (citing *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)). As will be set forth in detail here below, Poehlman does not disclose each and every element of claim 1 and thus does not anticipate the claim, as “[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *MPEP §2131* (citing *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987)).

Poehlman discloses a control apparatus 11 for selectively operating an internal combustion engine 13 on a first or gaseous fuel and on a second or liquid fuel. *Poehlman*, Col. 3, lns. 25-27. The engine includes a carburetor 15 which is connected through a supply line 19 with a source 21 of liquid fuel, such as, for instance, gasoline. *Poehlman*, Col. 3, lns. 27-31. The engine 13 also includes a gaseous fuel air mixer 23 which communicates with the carburetor 15, and which is connected through a supply line 25 with a source 27 of gaseous fuel, such as, for instance, natural gas. *Poehlman*, Col. 3, lns. 31-35. The engine 13 also includes control means 41 for selective change-over between use of liquid fuel and gaseous fuel. *Poehlman*, Col. 3, lns. 62-64. In this regard, the control means 41 includes a liquid fuel control valve 43 which is

incorporated in the liquid fuel supply line 19 and is movable between open and closed positions, and includes a gaseous fuel control valve 45 which is incorporated in the gaseous fuel supply line 25 and is movable between open and closed positions. *Poehlman*, Col. 3, ln. 64 to Col. 4, ln. 6.

The control means 41 also includes a primary or fuel selector switch 51 which is operator-controlled and which is movable between a first or gaseous fuel position and a second or liquid fuel position. *Poehlman*, Col. 4, lns. 16-20. The control means 41 is operable, when the selector switch 51 is in the liquid fuel position, to energize the liquid fuel control valve 43, thereby opening the liquid fuel control valve 43. *Poehlman*, Col. 4, lns. 21-24. In addition, the control means 41 is operable, when the selector switch 51 is in the liquid fuel position, to energize the gaseous fuel control valve 45, and thereby open the gaseous fuel control valve 45. *Poehlman*, Col. 4, lns. 24-30. More particularly, the selector switch 51 comprises a gaseous fuel terminal 53, a liquid fuel terminal 55, and a primary switch member 57 connected to a source 59 of direct current and movable between a first position energizing the liquid fuel terminal 55 and a second position energizing the gaseous fuel terminal 53. *Poehlman*, Col. 5, lns. 1-6.

The control means 41 includes a first switch means 61 including an energizing and holding terminal 63 connected to the gaseous fuel control valve 45 and a first switch member 65 connected to the gaseous fuel terminal 53 of the selector switch 51 and movable to and from a position energizing an energizing and holding terminal 63, means biasing the first switch member 65 away from the terminal 63, and means connected to the terminal 63 for holding the first switch member 65 in the position energizing the terminal 63 when the terminal is energized. *Poehlman*, Col. 5, lns. 7-21. The control means 41 also includes a second switch means 71 including a terminal 73 connected to the gaseous fuel control valve 45, a holding terminal 77, and a second switch member 79 electrically connected to the liquid fuel terminal 55 of the selector switch 51 and movable between a first position energizing the terminal 73 connected to the gaseous fuel control valve 45 for energization thereof, and a second position energizing the holding terminal 77, means biasing the second switch member 79 to the first position, and means connected to the holding terminal 77 for holding the second switch member 79 in the second position against the action of the biasing means when the holding terminal 77 is energized. *Poehlman*, Col. 5, lns. 22-35. The first and second switches 61 and 71 respectively include solenoid coils 81 and 83 which, when energized, cause movement of the respective first and second switch members 65 and 79 from their biased positions to their respective positions in engagement with the energizing and holding terminal 63 and the holding terminal 77. *Poehlman*, Col. 5, lns. 36-42.

In operation, when switching from liquid fuel to gaseous fuel, the operator moves the fuel selector switch 51 to the gaseous fuel position. *Poehlman*, Col. 6, lns. 21-23. As a result, the liquid fuel control valve 43 is consequently deenergized and turns off the liquid fuel supply to the carburetor 15. *Poehlman*, Col. 6, lns. 23-25. To change to liquid fuel from gaseous fuel, the operator moves the fuel selector switch 51 to the liquid fuel position. *Poehlman*, Col. 6, lns. 43-45. Such movement energizes the liquid fuel control valve 53 to the open position. *Poehlman*, Col. 6, lns. 45-46.

However, there is no disclosure provided in *Poehlman* of a liquid cutoff solenoid coupled to open and close a liquid fuel path to the engine, and a gaseous cutoff solenoid coupled to open and close a gaseous fuel source to the engine, as called for in claim 1. That is, while the Examiner has asserted that *Poehlman* discloses “a liquid cutoff solenoid (43) coupled to open and close a liquid fuel path to the engine [and] a gaseous cutoff solenoid (45) coupled to open and close a gaseous fuel source to the engine,” *Office Action*, supra at 3, such an assertion distorts what is disclosed in *Poehlman*. Instead, *Poehlman* only discloses “a liquid fuel control valve 43 which is incorporated in the liquid fuel supply line 19, which is movable between open and closed positions, which is biased to the closed position, and which, in response to electrical energization, moves to the open position to afford liquid fuel flow to the engine 13” and “a gaseous fuel control valve 45 which is incorporated in the gaseous fuel supply line 25, which is movable between open and closed positions, which is biased to the closed position, and which, in response to electrical energization, moves to the open position to afford gaseous fuel flow to the engine.” *Poehlman*, Col. 3, ln. 64 to Col. 4, ln. 9. There is no disclosure in *Poehlman* that the liquid fuel control valve 43 and gaseous fuel control valve 45 are solenoids that are coupled to open and close a liquid fuel path to the engine and coupled to open and close a gaseous fuel source to the engine, as called for in claim 1.

To the extent that *Poehlman* discloses the inclusion of solenoids in control means 41, *Poehlman* only describes that first and second switches 61 and 71 respectively include solenoid coils 81 and 83 which, when energized, cause movement of the respective first and second switch members 65 and 79 from their biased positions to their respective positions in engagement with the energizing and holding terminal 63 and the holding terminal 77. *Poehlman*, Col. 5, lns. 36-42. However, these solenoid coils 81 and 83 are not a liquid cutoff solenoid coupled to open and close a liquid fuel path to the engine, and a gaseous cutoff solenoid coupled to open and close a gaseous fuel source to the engine, as called for in claim 1 – but instead are only solenoid coils 81

and 83 which, when energized, cause movement of the respective first and second switch members 65 and 79.

As Poehlman fails to disclose a liquid cutoff solenoid coupled to open and close a liquid fuel path to the engine and a gaseous cutoff solenoid coupled to open and close a gaseous fuel source to the engine, Poehlman cannot be said to anticipate that which is called for in claim 1, as anticipation under pre-AIA 35 U.S.C. §102(a)(2) requires that “[t]he identical invention must be shown [in the reference] in as complete detail as is contained in the ... claim.” *MPEP §2131* (citing *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)). Applicant therefore respectfully requests withdrawal of the rejection of claim 1 and the claims dependent therefrom.

Claim 20

The Examiner rejected claim 20 under 35 U.S.C. §102(a)(2) as being anticipated by Poehlman (USP 4,489,699).

Claim 20 calls for a multi-fuel internal combustion engine includes an engine operable on liquid fuel supplied through a liquid fuel line from a liquid fuel source and gaseous fuel supplied through a gaseous fuel line from a pressurized fuel source, and a switch to change operation of the engine from liquid fuel to gaseous fuel and from gaseous fuel to liquid fuel while the engine is running. A liquid fuel cutoff solenoid coupled to control fuel flow through the liquid fuel line and engage engine operation on liquid fuel upon actuation of the switch from gaseous fuel to liquid fuel, and a gaseous fuel cutoff solenoid coupled to control fuel flow through the gaseous fuel line and engage engine operation on gaseous fuel upon actuation of the switch from liquid fuel to gaseous fuel.

In rejecting claim 20, the Examiner asserted (in part) that Poehlman discloses “a liquid fuel cutoff solenoid (43) coupled to control fuel flow through the liquid fuel line and engage engine operation on liquid fuel upon actuation of the switch from gaseous fuel to liquid fuel; and a gaseous fuel cutoff solenoid (45) coupled to control fuel flow through the gaseous fuel line and engage engine operation on gaseous fuel upon actuation of the switch from liquid fuel to gaseous fuel.” Applicant respectfully disagrees with the rejection. Specifically, Poehlman does not anticipate that which is called for in claim 20, as anticipation under pre-AIA 35 U.S.C. §102(a)(2) requires that “[t]he identical invention must be shown [in the reference] in as complete detail as is contained in the ... claim.” *MPEP §2131* (citing *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)). As will be set forth in detail here below,

Poehlman does not disclose each and every element of claim 1 and thus does not anticipate the claim, as “[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *MPEP* §2131 (citing *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987)).

As set forth above, Poehlman discloses a control apparatus 11 for selectively operating an internal combustion engine 13 on a first or gaseous fuel and on a second or liquid fuel. *Poehlman*, Col. 3, lns. 25-27. The engine includes a carburetor 15 which is connected through a supply line 19 with a source 21 of liquid fuel, such as, for instance, gasoline. *Poehlman*, Col. 3, lns. 27-31. The engine 13 also includes a gaseous fuel air mixer 23 which communicates with the carburetor 15, and which is connected through a supply line 25 with a source 27 of gaseous fuel, such as, for instance, natural gas. *Poehlman*, Col. 3, lns. 31-35. The carburetor 15 is connected to the engine 13 through an engine intake manifold 105. *Poehlman*, Col. 5, lns. 62-65; FIG. 1. The engine 13 also includes control means 41 for selective change-over between use of liquid fuel and gaseous fuel. *Poehlman*, Col. 3, lns. 62-64. In this regard, the control means 41 includes a liquid fuel control valve 43 which is incorporated in the liquid fuel supply line 19 and is movable between open and closed positions, and includes a gaseous fuel control valve 45 which is incorporated in the gaseous fuel supply line 25 and is movable between open and closed positions. *Poehlman*, Col. 3, ln. 64 to Col. 4, ln. 6. The control means 41 also includes a primary or fuel selector switch 51 which is operator-controlled and which is movable between a first or gaseous fuel position and a second or liquid fuel position. *Poehlman*, Col. 4, lns. 16-20. The control means 41 is operable, when the selector switch 51 is in the liquid fuel position, to energize the liquid fuel control valve 43, thereby opening the liquid fuel control valve 43. *Poehlman*, Col. 4, lns. 21-24. In addition, the control means 41 is operable, when the selector switch 51 is in the liquid fuel position, to energize the gaseous fuel control valve 45, and thereby open the gaseous fuel control valve 45. *Poehlman*, Col. 4, lns. 24-30. Additionally, first and second switches 61 and 71 are included in control means 41 that respectively include solenoid coils 81 and 83 which, when energized, cause movement of respective first and second switch members 65 and 79 from their biased positions to their respective positions in engagement with an energizing and holding terminal 63 and holding terminal 77. *Poehlman*, Col. 5, lns. 36-42.

However, Poehlman fails to teach that which is called for in claim 20 regarding a liquid fuel cutoff solenoid coupled to control fuel flow through the liquid fuel line and engage engine operation on liquid fuel upon actuation of the switch from gaseous fuel to liquid fuel, and a gaseous fuel cutoff solenoid coupled to control fuel flow through the gaseous fuel line. Instead,

and as set forth above with respect to claim 1, Poehlman only discloses “a liquid fuel control valve 43 which is incorporated in the liquid fuel supply line 19, which is movable between open and closed positions, which is biased to the closed position, and which, in response to electrical energization, moves to the open position to afford liquid fuel flow to the engine 13” and “a gaseous fuel control valve 45 which is incorporated in the gaseous fuel supply line 25, which is movable between open and closed positions, which is biased to the closed position, and which, in response to electrical energization, moves to the open position to afford gaseous fuel flow to the engine.” *Poehlman*, Col. 3, ln. 64 to Col. 4, ln. 9. There is no disclosure in Poehlman that the liquid fuel control valve 43 and gaseous fuel control valve 45 are solenoids that are coupled to control fuel flow through the liquid fuel line and to control fuel flow through the gaseous fuel line, as called for in claim 20. To the extent that Poehlman discloses the inclusion of solenoids in control means 41, Poehlman only describes that first and second switches 61 and 71 respectively include solenoid coils 81 and 83 which, when energized, cause movement of the respective first and second switch members 65 and 79 from their biased positions to their respective positions in engagement with the energizing and holding terminal 63 and the holding terminal 77. *Poehlman*, Col. 5, lns. 36-42. However, these solenoid coils 81 and 83 are not a liquid fuel cutoff solenoid and a gaseous fuel cutoff solenoid as called for in claim 20 – but instead are only solenoid coils 81 and 83 which, when energized, cause movement of the respective first and second switch members 65 and 79.

In light of at least the above, Poehlman does not anticipate that which is called for in claim 20, as “[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *MPEP* §2131 (citing *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987)). Applicant therefore respectfully requests withdrawal of the rejection of claim 20 and the claims dependent therefrom.

Rejection under 35 U.S.C. §103 over Kern et al. in view of Graf

Claim 13

The Examiner rejected claim 13 under 35 U.S.C. §103 as being unpatentable over Kern et al. (US Pub. 2004/0139943) in view of Graf (USP 5,450,832). In rejecting the claim, the Examiner asserted that Kern teaches that claimed engine and generator arrangement and then relied on Graf as teaching all remaining elements of the claim, including “a primary pressure regulator (23) coupled to a service valve (3) of the pressurized fuel source to regulate fuel

supplied from the pressurized fuel source to a reduced pressure, and a secondary pressure regulator (24) coupled to the primary pressure regulator to regulate fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the engine.” *Office Action*, supra at 7-8. Applicant respectfully disagrees with the rejection.

Kern discloses a method for controlling a bi-fuel generator set. The generator set includes a controller, a generator for generating electrical power, and an engine for driving the generator. *Kern*, Abstract. A flow of gaseous fuel is provided, and operation of the engine and the generator is monitored. *Kern*, Abstract. The flow of gaseous fuel is adjusted in response to various predetermined operating conditions on the engine. *Kern*, Abstract. In addition, the flow of gaseous fuel may be selectively passed through a charge cooler remote from a radiator for the engine. *Kern*, Abstract. The flow of gaseous fuel may be cooled by the charge cooler in response to certain operating conditions on the engine. *Kern*, Abstract.

Graf discloses a dual fuel system for internal combustion engines that includes a pressurized storage tank 1 having a fill port 2 to receive an alternate fuel supply such as compressed natural gas. *Graf*, Col. 3, Ins. 58-60. A solenoid valve 3 opens and closes the alternate fuel supply line 4 from the pressurized storage tank 1, the solenoid valve 3 being controlled by the fuel selector switch 5 between a valve open position and a valve closed position. *Graf*, Col. 3, Ins. 60-68. When solenoid valve 3 is in its valve closed position, gasoline is then supplied to the engine from the gasoline supply tank 9. *Graf*, Col. 4, Ins. 4-6. A heat exchange 23 is provided adjacent the alternate fuel line to pre-heat the alternate fuel as it passes to a pressure regulator 24. *Graf*, Col. 4, Ins. 40-42. Heat is provided by engine coolant passing through the shell of the heat exchanger, or by some other heat source such as an electrical heater or exhaust gas. *Graf*, Col. 4, Ins. 4-6. 44-47. Pressure of the alternate fuel in the supply tank is about 2500 pounds per square inch (psi) and the regulator 24 reduces the pressure in the alternate fuel supply line to between 100 psi to 200 psi. *Graf*, Col. 4, Ins. 48-51. The alternate fuel supply line 4 branches after passing through regulator 24 to direct a portion of the alternate fuel through branch line 25, a secondary regulator 26 and then to pilot control port 27. *Graf*, Col. 4, Ins. 52-55. The secondary regulator 26 reduces the alternate fuel pressure to 30 psi. Fuel from this branch fuel line 25 after passing through secondary regulator 26 and being reduced to 30 psi is also connected to supply idle fuel. *Graf*, Col. 4, Ins. 55-59. The main branch of alternate fuel supply line 4 leads to primary port 28 of pilot control valve 29. *Graf*, Col. 4, Ins. 60-61. The pilot control valve 29 controls flow of the alternate fuel to the engine using the fuel injector signal

from electronic control module 10, normally installed at the factory for engines originally equipped with electronic fuel injection. *Graf*, Col. 4, Ins. 61-66.

As the electronic control module 10 calls for fuel, the alternate fuel injectors 30 are turned on and off at a rate determined by the electronic control module 10 based on the requirements of the engine at that particular time. *Graf*, Col. 5, Ins. 7-10. When the electronic control module 10 calls for more fuel at the alternate fuel injectors 30, secondary fuel at 30 psi from branch alternate fuel supply line 25 flows into the chamber of the pilot control valve 29 at its bonnet side. *Graf*, Col. 5, Ins. 11-15. This causes pressure to build up against the diaphragm 31 which in turn displaces the spool 32 until it uncovers primary port 28 allowing primary fuel at between 100 to 250 psi to flow through the pilot control valve 29. *Graf*, Col. 5, Ins. 15-19. The spool 32 continues to open thereby widening the opening of port 28 allowing more of the alternate fuel to flow through the pilot control valve 29 to the engine. *Graf*, Col. 5, Ins. 20-22. As more primary fuel at 100 to 250 psi flows through port 28, pressure on the port 28 side of the diaphragm increases until it equalizes the pressure on the bonnet side of the pilot control valve. *Graf*, Col. 5, Ins. 23-26. At such point, the spool 32 and the amount which it has opened port 28 remains fixed until either more of the alternate fuel is called for or less. *Graf*, Col. 5, Ins. 26-29. When less fuel is called for by the electronic control module 10, the duty cycle portion of the signal of the alternate fuel injectors 30 in the bonnet of the pilot control valve 29 decreases. *Graf*, Col. 5, Ins. 30-33. Thus, as less secondary fuel is called for at pilot control port 27, pressure on the bonnet side of the pilot control valve 29 decreases allowing pressure of primary alternate fuel through port 28 on the opposite side of the diaphragm 31 to move the spool 32 in the direction which closes port 28 thereby reducing flow of primary alternate fuel through the pilot control valve. *Graf*, Col. 5, Ins. 11-15. 33-40.

However, neither of Kern or Graf teaches or suggests a fuel regulator system including a primary pressure regulator coupled to a service valve of the pressurized fuel source to regulate fuel supplied from the pressurized fuel source to a reduced pressure and a secondary pressure regulator coupled to the primary pressure regulator to regulate fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the engine and/or an electro-mechanical valve system coupled to the engine and operated by an electrical switch powered by one of the alternator, a battery, and a magneto that controls fuel flow to the engine from the liquid fuel source and the pressurized fuel source.

First, neither of Kern or Graf teaches or suggests a fuel regulator system including a primary pressure regulator and a secondary pressure regulator, with the secondary pressure

regulator regulating fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the engine. While the Examiner identified a “primary pressure regulator (23)” and a “secondary pressure regulator (24)” in Graf in rejecting claim 13, such a characterization distorts what is disclosed in Graf. That is, the “primary pressure regulator (23)” identified by the Examiner is in fact a “heat exchanger 23” that “is provided adjacent the alternate fuel line to pre-heat the alternate fuel as it passes to a pressure regulator 24.” *Graf*, Col. 4, lns. 40-42. As heat exchanger 23 is not a pressure regulator that regulates a gaseous fuel pressure, the Examiner has not identified a separate primary pressure regulator and secondary pressure regulator in Graf as is called for in claim 13.

Second, neither of Kern or Graf teaches or suggests an electro-mechanical valve system coupled to the engine and operated by an electrical switch powered by one of the alternator, a battery, and a magneto that controls fuel flow to the engine from the liquid fuel source and the pressurized fuel source. While the Examiner identified an electro-mechanical valve system (3) in Graf in rejecting claim 13, the solenoid valve 3 is not a valve system that controls fuel flow to the engine from the liquid fuel source and the pressurized fuel source, as called for in claim 13. That is, while the solenoid valve 3 does control a flow of compressed natural gas from the pressurized storage tank 1 through alternate fuel supply line 4 and to the engine, solenoid valve 3 does not also control fuel flow to the engine from the liquid fuel source as does the claimed electro-mechanical valve system of claim 13. Thus, the solenoid valve 3 of Graf cannot be said to teach or suggest the electro-mechanical valve system of claim 13 that controls fuel flow to the engine from both the liquid fuel source and the pressurized fuel source.

In light of at least the above, the combination of Kern and Graf fails to teach or suggest that which is called for in claim 13 and claim 13 is thus patentably distinct therefrom. Applicant therefore respectfully requests withdrawal of the rejection of claim 13 and of all claims dependent therefrom.

Conclusion

Therefore, in light of at least the foregoing, Applicant respectfully believes that the present application is in condition for allowance. As a result, Applicant respectfully requests timely issuance of a Notice of Allowance for claims 1-26.

Applicant appreciates the Examiner's consideration of these Amendments and Remarks and cordially invites the Examiner to call the undersigned, should the Examiner consider any matters unresolved.

Respectfully submitted,

/Kevin R. Rosin/

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Dated: May 2, 2018
Attorney Docket No.: CET1090.044

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General Authorization and Extension of Time

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 50-2623. Should no proper payment be enclosed herewith, as by credit card authorization being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 50-2623. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extensions under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 50-2623. Please consider this a general authorization to charge any fee that is due in this case, if not otherwise timely paid, to Deposit Account No. 50-2623.

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Attorney Docket No.: CET1090.044

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	15285215
	Filing Date	2016-10-04
	First Named Inventor	Kendall J. Collie et al.
	Art Unit	3747
	Examiner Name	Long T. Tran
	Attorney Docket Number	CET1090.044

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	2	3412258		1968-11-19	Satter	
	3	3659574		1972-05-02	Reschke et al.	
	4	3888223		1975-06-10	Mondt	
	5	4335697		1982-06-22	McLean	
	6	4373493		1983-02-15	Welsh	
	7	4463735		1984-08-07	Stoltman	
	8	4480595		1984-11-06	Hobby et al.	

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Application Number		15285215
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First Named Inventor	Kendall J. Collie et al.	
Art Unit	3747	
Examiner Name	Long T. Tran	
Attorney Docket Number	CET1090.044	

9	4628871		1986-12-16	Glass	
10	4708094		1987-11-24	Helmich et al.	
11	4979480		1990-12-25	Daikoku et al.	
12	5092305		1992-03-03	King	
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Application Number	15285215
Filing Date	2016-10-04
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Art Unit	3747
Examiner Name	Long T. Tran
Attorney Docket Number	CET1090.044

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Kevin R. Rosin/	Date (YYYY-MM-DD)	2018-05-02
Name/Print	Kevin R. Rosin	Registration Number	55584

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Application Number:	15285215			
Filing Date:	04-Oct-2016			
Title of Invention:	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE			
First Named Inventor/Applicant Name:	Kendall J. Collie			
Filer:	Kevin Roger Rosin./Robyn Templin			
Attorney Docket Number:	CET1090.044			
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
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Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	2806	1	120	120
Total in USD (\$)				120

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Application Number:	15285215
International Application Number:	
Confirmation Number:	2429
Title of Invention:	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE
First Named Inventor/Applicant Name:	Kendall J. Collie
Customer Number:	26629
Filer:	Kevin Roger Rosin./Robyn Templin
Filer Authorized By:	Kevin Roger Rosin.
Attorney Docket Number:	CET1090.044
Receipt Date:	02-MAY-2018
Filing Date:	04-OCT-2016
Time Stamp:	10:54:15
Application Type:	Utility under 35 USC 111(a)

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New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 15/285,215		Filing Date 10/04/2016		☐ To be Mailed			
ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO											
APPLICATION AS FILED - PART I											
		(Column 1)		(Column 2)							
FOR		NUMBER FILED		NUMBER EXTRA		RATE (\$)		FEE (\$)			
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A		N/A		N/A					
☐ SEARCH FEE (37 CFR 1.16(k), (l), or (m))		N/A		N/A		N/A					
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))		N/A		N/A		N/A					
TOTAL CLAIMS (37 CFR 1.16(i))		minus 20 = *				x \$40 =					
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 = *				x \$210 =					
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).									
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))											
* If the difference in column 1 is less than zero, enter "0" in column 2.						TOTAL					
APPLICATION AS AMENDED - PART II											
		(Column 1)		(Column 2)		(Column 3)					
AMENDMENT	05/02/2018	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA		RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 26	Minus	** 26	= 0			x \$50 =		0	
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0			x \$230 =		0	
	☐ Application Size Fee (37 CFR 1.16(s))										
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
								TOTAL ADD'L FEE		0	
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR		PRESENT EXTRA		RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	*	Minus	**	=			x \$0 =			
	Independent (37 CFR 1.16(h))	*	Minus	***	=			x \$0 =			
	☐ Application Size Fee (37 CFR 1.16(s))										
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
								TOTAL ADD'L FEE			
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.								LIE			
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".								bridget C monroe			
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".											
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.											

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	15285215
	Filing Date	2016-10-04
	First Named Inventor	Kendall J. Collie et al.
	Art Unit	3747
	Examiner Name	Long T. Tran
	Attorney Docket Number	CET1090.044

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	1	2060477	CN	U	1990-08-15	Zhao Yunying		

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		15285215
	Filing Date		2016-10-04
	First Named Inventor	Kendall J. Collie et al.	
	Art Unit	3747	
	Examiner Name	Long T. Tran	
	Attorney Docket Number	CET1090.044	

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Examiner Signature		Date Considered	
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	15285215
Filing Date	2016-10-04
First Named Inventor	Kendall J. Collie et al.
Art Unit	3747
Examiner Name	Long T. Tran
Attorney Docket Number	CET1090.044

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Stephanie M. Laundre/	Date (YYYY-MM-DD)	2018-02-21
Name/Print	Stephanie M. Laundre	Registration Number	65124

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

**Espacenet****Bibliographic data: CN2060477 (U) — 1990-08-15**

CARBURETTOR

Inventor(s): YUNYING ZHAO [CN] ± (ZHAO YUNYING)
Applicant(s): ZHAO YUNYING [CN] ± (ZHAO YUNYING)
Classification: - **international:** *F02M3/05*; (IPC1-7): F02M3/05
- **cooperative:**
Application number: CN1989217629U 19890927
Priority number(s): CN1989217629U 19890927

Abstract of CN2060477 (U)

The utility model relates to a carburetor used for a combustion engine. The carburetor used for a combustion engine is characterized in that a fuel oil switch is arranged at a fuel inlet of a carburetor, and a restoring spring is arranged on a valve core of the fuel oil switch. A torsional handle of the valve core is connected with an operation draw rod. When an automobile is put into gear to slide down a slope, the fuel oil switch is closed by a driver through the operation draw rod, and the purpose of oil saving is achieved. When the operation draw rod is released, the fuel oil switch is automatically restored. The structure of the carburetor used for a combustion engine is simple. The current carburetor is convenient to modify. The carburetor used for a combustion engine is particularly suitable for a vehicle which often runs in a mountain area.



(12) 实用新型专利申请说明书

[21] 申请号 89217629.6

[51] Int. Cl.³

F02M 3/05

[43] 公告日 1990年8月15日

[22] 申请日 89.9.27

[71] 申请人 赵云英

地址 河北省安国县鹿各庄乡郑各庄村
071202

[72] 设计人 赵云英

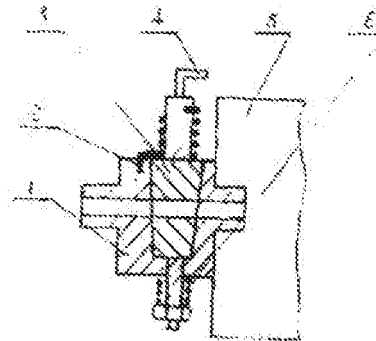
[44] 专利代理机构 河北省专利事务所
代理人 朱振强

说明书页数: 2 附图页数: 2

[54] 实用新型名称 一种汽化器

[57] 摘要

供微旋发动机使用的汽化器,其特征是汽化器的燃料入口处设有一燃油开关该开关的阀芯上设有复位弹簧,阀芯扭把与操作拉杆连接。当汽车下坡挂档慢行时,司机经拉杆关闭燃油开关,达到节油目的;解除拉杆,燃油开关自动复位。本实用新型结构简单,对现有汽化器改造方便,特别适用于经常在山区行驶的车辆。



(8.2) 第1张(2)号

权 利 要 求 书

1、一种燃烧发动机使用的汽化器，其特征在于所述的汽化器燃油入口处，有一燃油开关。

2、根据权利要求1所述的汽化器，其特征在于燃油开关由阀体1、复位弹簧2、阀芯3、扭把4和拉紧弹簧6组成。

3、根据权利要求1或2所述的汽化器，其特征在于所述阀体1与汽化器外壳5，可以设计为一体或分离式。

一种汽化器

本实用新型属于一种供燃烧发动机使用的汽化器。

现有汽车发动机使用的汽化器，燃油入口都没有燃油开关，按操作规程规定，汽车下坡时，不得空挡滑行，以保证汽车发动机带动压气机工作，使刹车有足够气压，而汽车下坡挂挡滑行时，发动机处于被驱动状态，发动机不需要汽化器供给可燃混合汽，现有技术决定了只要发动机工作，燃油泵就通过汽化器向发动机供给可燃混合汽，这样大量的燃油被浪费掉。

本实用新型的目的是：当汽车下坡挂挡滑行时，关闭汽化器燃油入口，使发动机在不烧燃油的情况下，带动机油泵、压气机工作，达到下坡节油的目的。

以下结合附图对本实用新型进行详细描述。

附图1为汽车发动系统示意图。

附图2为本实用新型燃油开关结构示意图。

参看附图1，发动机工作时，带动机油泵、燃油泵和压气机工作，机油泵向发动机供给润滑油，燃油泵通过汽化器向发动机供给可燃混合汽，压气机供刹车足够的气压，所以现有技术的缺点是，只要发动机工作，燃油泵就会通过汽化器向发动机供给可燃混合汽。

当汽车下坡时，汽车可挂挡滑行，由于发动机处于被驱动状态，不需要汽化器供给可燃混合汽，司机可通过拉杆关闭汽化器燃油入口开关，使燃油不能进入汽化器，同时关闭点火开关，发动机在不

烧燃油的情况下，带动机油泵、压气机工作，这样即保证了发动机的润滑和刹车气压，又达到节省燃油的目的。下坡终止，打开点火开关和汽化器燃油入口开关，汽车恢复正常运行。

参看图2，汽化器燃油进口，由阀体1、复位弹簧2、阀芯3、拉把4及拉紧弹簧6组成了燃油开关。阀体1与汽化器外壳5可是分离式，也可制成一体。需要关闭燃油进口时，司机通过拉杆驱动拉把4，使阀芯3上的孔与阀体1上的孔错开，使汽化器进口断开，释放拉杆阀芯3在复位弹簧2作用下复位，打开汽化器进口。拉紧弹簧6将阀芯3与阀体1紧密接触，以防接触面漏油。

本实用新型结构简单，对经常行驶在山区的车辆，节油效果更显著，实现了车辆下坡挂挡安全滑行，可广泛用于各种汽油车和柴油车。

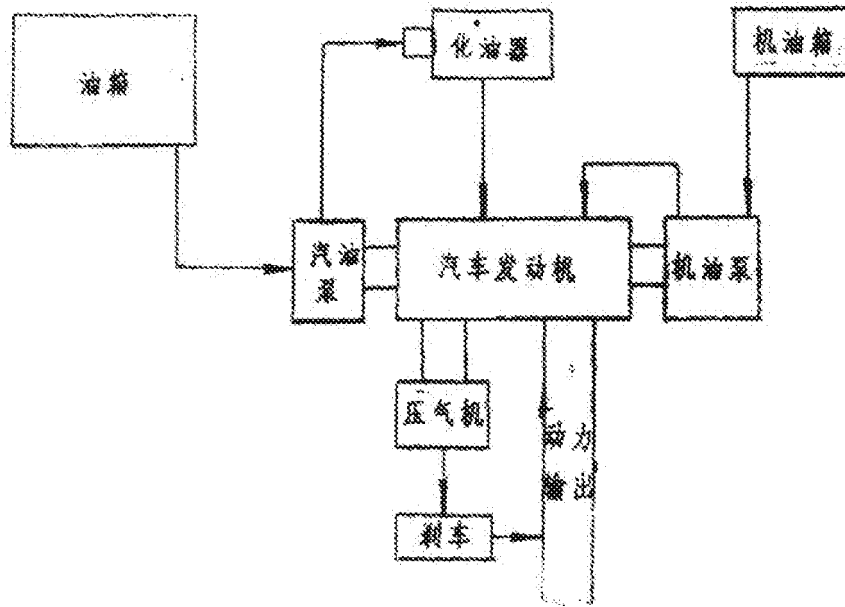


图1

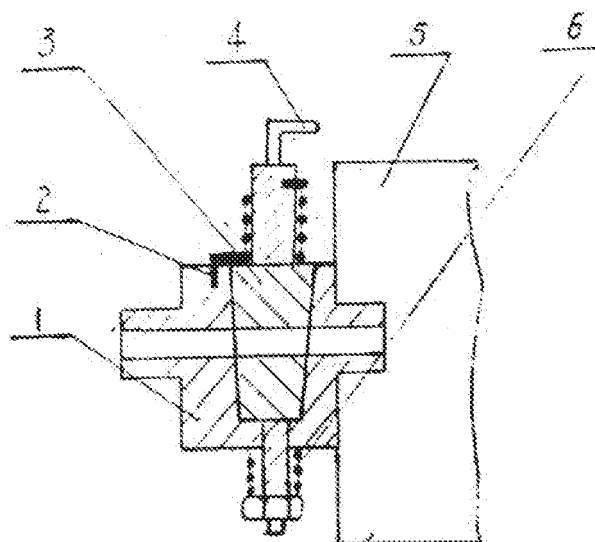


图2

Electronic Acknowledgement Receipt

EFS ID:	31847109
Application Number:	15285215
International Application Number:	
Confirmation Number:	2429
Title of Invention:	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE
First Named Inventor/Applicant Name:	Kendall J. Collie
Customer Number:	26629
Filer:	Stephanie Mueller Laundre/Robyn Templin
Filer Authorized By:	Stephanie Mueller Laundre
Attorney Docket Number:	CET1090.044
Receipt Date:	21-FEB-2018
Filing Date:	04-OCT-2016
Time Stamp:	14:15:30
Application Type:	Utility under 35 USC 111(a)

Payment information:

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	SupplIDS.pdf	1034974	no	4
			dc2baaffa6c075e9f0af1e7a8025d826a1c06d61		

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2	Foreign Reference	FPD1-CN2060477U.pdf	451233	no	7
			2141ee71ce889da1b107045535acd687116525e46		
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			Total Files Size (in bytes):	1486207	
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/285,215	10/04/2016	Kendall J. Collie	CET1090.044	2429

26629 7590 02/02/2018
ZIOLKOWSKI PATENT SOLUTIONS GROUP, SC (ZPS)
136 S WISCONSIN ST
PORT WASHINGTON, WI 53074

EXAMINER
TRAN, LONG T

ART UNIT	PAPER NUMBER
3747	

NOTIFICATION DATE	DELIVERY MODE
02/02/2018	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

info@zpspatents.com
sml@zpspatents.com

Office Action Summary	Application No. 15/285,215	Applicant(s) COLLIE ET AL.	
	Examiner LONG T. TRAN	Art Unit 3747	AIA (First Inventor to File) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

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- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 4 October 2016.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

- 5) ☒ Claim(s) 1-26 is/are pending in the application.
5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) ____ is/are allowed.
- 7) ☒ Claim(s) 1-26 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☒ The drawing(s) filed on 4 October 2016 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

- a) ☐ All b) ☐ Some** c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) ☒ Notice of References Cited (PTO-892) | 3) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)
Paper No(s)/Mail Date <u>see attached</u> . | 4) ☐ Other: ____. |

DETAILED ACTION

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.
2. Claims 1 - 26 remain pending in the application and have been fully considered.

Claim Rejections - 35 USC § 112

3. The following is a quotation of 35 U.S.C. 112(b):
(b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 5, 8 - 12 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention. Applicant claims the multi-fuel engine in Claim 5 is a dual fuel engine. However, claims 8 - 12 refer to a third fuel - a second gaseous fuel. This renders the claims unclear as to whether the engine is a dual fuel or the more generic multi-fuel engine. Correction is required.

Claim Rejections - 35 USC § 102

5. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of

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rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a)(2) the claimed invention was described in a patent issued under section 151, or in an application for patent published or deemed published under section 122(b), in which the patent or application, as the case may be, names another inventor and was effectively filed before the effective filing date of the claimed invention.

7. Claims 1 - 7, 20 - 25 are rejected under 35 U.S.C. 102(a)(2) as being anticipated by Poehlman (US 4,489,699).

Regarding Claim 1:

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

Regarding Claim 2:

Poehlman teaches a carburetor (15) attached to an intake (105) of the engine to mix air and fuel and connect a liquid fuel source to the intake; and wherein the liquid cutoff solenoid is coupled to the carburetor to open and close the liquid fuel path downstream from a float bowl (17) in the carburetor; and

further wherein the gaseous cutoff solenoid couples the gaseous fuel source to the intake to control flow of the gaseous fuel to the engine (Figs 1 - 3).

Regarding Claim 3:

Poehlman teaches the switch actuates the liquid cutoff solenoid and the gaseous cutoff solenoid to change engine operation between the liquid fuel and the gaseous fuel so as to prevent fuel flow from a liquid fuel source and the gaseous fuel source simultaneously and allow switching between fuel sources on-the-fly during engine operation (Col 4 lines 3 - 69).

Regarding Claim 4:

Poehlman teaches the switch actuates the gaseous cutoff solenoid and the liquid cutoff solenoid in succession to provide fuel overlap when changing engine operation between the liquid fuel and the gaseous fuel (Col 6 lines 43 - 55).

Regarding Claim 5:

Poehlman teaches the multi-fuel engine is a dual fuel engine (Col 1 lines 17 - 20) that operates on gasoline from a liquid fuel source and LPG from the gaseous fuel source (Col 3 lines 35 - 36 states other gaseous fuel types are useable).

Regarding Claim 6:

Peolhman teaches a liquid fuel valve (43) coupling the liquid fuel source to the carburetor, actuated by the switch coupled to the power source.

Regarding Claim 7:

Poehlman teaches the switch opens the liquid fuel valve to fill the float bowl with liquid fuel prior to switching operation to liquid fuel (Col 11 lines 35 - 50).

Regarding Claim 20:

Poehlman teaches a multi-fuel internal combustion engine comprising: an engine (13) operable on liquid fuel supplied through a liquid fuel line from a liquid fuel source (21) and gaseous fuel supplied through a gaseous fuel line from a pressurized fuel source (27); a switch (51) to change operation of the engine from liquid fuel to gaseous fuel and from gaseous fuel to liquid fuel while the engine is running; a liquid fuel cutoff solenoid (43) coupled to control fuel flow through the liquid fuel line and engage engine operation on liquid fuel upon actuation of the switch from gaseous fuel to liquid fuel; and a gaseous fuel cutoff (45) solenoid coupled to control fuel flow through the gaseous fuel line and engage engine operation on gaseous fuel upon actuation of the switch from liquid fuel to gaseous fuel.

Regarding Claim 21:

Poehlman teaches the liquid fuel cutoff solenoid (via 51, see Figs 1 - 3) is a carburetor cutoff solenoid coupled to a carburetor (15).

Regarding Claim 22:

Poehlman teaches the liquid fuel cutoff solenoid is coupled along the liquid fuel line (Figs 1 - 3).

Regarding Claim 23:

Poehlman teaches the switch institutes a predefined delay between actuating the liquid fuel cutoff solenoid and the gaseous fuel cutoff solenoid (via 51, during a switch, the flow of fuel is not always immediate).

Regarding Claim 24:

Poehlman teaches the switch operates the liquid fuel cutoff solenoid and the gaseous fuel cutoff solenoid to substantially prevent simultaneous fuel delivery of the liquid fuel and the gaseous fuel to the engine (Col 4 and Col 6).

Regarding Claim 25:

Poehlman teaches the gaseous fuel cutoff solenoid and the liquid fuel cutoff solenoid operate as normally closed solenoid valves (via switch 51).

Claim Rejections - 35 USC § 103

8. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

9. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

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10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103 are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. This application currently names joint inventors. In considering patentability of the claims the examiner presumes that the subject matter of the various claims was commonly owned as of the effective filing date of the claimed invention(s) absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and effective filing dates of each claim that was not commonly owned as of the effective filing date of the later invention in order for the examiner to consider the applicability of 35 U.S.C. 102(b)(2)(C) for any potential 35 U.S.C. 102(a)(2) prior art against the later invention.

12. Claims 13 - 15, and 18 - 19 are rejected under 35 U.S.C. 103 as being unpatentable over Kern et al. (US 2004/0139943) and in view of Graf (US 5,450,832).

Regarding Claim 13:

Kern et al. teaches a multi-fuel generator (10) and fuel delivery system comprising an alternator (14) driven by the multi-fuel internal combustion engine (12).

Kern et al. is silent to a multi-fuel internal combustion engine configured to operate on a liquid fuel supplied from a liquid fuel source through a liquid fuel line and a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line ; a fuel regulator system comprising: a primary pressure regulator coupled to a service valve of the pressurized fuel source to regulate fuel supplied from the pressurized fuel source to a reduced pressure, and a secondary pressure regulator coupled to the primary pressure regulator to regulate fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the engine; and an electro-mechanical valve system coupled to the engine and operated by an electrical switch powered by one of the alternator, a battery, and a magneto that controls fuel flow to the engine from the liquid fuel source and the pressurized fuel source.

However, Graf teaches a multi-fuel internal combustion engine (see abstract) configured to operate on a liquid fuel supplied from a liquid fuel source (2) through a liquid fuel line and a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line (1) ; a fuel regulator system comprising: a primary pressure regulator (23) coupled to a service valve (3) of the pressurized fuel source to regulate fuel supplied from the pressurized fuel source to a reduced pressure, and a secondary pressure regulator (24) coupled to the primary pressure regulator to regulate fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the engine; and an electro-mechanical valve system (3 in combination

with 7 and 6) coupled to the engine and operated by an electrical switch powered by one of the alternator, a battery (8), and a magneto that controls fuel flow to the engine from the liquid fuel source and the pressurized fuel source.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the multi-fuel engine of Graf in the generator of Kern et al. in order to switch between the two fuels and increase the fuel economy of the generator.

Regarding Claim 14:

Kern et al. is silent to the electro-mechanical valve system is configured to switch operation of the generator from multiple fuel sources while the generator is running.

However, Graf teaches via switch 51 the electro-mechanical valve system is configured to switch operation of the generator from multiple fuel sources while the generator is running.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the multi-fuel engine of Graf in the generator of Kern et al. in order to switch between the two fuels and increase the fuel economy of the generator.

Regarding Claim 15:

Kern et al. is silent to wherein the electro-mechanical valve system is configured to prevent simultaneous delivery of the liquid fuel and the gaseous fuel to the engine.

However, Graf teaches via switch 51 the electro-mechanical valve system is configured to prevent simultaneous delivery of the liquid fuel and the gaseous fuel to the engine.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the multi-fuel engine of Graf in the generator of Kern et al. in order to switch between the two fuels and increase the fuel economy of the generator.

Regarding Claim 18:

Kern et al. is silent to the pressurized fuel source comprises a pressurized fuel container located off-board the generator having a regulator mounting device to secure at least the secondary pressure regulator thereto.

However, Graf teaches the pressurized fuel source comprises a pressurized fuel container located off-board the generator having a regulator mounting device to secure at least the secondary pressure regulator thereto (Fig 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the multi-fuel engine of Graf in the generator of Kern et al. in order to switch between the two fuels and increase the fuel economy of the generator.

Regarding Claim 19:

Kern et al. is silent to a dual stage pressure regulator comprises the primary pressure regulator and the secondary pressure regulator.

However, Graf teaches a dual stage pressure regulator (Fig 1, 24 and 25) comprises the primary pressure regulator and the secondary pressure regulator.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the multi-fuel engine of Graf in the generator of Kern et al. in order to switch between the two fuels and increase the fuel economy of the generator.

13. Claims 16 - 17 are rejected under 35 U.S.C. 103 as being unpatentable over Kern et al. (US 2004/0139943) and in view of Poehlman (US 4,489,699).

Regarding Claim 16:

Kern et al. is silent to a carburetor cutoff solenoid coupled to a carburetor to control liquid fuel flow to the engine, and a gaseous fuel cutoff solenoid coupled to the gaseous fuel line to control flow of the gaseous fuel to the engine.

However, Poehlman teaches a carburetor cutoff solenoid (via ECM 10 and switch 51) coupled to a carburetor (15) to control liquid fuel flow to the engine, and a gaseous fuel cutoff solenoid (45) coupled to the gaseous fuel line to control flow of the gaseous fuel to the engine.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the multi-fuel engine of Poehlman in the generator of Kern et al. in order to switch between the two fuels and increase the fuel economy of the generator.

Regarding Claim 17:

Kern et al. is silent to a liquid fuel cutoff solenoid coupled to the liquid fuel line to control flow of the liquid fuel to the carburetor.

However, Poehlman teaches a liquid fuel cutoff solenoid (43) coupled to the liquid fuel line to control flow of the liquid fuel to the carburetor.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the multi-fuel engine of Poehlman in the generator of Kern et al. in order to switch between the two fuels and increase the fuel economy of the generator.

14. Claim 26 is rejected under 35 U.S.C. 103 as being unpatentable over Poehlman (US 4,489,699) and in view of Kern et al. (US 2004/0139943) and Graf (US 5,450,832).

Regarding Claim 26:

Poehlman teaches a carburetor (15) coupled to an intake (105) of the engine to mix air and fuel and connect to the liquid fuel line and the gaseous fuel line.

Poehlman is silent to an alternator driven by the engine to form a generator; and a fuel regulator system located off-board the generator and comprising: a primary pressure regulator coupled to a service valve of the pressurized fuel source to regulate the fuel supplied from the pressurized fuel source to a reduced pressure, and a secondary pressure regulator coupled to the primary pressure regulator to regulate the gaseous fuel supplied from the primary

pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the engine.

However, Kern et al. teaches a multi-fuel engine comprising an alternator (41) driven by the engine to form a generator (10) for the purpose of generating electric power for a generator.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the alternator of Kern et al. in order to utilize the power driven by the crankcase of the engine to generate electricity.

In addition, Graf teaches a fuel regulator system comprising: a primary pressure regulator (23) coupled to a service valve (3) of the pressurized fuel source to regulate fuel supplied from the pressurized fuel source to a reduced pressure, and a secondary pressure regulator (24) coupled to the primary pressure regulator to regulate fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the engine.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the fuel regulator system of Graf in the engine of Poehlman in order to control the amount of fuel being metered to the engine based on engine operating conditions to improve fuel economy.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LONG T. TRAN whose telephone number is (571)270-1899. The examiner can normally be reached on M-F, 7:30am - 5:00pm.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lindsay Low can be reached on 571-272-1196. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/LONG T TRAN/
Primary Examiner, Art Unit 3747

Notice of References Cited	Application/Control No. 15/285,215		Applicant(s)/Patent Under Reexamination COLLIE ET AL.	
	Examiner LONG T. TRAN		Art Unit 3747	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-2015/0122230 A1	05-2015	Sarder; Mark J.	F02D19/0647	123/525
*	B	US-2014/0373531 A1	12-2014	Wong; Jim	F02B43/02	60/605.1
*	C	US-2014/0238340 A1	08-2014	Dunn; Mark E.	F02M43/00	123/299
*	D	US-2007/0137591 A1	06-2007	Sugimoto; Yasuhiro	F02B43/00	123/41.7
*	E	US-2004/0139943 A1	07-2004	Kern, Robert D.	F01P11/16	123/198D
*	F	US-6,591,817 B2	07-2003	Deutsch; Robert W.	F02D19/0647	123/525
*	G	US-2002/0134362 A1	09-2002	Deutsch, Robert W.	F02D19/0647	123/575
*	H	US-5,611,312 A	03-1997	Swanson; Mark S.	F02M1/02	123/179.18
*	I	US-5,450,832 A	09-1995	Graf; Bruce R.	F02M13/08	123/515
*	J	US-4,489,699 A	12-1984	Poehlman; Arthur G.	F02B69/04	123/525
*	K	US-3,783,849 A	01-1974	Bramfitt; Thomas Hugh	F02M13/06	123/179.16
*	L	US-3,718,000 A	02-1973	Walker; Brooks	F02B11/02	123/525
	M	US-				

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes 	Application/Control No. 15285215	Applicant(s)/Patent Under Reexamination COLLIE ET AL.
	Examiner LONG T TRAN	Art Unit 3747

CPC- SEARCHED		
Symbol	Date	Examiner
F02D41/0025; F02D41/0027; F02D19/0647; F02D19/081; F02D19/0613; F02D19/08; F02D19/105; F02B2043/103; F02B2201/06; F02B2201/064	1/29/2018	LT

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor search	1/29/2018	LT
PLUS search	1/29/2018	LT
Forward and backward citation	1/29/2018	LT
Text search	1/29/2018	LT

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S47	20	engine and (gasoline same fuel same valve) and ((gas\$4 lpg ng (natural adj gas)) near5 fuel same valve) and solenoid and ((carburetor carburetor) same intake) and ((switch\$4 chang\$4) near5 fuel) and (float near2 bowl)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 09:39
S48	33	engine and (gasoline same fuel same valve) and ((gas\$4 lpg ng (natural adj gas)) near5 fuel same valve) and solenoid and ((carburetor carburetor) same intake) and ((switch\$4 chang\$4) near5 fuel) and (float near2 (chamber bowl) same (carburetor carburettor))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 09:52
S49	38	engine and ((gasoline liquid first second) near3 fuel same valve) and ((gas\$4 lpg ng (natural adj gas)) near5 fuel same valve) and solenoid and ((carburetor carburetor) same intake) and ((switch\$4 chang\$4) near5 fuel) and (float near2 (chamber bowl) same (carburetor carburettor)) and gasoline	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 10:10
S50	10	engine and ((gasoline liquid first second) near3 fuel same valve) and ((gas\$4 lpg ng (natural adj gas)) near5 fuel same valve) and solenoid and ((carburetor carburetor) same intake) and ((switch\$4 chang\$4) near5 fuel) and (float near2 (chamber bowl) same (carburetor carburettor)) and gasoline and ((dual plural\$4 two bi multi multiple) adj fuel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 10:24
S51	14	engine and (fuel same valve) and ((gas\$4 lpg ng (natural adj gas)) same gasoline) and solenoid and ((carburetor carburetor) same intake) and ((switch\$4 chang\$4) near5 fuel) and (float near2 (chamber bowl) same (carburetor carburettor)) and ((dual plural\$4 two bi multi multiple) adj fuel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 10:27
S52	14	engine and (fuel same valve) and ((gas\$4 lpg ng (natural adj gas)) same gasoline) and solenoid and ((carburetor carburetor) same intake) and ((switch\$4 chang\$4) near5 fuel) and (float\$4 near2 (chamber bowl) same (carburetor carburettor)) and ((dual plural\$4 two bi multi multiple) adj fuel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 10:32
S53	3	engine and (fuel same valve) and ((gas\$4) same gasoline) and solenoid and ((carburetor carburetor) same intake) and ((switch\$4 chang\$4) near5 fuel) and	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	ON	2018/01/29 10:52

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		((float\$4 near2 (chamber bowl) same (carburetor carburettor)) and ((plural\$4 multi multiple) adj fuel) and (lpg same (ng "natural gas"))) and gasoline	JPO; DERWENT; IBM_TDB			
S55	4	engine and (fuel same valve) and ((gas\$4) same gasoline) and solenoid and ((switch\$4 chang\$4) near5 fuel) and (float\$4 near2 (chamber bowl) same (carburetor carburettor)) and ((plural\$4 multi multiple) adj fuel) and (lpg same (ng "natural gas"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 10:59
S54	4	engine and (fuel same valve) and ((gas\$4) same gasoline) and solenoid and ((switch\$4 chang\$4) near5 fuel) and (float\$4 near2 (chamber bowl) same (carburetor carburettor)) and ((plural\$4 multi multiple) adj fuel) and (lpg same (ng "natural gas"))) and gasoline	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 10:59
S56	8	engine and (fuel same valve) and ((gas\$4) same gasoline) and ((switch\$4 chang\$4) near5 fuel) and (float\$4 near2 (chamber bowl) same (carburetor carburettor)) and ((plural\$4 multi multiple) adj fuel) and (lpg same (ng "natural gas"))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 11:06
S57	70	engine and (fuel same valve) and ((gas\$4) same gasoline) and ((switch\$4 chang\$4) near5 fuel) and ((plural\$4 multi multiple dual two bi) adj fuel) and (alternator or (gnerat\$4 near5 electric\$4)) and (fuel same (pressure near2 regulat\$4) same valve)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 11:21
S58	11	engine and (fuel same valve) and ((gas\$4) same gasoline) and ((switch\$4 chang\$4) near5 fuel) and ((plural\$4 multi multiple dual two bi) adj fuel) and (alternator or (gnerat\$4 near5 electric\$4)) and (fuel same (pressure near2 regulat\$4) same valve) and ((primary second\$4 supplement\$4) near2 pressure near2 regulat\$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 11:26
S59	17	engine and (fuel same valve) and ((gas\$4) same gasoline) and ((switch\$4 chang\$4) near5 fuel) and ((plural\$4 multi multiple dual two bi) adj fuel) and (alternator or (generat\$4 near5 electric\$4)) and (fuel same (pressure near2 regulat\$4) same valve) and ((primary second\$4 supplement\$4) near2 pressure near2 regulat\$4) and generator	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 11:31
L1	22	engine and (fuel same valve) and ((gas\$4) same gasoline) and ((switch\$4 chang\$4) near5 fuel) and ((plural\$4 multi multiple dual two bi) adj fuel) and (alternator or (generat\$4 near5 electric\$4)) and (fuel same (pressure near2 regulat\$4) same valve) and ((primary second\$4 supplement\$4) near2 pressure near2 regulat\$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 12:51
L2	24	engine and (fuel same valve) and ((gas\$4) same gasoline) and ((switch\$4 chang\$4)	US-PGPUB; USPAT;	OR	ON	2018/01/29 12:57

		near5 fuel) and ((plural\$4 multi multiple dual two bi) adj fuel) and (alternator or (generat\$4 near5 electric\$4)) and (fuel same (pressure near2 regulat\$4) same valve) and ((primary second\$4 supplement\$4) near2 (fuel pressure) near2 regulat\$4)	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
L3	63	engine and (fuel same valve) and ((gas\$4) same gasoline) and ((switch\$4 chang\$4) near5 fuel) and ((plural\$4 multi multiple dual two bi) adj fuel) and (fuel same (pressure near2 regulat\$4) same valve) and ((primary second\$4 supplement\$4) near2 (fuel pressure) near2 regulat\$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 13:06
L4	55	engine and (fuel same valve) and ((gas\$4) same gasoline) and ((switch\$4 chang\$4) near5 fuel) and ((plural\$4 multi multiple dual two bi) adj fuel) and (fuel same (pressure near2 regulat\$4) same valve) and ((primary second\$4 supplement\$4) near2 (pressure) near2 regulat\$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 13:13
L5	45	engine and (fuel same valve) and ((gas\$4) same gasoline) and ((switch\$4 chang\$4) near5 fuel) and ((plural\$4 multi multiple dual two bi) adj fuel) and (fuel same (pressure near2 regulat\$4) same valve) and ((primary second\$4 supplement\$4) near2 (pressure) near2 regulat\$4) and switch\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 13:17
L6	100	(fuel same valve) and ((gas\$4) same gasoline) and ((switch\$4 chang\$4) near5 fuel) and ((plural\$4 multi multiple dual two bi) adj fuel) and (generator same engine) and alternator	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 13:30
L7	5	((gas\$4) same gasoline) and ((switch\$4 chang\$4) near5 fuel) and ((plural\$4 multi multiple dual two bi) adj fuel) and (generator near20 portable) and engine and alternator	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 13:40
L13	379	generator and alternator and engine and ((multi multiple plural\$4 dual bi) near2 fuel) and gasoline and (gas\$4 near20 fuel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 13:48
L14	176	generator and alternator and engine and ((multi multiple plural\$4 dual bi) near2 fuel) and gasoline and (gas\$4 near20 fuel) and ((switch\$5 chang\$4) near5 fuel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 13:59
L15	334	generator and alternator and engine and ((multi multiple plural\$4 dual bi) near2 fuel) and ((switch\$5 chang\$4) near5 fuel)	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	ON	2018/01/29 14:10

			JPO; DERWENT; IBM_TDB			
L16	304	generator same engine and alternator and ((multi multiple plural\$4 dual bi) near2 fuel) and ((switch\$5 chang\$4) near5 fuel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 14:14
L18	30	generator same engine and alternator and ((multi multiple plural\$4 dual bi) near2 fuel) and ((switch\$5 chang\$4) near5 fuel) and portable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 15:30
L19	55	generator same engine and alternator and ((multi multiple plural\$4 dual bi) near2 fuel) and ((switch\$5 chang\$4) near5 fuel) and (carburetor carburettor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 15:32
L20	72	generator same engine and alternator and ((multi multiple plural\$4 dual bi) near2 fuel) and (carburetor carburettor) and gas\$4 near5 fuel and gasoline	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 16:14
L21	19	generator same engine and alternator and ((multi multiple plural\$4 dual bi) near2 fuel same (switch\$4 chang\$4)) and (carburetor carburettor) and gas\$4 near5 fuel and gasoline	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 16:29
L22	21	generator same engine and alternator and ((multi multiple plural\$4 dual bi) near2 fuel same (switch\$4 chang\$4)) and (carburetor carburettor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 16:44
L23	105	generator same engine and alternator and ((multi multiple plural\$4 dual bi) near2 fuel) and (carburetor carburettor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 16:45
L24	74	generator and engine same ((multi multiple plural\$4 dual bi) near2 fuel) and (carburetor carburettor) and alternator	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 16:49
L25	15	generator same ((multi multiple plural\$4 dual bi) near2 fuel) and (carburetor	US-PGPUB; USPAT;	OR	ON	2018/01/29 16:50

		carburettor) and alternator and engine	USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
L26	51	generator same ((dual bi) near2 fuel) and alternator and engine	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2018/01/29 16:58

1/ 29/ 2018 5:24:48 PM
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Bibliographic Data

Application No: 15285215

Foreign Priority claimed: ☐ Yes ☒ No

35 USC 119 (a-d) conditions met: ☐ Yes ☒ No ☐ Met After Allowance

Verified and Acknowledged:

LT

Examiner's Signature

Initials

Title:

FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION
ENGINE

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
10/04/2016	123	3747	CET1090.044
RULE			

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James J. Dehn, Brookfield, WI, UNITED STATES

Leigh Jenison, Hartland, WI, UNITED STATES

CONTINUING DATA

This application is a CIP of 14925441 10/28/2015

14925441 is a CIP of 14738060 06/12/2015

FOREIGN APPLICATIONS

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PTO/SB/08a (01-10)

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031

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	First Named Inventor	Kendall J. Collie et al.	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	CET1090.044	

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Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
/L.T.T/ 1	2722208			1955-11-01	Conroy, Jr. et al.	
/L.T.T/ 2	4372276			1983-02-08	Bernhardsson et al.	
/L.T.T/ 3	4450821			1984-05-29	Venning et al.	
/L.T.T/ 4	4489699			1984-12-25	Poehlman	
/L.T.T/ 5	4502453			1985-03-05	Kabasin et al.	
/L.T.T/ 6	4619240			1986-10-28	Bedford et al.	
/L.T.T/ 7	4895124			1990-01-23	Bartholomew	
/L.T.T/ 8	5171487			1992-12-15	Hudz	

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Art Unit		
Examiner Name		
Attorney Docket Number	CET1090.044	

/L.T.T/ ~~9~~	5287839		1994-02-22	Kondou et al.	
/L.T.T/ ~~10~~	5320078		1994-06-14	Lorraine	
/L.T.T/ ~~11~~	5379740		1995-01-10	Moore et al.	
/L.T.T/ ~~12~~	5419291		1995-05-30	Kimata et al.	
/L.T.T/ ~~13~~	5438968		1995-08-08	Johnson et al.	
/L.T.T/ ~~14~~	5450832		1995-09-19	Graf	
/L.T.T/ ~~15~~	5673670		1997-10-07	Powell et al.	
/L.T.T/ ~~16~~	5816224		1998-10-06	Welsh et al.	
/L.T.T/ ~~17~~	6082323		2000-07-04	Winberg	
/L.T.T/ ~~18~~	6213083	B1	2001-04-10	Winberg	
/L.T.T/ ~~19~~	6223730	B1	2001-05-01	Hasegawa et al.	

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Attorney Docket Number	CET1090.044	

/L.T.T/	20	6276345	B1	2001-08-21	Nelson et al.	
/L.T.T/	21	6401685	B1	2002-06-11	Warner	
/L.T.T/	22	6453877	B1	2002-09-24	Lucier et al.	
/L.T.T/	23	6914342	B1	2005-07-05	French	
/L.T.T/	24	7905469	B2	2011-03-15	Nickels et al.	
/L.T.T/	25	8342158	B2	2013-01-01	Ulrey et al.	
/L.T.T/	26	8590510	B2	2013-11-26	Sumilla et al.	
/L.T.T/	27	5161496		1992-11-10	Matsushima et al.	
/L.T.T/	28	5325835		1994-07-05	Kimata et al.	

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First Named Inventor	Kendall J. Collie et al.	
Art Unit		
Examiner Name		
Attorney Docket Number	CET1090.044	

/L.T.T/	1	20130047964	A1	2013-02-28	Kim	
/L.T.T/	2	20130220274	A1	2013-08-29	Deshpande et al.	

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/L.T.T/	1	Honda EU20i LPG, March 20, 2012, https://www.youtube.com/watch?v=yBpq33aJmR0	
/L.T.T/	2	JOHNSON et al., "Electronic Direct Fuel Injection (EDFI) for Small Two-Stroke Engines," SAE Technical Paper 1999-01-3312, Proceedings of the 1999 SAE Small Engine Technology Conference, Madison, WI, September 28-30, 1999, pp. 1-15	

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EXAMINER SIGNATURE

Examiner Signature	/LONG T TRAN/	Date Considered	01/29/2018
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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Application Number		
Filing Date		
First Named Inventor	Kendall J. Collie et al.	
Art Unit		
Examiner Name		
Attorney Docket Number	CET1090.044	

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Application Number		
Filing Date		
First Named Inventor	Kendall J. Collie et al.	
Art Unit		
Examiner Name		
Attorney Docket Number	CET1090.044	

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That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Timothy J. Ziolkowski/	Date (YYYY-MM-DD)	2016-10-04
Name/Print	Timothy J. Ziolkowski	Registration Number	38368

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<i>Index of Claims</i> 	Application/Control No. 15285215	Applicant(s)/Patent Under Reexamination COLLIE ET AL.
	Examiner LONG T TRAN	Art Unit 3747

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant		☐ CPA		☐ T.D.		☐ R.1.47			
CLAIM		DATE							
Final	Original	01/29/2018							
	1	✓							
	2	✓							
	3	✓							
	4	✓							
	5	✓							
	6	✓							
	7	✓							
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	25	✓							
	26	✓							

PLUS Search Results for S/N 15285215, Searched Mon Jan 29 09:14:32 EST 2018

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6003478 99	4836173 96
4825843 97	
5178101 97	
5713336 97	
5832905 97	
5881701 97	
6176224 97	
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4517928 96	
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4825843 97	
5178101 97	
5713336 97	
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4825683 96	
4829957 96	



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/285,215	10/04/2016	Kendall J. Collie	CET1090.044

CONFIRMATION NO. 2429

PUBLICATION NOTICE



OC000000088753487

26629
ZIOLKOWSKI PATENT SOLUTIONS GROUP, SC (ZPS)
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PORT WASHINGTON, WI 53074

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

Publication No.US-2017-0022910-A1

Publication Date:01/26/2017

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
15/285,215	10/04/2016	3747	1040	CET1090.044	26	3

CONFIRMATION NO. 2429

UPDATED FILING RECEIPT

26629
ZIOLKOWSKI PATENT SOLUTIONS GROUP, SC (ZPS)
136 S WISCONSIN ST
PORT WASHINGTON, WI 53074



Date Mailed: 12/01/2016

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Kendall J. Collie, Anaheim Hills, CA;
Mark J. Sarder, Waukesha, WI;
Aleko D. Sotiriades, Cedarburg, WI;
James J. Dehn, Brookfield, WI;
Leigh Jenison, Hartland, WI;

Applicant(s)

Champion Engine Technology, LLC, Sussex, WI

Power of Attorney: The patent practitioners associated with Customer Number 26629

Domestic Priority data as claimed by applicant

This application is a CIP of 14/925,441 10/28/2015
which is a CIP of 14/738,060 06/12/2015

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 10/17/2016

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/285,215**

Projected Publication Date: 01/26/2017

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE

Preliminary Class

123

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER
Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 15/285,215				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A				
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	300		N/A				
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A				
TOTAL CLAIMS (37 CFR 1.16(i))	26 minus 20 =	*	x 40 =	240	OR					
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 210 =	0.00						
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00						
			TOTAL	970		TOTAL				
* If the difference in column 1 is less than zero, enter "0" in column 2.										
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.										

Customer No. 26629
Confirmation No. 2429

Patent
Attorney Docket No. CET1090.044

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of : Collie et al.
Serial No. : 15/285,215
Filed : October 4, 2016
For : FUEL SYSTEM FOR A MULTI-FUEL INTERNAL
COMBUSTION ENGINE
Group Art No. : 3747
Examiner : NOT YET ASSIGNED

CERTIFICATION UNDER 37 CFR 1.8(a) and 1.10

I hereby certify that, on the date shown below, this correspondence is being:

Mailing

☐ deposited with the US Postal Service in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

37 CFR 1.8(a)

37 CFR 1.10

☐ with sufficient postage as first class mail ☐ As "Express Mail Post Office to Addressee" Mailing Label No.

Transmission

■ transmitted by EFS-WEB addressed to **Mail Stop Missing Parts** at the Patent and Trademark Office.

Date: November 28, 2016

/Robyn L. Templin/
Signature

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO NOTICE TO FILE MISSING PARTS OF APPLICATION

Dear Sir:

This is in response to a Notice to File Missing Parts of Application under 37 CFR 1.53(b). Because this response is being filed via EFS-WEB a copy of the Notice is not enclosed. Enclosed are the following documents and/or fees referenced in the Notice to File Missing Parts that are necessary to complete the filing requirements of the above-identified application.

☒ Executed Declaration. The above-identified application is the same application which the inventors executed by signing the enclosed declaration.

☐ Replacement drawings.

☐ Statutory basic filing fee ☐ Utility ☐ Design

☐ Additional claim fees of \$

☒ Missing Parts Surcharge \$70.00

☐ A Petition for Extension of Time for reply to Notice of Missing Parts is attached.

☐ one month (\$100.00)

☐ two months (\$300.00)

☐ three months (\$700.00)

☐ four months (\$1100.00)

Respectfully submitted,

/Stephanie M. Laundre/

Stephanie M. Laundre
Registration No. 65,124
Phone 262-268-8100 ext. 17
SML@zpspatents.com

Dated: November 28, 2016

Attorney Docket No.: CET1090.044

P.O. ADDRESS:

Ziolkowski Patent Solutions Group, SC
136 South Wisconsin Street
Port Washington, WI 53074
262-268-8100

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE
As the below named inventor, I hereby declare that:	
This declaration ☐ The attached application, or is directed to:	
☒ United States application or PCT international application number <u>15/285,215</u> filed on <u>October 4, 2016</u>	
The above-identified application was made or authorized to be made by me.	
I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.	
I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.	
WARNING: Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.	
LEGAL NAME OF INVENTOR	
Inventor: <u>Aleko D. Sotiriades</u>	Date (Optional): <u>10/6/2016</u>
Signature: <u>Aleko Sotiriades</u>	
Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01 form for each additional inventor.	

Customer No. 26629
Confirmation No. 2429

Patent
Attorney Docket No. CET1090.044

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of : Collie et al.
Serial No. : 15/285,215
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For : FUEL SYSTEM FOR A MULTI-FUEL INTERNAL
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Group Art No. : 3747
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Mailing

☐ deposited with the US Postal Service in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

37 CFR 1.8(a)

37 CFR 1.10

☐ with sufficient postage as first class mail ☐ As "Express Mail Post Office to Addressee" Mailing Label No.

Transmission

☒ transmitted by EFS-WEB addressed to the Patent and Trademark Office.

Date: November 28, 2016

/Robyn L. Templin/
Signature

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REQUEST FOR CORRECTED FILING RECEIPT

Dear Sirs:

Correction of the Filing Receipt mailed October 19, 2016 in the above-captioned patent application is hereby requested. A copy of the relevant page of the Filing Receipt with the change noted thereon is being filed herewith.

Specifically, on Page 2 of the Filing Receipt, the word “COMBUSION” in the Title should be corrected to “COMBUSTION”.

An ADS making the above identified change regarding the Title was filed on October 13, 2016, and Applicant requests a Corrected Filing Receipt in accordance with this change.

Please call the undersigned at 262-268-8100 should any matter be unresolved.

Respectfully submitted,

/Stephanie M. Laundre/

Stephanie M. Laundre
Registration No. 65,124
Phone 262-268-8100 ext. 17
SML@zpspatents.com

Dated: November 28, 2016
Attorney Docket No.: CET1090.044

P.O. ADDRESS:

Ziolkowski Patent Solutions Group, SC
136 South Wisconsin Street
Port Washington, WI 53074
262-268-8100

If Required, Foreign Filing License Granted: 10/17/2016

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/285,215**

Projected Publication Date: 01/26/2017

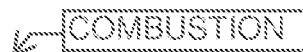
Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE



Preliminary Class

123

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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Electronic Patent Application Fee Transmittal

Application Number:	15285215			
Filing Date:	04-Oct-2016			
Title of Invention:	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE			
First Named Inventor/Applicant Name:	Kendall J. Collie			
Filer:	Stephanie Mueller Laundre/Robyn Templin			
Attorney Docket Number:	CET1090.044			
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
LATE FILING FEE FOR OATH OR DECLARATION	2051	1	70	70
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				70

Electronic Acknowledgement Receipt

EFS ID:	27618655
Application Number:	15285215
International Application Number:	
Confirmation Number:	2429
Title of Invention:	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE
First Named Inventor/Applicant Name:	Kendall J. Collie
Customer Number:	26629
Filer:	Stephanie Mueller Laundre/Robyn Templin
Filer Authorized By:	Stephanie Mueller Laundre
Attorney Docket Number:	CET1090.044
Receipt Date:	28-NOV-2016
Filing Date:	04-OCT-2016
Time Stamp:	12:51:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$70
RAM confirmation Number	112816INTEFSW12523800
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Response to Pre-Exam Formalities Notice	ResponseToMissingParts.pdf	100045	no	2
			feeabc21a6be72b6277566b0ebb0b798e4c6b4ff		
Warnings:					
Information:					
2	Oath or Declaration filed	Declaration.pdf	222206	no	1
			a90b3d3f60ceea17d2ffd643efb339bf339bb34f9		
Warnings:					
Information:					
3	Request for Corrected Filing Receipt	RequestForCorrFilingReceipt.pdf	161875	no	3
			a4f3cca780146cef0268629d988ff7dd0edd1333		
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30435	no	2
			2142022e085fca7c5a040d7b756527dbb62b4f68		
Warnings:					
Information:					
Total Files Size (in bytes):			514561		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

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ZIOLKOWSKI PATENT SOLUTIONS GROUP, SC (ZPS)
136 S WISCONSIN ST
PORT WASHINGTON, WI 53074



Date Mailed: 10/19/2016

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Inventor(s)

Kendall J. Collie, Anaheim Hills, CA;
Mark J. Sarder, Waukesha, WI;
Aleko D. Sotiriades, Cedarburg, WI;
James J. Dehn, Brookfield, WI;
Leigh Jenison, Hartland, WI;

Applicant(s)

Champion Engine Technology, LLC, Sussex, WI

Power of Attorney: The patent practitioners associated with Customer Number 26629

Domestic Priority data as claimed by applicant

This application is a CIP of 14/925,441 10/28/2015
which is a CIP of 14/738,060 06/12/2015

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

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Projected Publication Date: 01/26/2017

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

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PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER
Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/285,215	10/04/2016	Kendall J. Collie	CET1090.044

CONFIRMATION NO. 2429

FORMALITIES LETTER



OC000000086520712

26629
ZIOLKOWSKI PATENT SOLUTIONS GROUP, SC (ZPS)
136 S WISCONSIN ST
PORT WASHINGTON, WI 53074

Date Mailed: 10/19/2016

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing.

Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- Surcharge as set forth in 37 CFR 1.16(f) must be submitted.

The surcharge is due for any one of:

- late submission of the basic filing fee, search fee, or examination fee,
- late submission of inventor's oath or declaration,
- filing an application that does not contain at least one claim on filing, or
- submission of an application filed by reference to a previously filed application.

SUMMARY OF FEES DUE:

The fee(s) required within **TWO MONTHS** from the date of this Notice to avoid abandonment is/are itemized below. Small entity discount is in effect. If applicant is qualified for micro entity status, an acceptable Certification of Micro Entity Status must be submitted to establish micro entity status. (See 37 CFR 1.29 and forms PTO/SB/15A and 15B.)

- \$ 70 surcharge.
- \$(0) previous unapplied payment amount.
- \$ 70 TOTAL FEE BALANCE DUE.

Items Required To Avoid Processing Delays:

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):

page 1 of 2

Aleko D. Sotiriades

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web, including a copy of this Notice and selecting the document description "Applicant response to Pre-Exam Formalities Notice".
<https://portal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html>

For more information about EFS-Web please call the USPTO Electronic Business Center at 1-866-217-9197 or visit our website at <http://www.uspto.gov/ebc>.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/zretta/

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 15/285,215				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A				
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	300		N/A				
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A				
TOTAL CLAIMS (37 CFR 1.16(i))	26 minus 20 =	*	x 40 =	240	OR					
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 210 =	0.00						
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00						
			TOTAL	970		TOTAL				
* If the difference in column 1 is less than zero, enter "0" in column 2.										
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.										

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	CET1090.044
		Application Number	
Title of Invention	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
--

Inventor Information:

Inventor 1 Remove				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Kendall	J.	Collie	
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service				
City	Anaheim Hills	State/Province	CA	Country of Residence US

Mailing Address of Inventor:

Address 1	751 S Weir Canyon Rd, Suite 157 PMB 391			
Address 2				
City	Anaheim Hills	State/Province	CA	
Postal Code	92809	Country	US	

Inventor 2 Remove				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Mark	J.	Sarder	
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service				
City	Waukesha	State/Province	WI	Country of Residence US

Mailing Address of Inventor:

Address 1	W245 N5551 Corporate Circle			
Address 2				
City	Sussex	State/Province	WI	
Postal Code	53089	Country	US	

Inventor 3 Remove				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Aleko	D.	Sotiriades	
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service				

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	CET1090.044
		Application Number	
Title of Invention	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE		

City	Cedarburg	State/Province	WI	Country of Residence	US
-------------	-----------	-----------------------	----	-----------------------------	----

Mailing Address of Inventor:

Address 1	W62N1026 Fairhaven Ct				
Address 2					
City	Cedarburg	State/Province	WI		
Postal Code	53012	Country	US		

Inventor 4					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	James	J.	Dehn		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	Brookfield	State/Province	WI	Country of Residence	US

Mailing Address of Inventor:

Address 1	W245 N5551 Corporate Circle				
Address 2					
City	Sussex	State/Province	WI		
Postal Code	53089	Country	US		

Inventor 5					Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Leigh		Jenison		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	Hartland	State/Province	WI	Country of Residence	US

Mailing Address of Inventor:

Address 1	W245 N5551 Corporate Circle				
Address 2					
City	Sussex	State/Province	WI		
Postal Code	53089	Country	US		

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button.

[Add](#)**Correspondence Information:**

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

Champion - EX2092, Page 320 of 387

☐ An Address is being provided for the correspondence information of this application.

Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	CET1090.044
		Application Number	
Title of Invention	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE		
Customer Number	26629		
Email Address		Add Email	Remove Email

Application Information:

Title of the Invention	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE		
Attorney Docket Number	CET1090.044	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)		Suggested Figure for Publication (if any)	

Publication Information:

☐	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐	Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.			
Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	26629		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.			
Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation in part of	14925441	2015-10-28
Prior Application Status	Pending	Remove	

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	CET1090.044
		Application Number	
Title of Invention	COMBUSTION FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
14925441	Continuation in part of	14738060	2015-06-12
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			

Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).			
			Remove
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Priority Claimed
			☒ Yes ☐ No
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices
If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application. In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application. In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	CET1090.044
		Application Number	
Title of Invention	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE COMBUSTION		

Applicant 1			
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.			
☐ Assignee		☐ Legal Representative under 35 U.S.C. 117	
☒ Person to whom the inventor is obligated to assign.		☐ Person who shows sufficient proprietary interest	
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:			
Name of the Deceased or Legally Incapacitated Inventor :			
If the Assignee is an Organization check here. ☒			
Organization Name	Champion Engine Technology, LLC		
Mailing Address Information:			
Address 1	W245 N5551 Corporate Circle		
Address 2			
City	Sussex	State/Province	WI
Country	US	Postal Code	53089
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button.			

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications					
Signature	/Timothy J. Ziolkowski/			Date (YYYY-MM-DD)	2016-10-13
First Name	Timothy J.	Last Name	Ziolkowski	Registration Number	38368
Additional Signature may be generated within this form by selecting the Add button.					

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	CET1090.044
		Application Number	
Title of Invention	~~COMBUSTION~~ ~~COMBUSTION~~ FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE		

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	27200160
Application Number:	15285215
International Application Number:	
Confirmation Number:	2429
Title of Invention:	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE
First Named Inventor/Applicant Name:	Kendall J. Collie
Customer Number:	26629
Filer:	Timothy J. Ziolkowski/Robyn Templin
Filer Authorized By:	Timothy J. Ziolkowski
Attorney Docket Number:	CET1090.044
Receipt Date:	13-OCT-2016
Filing Date:	
Time Stamp:	10:16:00
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
------------------------	----

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	ADS.pdf	83056	no	7
			242ccdb2c9f95fd57e76f45a61841fe84311c cfe		

Champion - EX2092, Page 326 of 387

Warnings:

Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.

IPR2025-01121

Information:	
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Total Files Size (in bytes):	83056
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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number

Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)



I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above:

26629

OR



I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

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I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):



Inventor or Joint Inventor (title not required below)



Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)



Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)



Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature

Date (Optional)

Name

Mark J. Sarder

Title

Vice President of Engineering, Champion Engine Technology, LLC

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.



Total of

1

forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		
	Filing Date		
	First Named Inventor	Kendall J. Collie et al.	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	CET1090.044	

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	2722208		1955-11-01	Conroy, Jr. et al.	
	2	4372276		1983-02-08	Bernhardsson et al.	
	3	4450821		1984-05-29	Venning et al.	
	4	4489699		1984-12-25	Poehlman	
	5	4502453		1985-03-05	Kabasin et al.	
	6	4619240		1986-10-28	Bedford et al.	
	7	4895124		1990-01-23	Bartholomew	
	8	5171487		1992-12-15	Hudz	

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number		
Filing Date		
First Named Inventor	Kendall J. Collie et al.	
Art Unit		
Examiner Name		
Attorney Docket Number	CET1090.044	

9	5287839		1994-02-22	Kondou et al.	
10	5320078		1994-06-14	Lorraine	
11	5379740		1995-01-10	Moore et al.	
12	5419291		1995-05-30	Kimata et al.	
13	5438968		1995-08-08	Johnson et al.	
14	5450832		1995-09-19	Graf	
15	5673670		1997-10-07	Powell et al.	
16	5816224		1998-10-06	Welsh et al.	
17	6082323		2000-07-04	Winberg	
18	6213083	B1	2001-04-10	Winberg	
19	6223730	B1	2001-05-01	Hasegawa et al.	

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number		
Filing Date		
First Named Inventor	Kendall J. Collie et al.	
Art Unit		
Examiner Name		
Attorney Docket Number	CET1090.044	

20	6276345	B1	2001-08-21	Nelson et al.	
21	6401685	B1	2002-06-11	Warner	
22	6453877	B1	2002-09-24	Lucier et al.	
23	6914342	B1	2005-07-05	French	
24	7905469	B2	2011-03-15	Nickels et al.	
25	8342158	B2	2013-01-01	Ulrey et al.	
26	8590510	B2	2013-11-26	Sumilla et al.	
27	5161496		1992-11-10	Matsushima et al.	
28	5325835		1994-07-05	Kimata et al.	

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Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		
	Filing Date		
	First Named Inventor	Kendall J. Collie et al.	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	CET1090.044	

1	20130047964	A1	2013-02-28	Kim
2	20130220274	A1	2013-08-29	Deshpande et al.

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Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²ⁱ	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1							

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	1	Honda EU20i LPG, March 20, 2012, https://www.youtube.com/watch?v=yBpq33aJmR0	
	2	JOHNSON et al., "Electronic Direct Fuel Injection (EDFI) for Small Two-Stroke Engines," SAE Technical Paper 1999-01-3312, Proceedings of the 1999 SAE Small Engine Technology Conference, Madison, WI, September 28-30, 1999, pp. 1-15	

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Examiner Signature		Date Considered	

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(Not for submission under 37 CFR 1.99)

Application Number		
Filing Date		
First Named Inventor	Kendall J. Collie et al.	
Art Unit		
Examiner Name		
Attorney Docket Number	CET1090.044	

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	
First Named Inventor	Kendall J. Collie et al.
Art Unit	
Examiner Name	
Attorney Docket Number	CET1090.044

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Timothy J. Ziolkowski/	Date (YYYY-MM-DD)	2016-10-04
Name/Print	Timothy J. Ziolkowski	Registration Number	38368

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
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Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSION ENGINE		
First Named Inventor/Applicant Name:		Kendall J. Collie		
Filer:		Timothy J. Ziolkowski/Robyn Templin		
Attorney Docket Number:		CET1090.044		
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	70	70
UTILITY SEARCH FEE	2111	1	300	300
UTILITY EXAMINATION FEE	2311	1	360	360
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	2202	6	40	240
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				970

Electronic Acknowledgement Receipt

EFS ID:	27120429
Application Number:	15285215
International Application Number:	
Confirmation Number:	2429
Title of Invention:	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE
First Named Inventor/Applicant Name:	Kendall J. Collie
Customer Number:	26629
Filer:	Timothy J. Ziolkowski/Robyn Templin
Filer Authorized By:	Timothy J. Ziolkowski
Attorney Docket Number:	CET1090.044
Receipt Date:	04-OCT-2016
Filing Date:	
Time Stamp:	16:57:54
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
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RAM confirmation Number	100516INTEFSW16592200
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	App-ADS.pdf	1450497	no	7
			061818a623bdad9c79d766e5525f7a92235715e5		
Warnings:					
Information:					
2		App-Body.pdf	174660	yes	29
			42240f41cee33f766ba5fa8071654445d66d0a62		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	22	
	Claims		23	28	
	Abstract		29	29	
Warnings:					
Information:					
3	Oath or Declaration filed	App-Dec.pdf	817735	no	5
			cbdc238c695702bcc5683b2f3fe86579ee1a0cc8		
Warnings:					
Information:					
4	Drawings-only black and white line drawings	App-Drawings.pdf	1215236	no	4
			cbc21e7fdb7fa1e2fbcaf8b239f8dafec3b1d8cc		
Warnings:					
Information:					
5	Power of Attorney	POATransmittal.pdf	167920	no	1
			f6482531bd9340412eaa187f46a7b0b905f0		
Champion - EX2092, Page 339 of 387					
Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.					

Warnings:					
Information:					
6	Power of Attorney	GeneralPOA.pdf	447239	no	1
			fb2334f1e7e18c8c4035637c5369a9c4fb88a10		
Warnings:					
Information:					
7	Information Disclosure Statement (IDS) Form (SB08)	IDS.pdf	612947	no	7
			665ab60eb55db39fca36a94949141efb959f359a		
Warnings:					
Information:					
8	Non Patent Literature	NPL1-HONDA_EU20i_LPG.pdf	15304933	no	3
			ab3bddf9b920528fa110a17a5b7c5436961daabe		
Warnings:					
Information:					
9	Non Patent Literature	NPL2-Johnson-Electronic_Direct_Fuel_Injection.pdf	414792	no	17
			fb1a5b3aa5b1053ee0c5f24678e329b555464f3b		
Warnings:					
Information:					
10	Fee Worksheet (SB06)	fee-info.pdf	36751	no	2
			e870e684f3fea122420dc9c80751436e76a1cde9		
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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	CET1090.044
		Application Number	
Title of Invention	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
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Inventor Information:

Inventor	1				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Kendall	J.	Collie			
Residence Information (Select One) • US Residency Non US Residency Active US Military Service						
City	Anaheim Hills	State/Province	CA	Country of Residence	US	

Mailing Address of Inventor:

Address 1	751 S Weir Canyon Rd, Suite 157 PMB 391					
Address 2						
City	Anaheim Hills	State/Province	CA			
Postal Code	92809	Country	US			

Inventor	2				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Mark	J.	Sarder			
Residence Information (Select One) • US Residency Non US Residency Active US Military Service						
City	Waukesha	State/Province	WI	Country of Residence	US	

Mailing Address of Inventor:

Address 1	W245 N5551 Corporate Circle					
Address 2						
City	Sussex	State/Province	WI			
Postal Code	53089	Country	US			

Inventor	3				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Aleko	D.	Sotiriades			
Residence Information (Select One) • US Residency Non US Residency Active US Military Service						

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	CET1090.044
		Application Number	
Title of Invention	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE		

City	Cedarburg	State/Province	WI	Country of Residence	US
------	-----------	----------------	----	----------------------	----

Mailing Address of Inventor:

Address 1	W62N1026 Fairhaven Ct				
Address 2					
City	Cedarburg	State/Province	WI		
Postal Code	53012	Country	US		
Inventor	4				Remove
Legal Name					

Prefix	Given Name	Middle Name	Family Name	Suffix	
	James	J.	Dehn		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	Brookfield	State/Province	WI	Country of Residence	US

Mailing Address of Inventor:

Address 1	W245 N5551 Corporate Circle				
Address 2					
City	Sussex	State/Province	WI		
Postal Code	53089	Country	US		
Inventor	5				Remove
Legal Name					

Prefix	Given Name	Middle Name	Family Name	Suffix	
	Leigh		Jenison		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	Hartland	State/Province	WI	Country of Residence	US

Mailing Address of Inventor:

Address 1	W245 N5551 Corporate Circle				
Address 2					
City	Sussex	State/Province	WI		
Postal Code	53089	Country	US		

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button.

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Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

Champion - EX2092, Page 343 of 387

☐ An Address is being provided for the correspondence information of this application.

Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	CET1090.044
		Application Number	
Title of Invention	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE		

Customer Number	26629		
Email Address		Add Email	Remove Email

Application Information:

Title of the Invention	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE		
Attorney Docket Number	CET1090.044	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)		Suggested Figure for Publication (if any)	

Publication Information:

☐	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐	Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.			
Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	26629		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.			
Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation in part of	14925441	2015-10-28
Prior Application Status	Pending	Remove	

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Harbor Freight Tools USA Inc. et al v. Champion Power Equip., Inc.

IPR2025-01121

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	CET1090.044
		Application Number	
Title of Invention	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
14925441	Continuation in part of v	14738060	2015-06-12
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Application Number	Country ¹	Filing Date (YYYY-MM-DD)	Priority Claimed
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	CET1090.044
		Application Number	
Title of Invention	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE		

Applicant	1
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.	
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Assignee	Legal Representative under 35 U.S.C. 117
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest
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Name of the Deceased or Legally Incapacitated Inventor :			
If the Assignee is an Organization check here. ☒			
Organization Name	Champion Engine Technology, LLC		
Mailing Address Information:			
Address 1	W245 N5551 Corporate Circle		
Address 2			
City	Sussex	State/Province	WI
Country	US	Postal Code	53089
Phone Number		Fax Number	
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Signature	Timothy J. Ziolkowski/		Date (YYYY-MM-DD)	2016-10-04
First Name	Timothy J.	Last Name	Ziolkowski	Registration Number
				38368
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	CET1090.044
		Application Number	
Title of Invention	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE		

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FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present application is a continuation-in-part of and claims priority to U.S. Patent Application Ser. No. 14/925,441, filed October 28, 2015, which is a continuation-in-part of and claims priority to U.S. Patent Application Ser. No. 14/738,060, filed June 12, 2015, the disclosures of which are incorporated herein by reference in their entirety.

BACKGROUND OF THE INVENTION

[0002] Embodiments of the invention relate generally to dual fuel and other multi-fuel internal combustion engines, and more particularly, to an apparatus and method for delivering liquid fuel and gaseous fuel to a generator driven by a multi-fuel internal combustion engine.

[0003] Electric generators are frequently driven by internal combustion engines that use gasoline as a fuel source. Gasoline is a common fuel source for generators in a variety of applications. However, alternative fuel sources also provide a desirable fuel source. For instance, alternative fuels may provide a cleaner burning fuel that limits undesirable emissions. Alternative fuels may also be stored for longer periods of time without degradation, whereas gasoline can degrade over a period of months leading to hard starting, rough running, and also lead to gum and varnish deposits in the fuel system. In addition, generators that operate on alternative fuels are able to generate electricity when gasoline is not readily available. For instance, generators are frequently used when power outages in the utility grid result from severe weather. Unfortunately, gas stations may also be closed as a result of the power outage. Such a circumstance presents just one example where it would be advantageous to operate electric generators on alternative fuels.

[0004] 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 either liquid fuel or an alternative

fuel. The alternative fuel may exist in a gaseous state at normal temperature and pressure and can be any one of liquefied petroleum gas, compressed natural gas, hydrogen, or the like. Liquefied petroleum gas (LPG), often referred to as propane, exists in a gaseous state at normal temperature and pressure but can be conveniently stored under pressure in a liquid state. LPG may be a desirable fuel source for internal combustion engines because it can be stored for extended periods of time and contains fewer impurities than gasoline, resulting in smoother and cleaner operation. In addition, propane fueled engines typically have a longer life cycle due to less carbon build-up and virtually no fuel gumming or varnish accumulation.

[0005] In order to provide the liquid and gaseous fuel to the engine, the dual fuel engine may have a first fuel line for liquid fuel and a second fuel line for gaseous fuel. A liquid fuel source and a gaseous fuel source may be coupled to the respective lines to provide fuel to the engine. However, a common problem with such configurations that couple two fuel sources to a single fuel inlet, such as a carburetor, of an engine is that during cross-over switching between the fuel sources the engine can experience overly rich air-fuel ratio. This is particularly problematic when switching from a liquid fuel to a gaseous fuel because carburetors have a fuel bowl containing fuel that is drawn into the engine even after the liquid fuel source is cut-off. Therefore, for a period of time, the engine is running on both liquid and gaseous fuels causing an overly rich fuel mixture. Further, such simultaneous delivery of fuel from the first fuel line and the second fuel line, even if for a brief time, may make the engine hard to start and lead to unstable operating conditions.

[0006] Therefore, it would be desirable to design a generator having a liquid fuel and gaseous fuel delivery system that overcomes the aforementioned detriments without substantially increasing the overall cost of the system.

BRIEF DESCRIPTION OF THE INVENTION

[0007] In accordance with one aspect of the invention, a multi-fuel engine includes an engine operable on a liquid fuel and a gaseous fuel. The multi-fuel engine also includes a liquid cutoff solenoid coupled to open and close a liquid fuel path to the engine, and a gaseous cutoff solenoid coupled to open and close a gaseous fuel source to the engine. A switch couples a power source to the liquid cutoff solenoid and the gaseous cutoff solenoid to switch between fuel sources on-the-fly during engine operation.

[0008] In accordance with another aspect of the invention, a multi-fuel generator and fuel delivery system includes a multi-fuel internal combustion engine configured to operate on a liquid fuel supplied from a liquid fuel source through a liquid fuel line and a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line, and further includes an alternator driven by the multi-fuel internal combustion engine. The multi-fuel generator and fuel delivery system also has a fuel regulator system and an electro-mechanical valve system. The fuel regulator system includes a primary pressure regulator coupled to a service valve of the pressurized fuel source to regulate fuel supplied from the pressurized fuel source to a reduced pressure, and a secondary pressure regulator coupled to the primary pressure regulator to regulate fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the engine. The electro-mechanical valve system couples to the engine and operates by an electrical switch powered by one of the alternator, a battery, and a magneto to control fuel flow to the engine from the liquid fuel source and the pressurized fuel source.

[0009] In accordance with yet another aspect of the invention, a multi-fuel internal combustion engine includes an engine operable on liquid fuel supplied through a liquid fuel line from a liquid fuel source and gaseous fuel supplied through a gaseous fuel line from a pressurized fuel source, and a switch to change operation of the engine from liquid fuel to gaseous fuel and from gaseous fuel to liquid fuel while the engine is running. A liquid fuel cutoff solenoid couples to control fuel flow through the liquid

fuel line and engage engine operation on liquid fuel upon actuation of the switch from gaseous fuel to liquid fuel, and a gaseous fuel cutoff solenoid couples to control fuel flow through the gaseous fuel line and engage engine operation on gaseous fuel upon actuation of the switch from liquid fuel to gaseous fuel.

[0010] Various other features and advantages will be made apparent from the following detailed description and the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The drawings illustrate preferred embodiments presently contemplated for carrying out the invention.

[0012] In the drawings:

[0013] FIG. 1 is a perspective view of a multi-fuel generator coupled to a fuel delivery system, according to an embodiment of the invention.

[0014] FIG. 2 is a schematic diagram of a fuel system for the multi-fuel generator of FIG. 1 configured in a bi-fuel arrangement, according to an embodiment of the invention.

[0015] FIG. 3 is a schematic diagram of a fuel system for the multi-fuel generator of FIG. 1 to operate in a tri-fuel arrangement, according to an embodiment of the invention.

[0016] FIG. 4 is a cross-sectional view of a carburetor for the multi-fuel generator of FIG. 1 taken transverse to a throat of the carburetor and through a fuel passage that provides fuel from a float bowl to the throat of the carburetor, according to an embodiment of the invention.

[0017] FIG. 5 is a cross-sectional view of the carburetor of FIG. 4 coupled to an engine intake taken lengthwise to the throat and through the fuel passage, according to an embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0018] The operating environment of the invention is described with respect to a multi-fuel generator. However, it will be appreciated by those skilled in the art that the invention is equally applicable for use with any multi-fuel internal combustion engine. Moreover, the invention will be described with respect to a dual fuel or other multi-fuel generator configured to operate on liquid fuel and gaseous fuel. However, one skilled in the art will further appreciate that the invention is equally applicable for use with other fuel combinations for multi-fuel generators and internal combustion engines.

[0019] Referring to FIG. 1, a dual fuel generator 30 is coupled to fuel delivery systems 32, 33 in accordance with an embodiment of the invention. Dual fuel generator 30 includes a dual fuel internal combustion engine 34 within housing 36 at one end 38, operatively connected to an alternator 40 also enclosed in housing 36 at another end 42 by conventional means. Dual fuel generator 30 is configured to operate on different fuels via either a first fuel source 44 or a second fuel source 46. In an exemplary embodiment of the invention, first fuel source 44 is a liquid fuel and second fuel source 46 is a gaseous fuel. In one preferred embodiment, the liquid fuel is gasoline and the gaseous fuel is liquid petroleum gas (LPG). An operator can selectively operate the generator on either fuel as desired. For instance, generator 30 may operate on gasoline for a first period of operation and then switch to LPG for a second period of operation. However, it is contemplated that dual fuel generator 30 is configured to operate on fuels other than gasoline and LPG (e.g., natural gas, biodiesel, etc.), and thus the scope of the invention is not meant to be limited strictly to a dual fuel arrangement where first fuel source 44 provides gasoline and second fuel source 46 provides LPG. In addition, embodiments of the invention contemplate tri-fuel, quad-fuel, and other multi-fuel arrangements.

[0020] In one embodiment of the invention, dual fuel generator 30 includes a gasoline tank 48 or, generally, a liquid fuel tank, located inside cover 36 onboard generator 30 to provide gasoline to the engine as first fuel source 44. Gasoline tank 48 connects to a first fuel line to provide gasoline to the carburetor to run the engine, as

will later be described with reference to FIG. 2. Generator 30 is also coupled to a pressurized fuel container 50, or a pressurized fuel source, located off board generator 30 to provide LPG to the engine as second fuel source 46. Pressurized fuel container 50 is coupled to generator 30 with an LPG supply hose 52. LPG supply hose 52 is coupled to a second fuel line within generator 30 to provide LPG to the engine via the carburetor. Dual fuel generator 30 includes an electrical fuel switch 54 for selecting a desired fuel to the engine.

[0021] In an exemplary embodiment, fuel 46 from pressurized fuel container 50 is regulated using a fuel regulator system 56 for delivery to the engine. Fuel regulator system 56 includes one or more pressure regulators that reduce and control the pressure of the fuel from pressurized fuel container 50 and delivers fuel at a desired pressure for operation of the engine. Fuel regulator system 56 has an inlet 58 operatively coupled to a service valve 60 of pressurized fuel container 50 and an outlet 62 coupled to LPG supply hose 52. Fuel regulator system 56 includes a primary pressure regulator 64 coupled to pressurized fuel container 50 and a secondary pressure regulator 66. Primary pressure regulator 64 protects downstream components from high pressure of pressurized fuel container 50. Primary pressure regulator 64 receives LPG through service valve 60 of pressurized fuel container 50 and reduces the pressure of the LPG to a first stage. In one embodiment of the invention, the first stage may be delivered directly to generator 30 at a pressure required for operation of the engine.

[0022] In an exemplary embodiment of the invention, fuel regulator system 56 includes secondary pressure regulator 66 coupled to the outlet of primary pressure regulator 64 in order to use standard “off-the-shelf” components. Typically, the primary pressure regulator is mounted on the LPG tank, while the secondary pressure regulator is mounted on the component using the fuel, such as an engine or grill. Here, since generator 30 can be used as a gasoline only generator, secondary pressure regulator 66 is mounted off-board the generator to reduce size and cost of the generator. Secondary pressure regulator 66 receives LPG from primary pressure regulator 64 and further reduces the pressure of LPG to a second stage to be delivered to generator 30. In a system with two regulators, primary pressure regulator 64 regulates fuel received from

pressurized fuel container 50 and reduces the pressure of the fuel to a level required for operation of secondary pressure regulator 66. Secondary pressure regulator 66 regulates fuel received from primary pressure regulator 64 and further reduces the pressure of the fuel to a level required for operation of generator 30. In addition, primary pressure regulator 64 may compensate for varying tank pressure as fuel is depleted while secondary pressure regulator 66 may compensate for varying demand from generator 30.

[0023] In accordance with an exemplary embodiment of the invention, fuel regulator system 56 includes both the primary and secondary regulators or a customized single regulator to perform both regulator functions in one, but in any case, in this embodiment, is located remotely, or off-board, from dual fuel generator 30. Fuel regulator system 56 may be directly mounted to pressurized fuel container 50 using a regulator mounting structure 68. Regulator mounting structure 68 is a device having mounting locations for primary pressure regulator 64 and secondary pressure regulator 66. Regulator mounting structure 68 also has a securing mechanism 70 to secure regulator mounting structure 68 to pressurized fuel container 50. The securing mechanism 70 is a cover or dome that sits on the container with an opening therein that fits around service valve 60.

[0024] In another embodiment of the invention, primary pressure regulator 64 is mounted on regulator mounting structure 68 while secondary pressure regulator 66 could be mounted on or near generator 30. In yet another embodiment of the invention, a dual stage regulator regulates the fuel received from pressurized fuel container 50 and delivers fuel at a pressure required for operation of generator 30. Such a dual stage regulator regulates the fuel to the second stage within a single structure and may comprise both the primary pressure regulator 64 and the secondary pressure regulator 66. The dual stage regulator may be mounted directly on fuel container 50. Pressurized fuel container 50 may be secured to a platform or mobile cart 72 for stability or transportation. In another embodiment, a regulator mounting structure 68 is secured directly to a platform or a mobile cart.

[0025] A quick-disconnect hose coupling 74, also referred to as a quick-connect hose coupling, connects LPG supply hose 52 to generator 30 so that LPG supply hose 52 may be quickly attached and detached from generator 30. Hose coupling 74 has a first end 74a mounted on the external surface of generator 30 and coupled to supply the second fuel to the engine. Hose coupling 74 has a second end 74b coupled to the outlet of LPG supply hose 52. Hose coupling 74 has a valve that opens when the couplings are engaged and closes when the couplings are disengaged. As such, quick-disconnect hose coupling 74 automatically opens when connected to enable fuel flow from LPG supply hose 52 to the engine. Hose coupling 74 automatically disconnects fluid communication when disconnected. Accordingly, when the supply hose is detached from generator 30, the coupling 74 is automatically closed so that fuel does not escape and unwanted air does not enter the fuel system.

[0026] Referring now to FIG. 2, a schematic diagram of a fuel system for the dual fuel generator is shown, in accordance with an embodiment of the invention. The fuel system includes an electro-mechanical valve system 76 that includes a carburetor cutoff solenoid 94, gasoline cutoff solenoid 96, and a LPG cutoff solenoid 98. The electro-mechanical valve system 76 is coupled to a multi-fuel internal combustion engine configured to operate on a liquid fuel supplied from a liquid fuel source 78 through a liquid fuel line 80, and a gaseous fuel supplied from a gaseous fuel source 82, or a pressurized fuel source, through a gaseous fuel line 84. Electro-mechanical valve system 76 is operated by electrical fuel switch 54 that controls fuel flow to the engine from liquid fuel source 78 and gaseous fuel source 82. In an exemplary embodiment of the invention, the dual fuel engine operates on gasoline from liquid fuel source 78 and LPG from gaseous fuel source 82.

[0027] In one embodiment of the invention, the engine has a carburetor 86 coupled to an intake of the engine to mix air and fuel and connect to liquid fuel line 80 and gaseous fuel line 84. Carburetor 86 has a mixing passage or throat with an inlet for air and an outlet for the air-fuel mixture. Carburetor 86 also has a float bowl 88 that receives liquid fuel through a liquid fuel inlet 90 coupled to liquid fuel line 80. Carburetor 86 may also have a gaseous fuel inlet 92 in the throat and coupled to gaseous

fuel line 84. Gaseous fuel inlet 92 is preferably located upstream from a venturi in the throat for improved fuel and air mixing. Air is mixed with either of the fuels in the throat to provide the air-fuel mixture for operation of the engine. In another embodiment of the invention, a gaseous fuel mixer couples to the engine intake to mix gaseous fuel and air separately from carburetor 86.

[0028] In an exemplary embodiment of the invention, electro-mechanical valve system 76 includes a carburetor cutoff solenoid 94 coupled to carburetor 86 to control liquid fuel flow to the engine. Carburetor cutoff solenoid 94 operates to open and close a liquid fuel path to the engine downstream from float bowl 88 in carburetor 86. The liquid fuel path in carburetor 86 provides fuel to the throat from float bowl 88 and will later be described with reference to FIG. 4. The liquid fuel path may comprise a main fuel circuit within carburetor 86, and in some cases, also includes an idle fuel circuit within carburetor 86. Carburetor cutoff solenoid 94 cuts off liquid fuel flow through the liquid fuel path to provide a liquid fuel cutoff solenoid that controls fuel flow from liquid fuel line 80 to the engine.

[0029] Electro-mechanical valve system 76 may include a gasoline cutoff solenoid 96, or generally a liquid fuel cutoff solenoid, coupling liquid fuel source 78 to carburetor 86 and to control flow of the liquid fuel to carburetor 86. That is, gasoline cutoff solenoid 96 provides a liquid fuel valve coupled along liquid fuel line 80 to open and close liquid fuel source 78 to the engine. Electro-mechanical valve system 76 can operate with either or both the gasoline cutoff solenoid 96 and carburetor cutoff solenoid 94 to control liquid fuel flow to the engine. However, gasoline cutoff solenoid 96 is advantageous to quickly cut-off all liquid fuel flow to carburetor 86, and particularly, through the idle fuel circuit if carburetor cutoff solenoid 94 is regulating fuel through the main fuel circuit only. While limited fuel flow through the idle fuel circuit may not noticeably affect gaseous fuel operation, gasoline cutoff solenoid 96 prevents drawing gasoline through the idle fuel circuit after carburetor cutoff solenoid 94 closes the main fuel circuit.

[0030] Electro-mechanical valve system 76 may include an LPG cutoff solenoid 98, or generally a gaseous fuel cutoff solenoid, coupling gaseous fuel source 82 to the intake and to control flow of the gaseous fuel to the engine. LPG cutoff solenoid 98 provides a gaseous fuel valve coupled along gaseous fuel line 84 to open and close gaseous fuel source 82 to the engine. LPG cutoff solenoid 98 is preferably located downstream from fuel regulator system 56, shown in FIG. 2 as dual stage regulator 100, for a fast response in controlling gaseous fuel delivery to the engine.

[0031] Electro-mechanical valve system 76 also includes electrical switch 54 coupling a power source 102 to one or more of carburetor cutoff solenoid 94, gasoline cutoff solenoid 96 and LPG cutoff solenoid 98 to actuate the solenoids and provide a one-touch fuel selector to switch engine operation between fuels. Power source 102 is shown as a battery in FIG. 2, but could be from an engine driven power source, such as an alternator 40 (FIG. 1), a magneto, or any other suitable power supply. Switch 54 selectively powers solenoids 94, 96, 98 to engage liquid fuel operation when actuated to a first position and gaseous fuel operation when actuated to a second position. In an exemplary embodiment of the invention, switch 54 engages gasoline operation by closing LPG cutoff solenoid 98, opening gasoline cutoff solenoid 96, and operating carburetor cutoff solenoid 94 to open the main fuel circuit in the carburetor, and switch 54 engages LPG operation by closing gasoline cutoff solenoid 96, operating carburetor cutoff solenoid 94 to close the main fuel circuit, and opening LPG cutoff solenoid 98.

[0032] In an exemplary embodiment of the invention, gasoline cutoff solenoid 96, LPG cutoff solenoid 98, and carburetor cutoff solenoid 94 operate as normally closed solenoid valves to ensure excess fuel is not delivered to the engine if power to the solenoids is interrupted. To engage LPG operation, electrical fuel switch 54 provides electrical connection between power source 102 and a first contact 104 to power LPG cutoff solenoid 98 to open gaseous fuel line 84 while gasoline cutoff solenoid 96 and carburetor cutoff solenoid 94 are unpowered to close liquid fuel line 80 and the main fuel circuit in carburetor 86, respectively. To engage gasoline operation, electrical switch 54 provides electrical connection between power source 102 and a second contact 106 to power gasoline cutoff solenoid 96 and carburetor cutoff solenoid 94 to

open liquid fuel line 80 and the main fuel circuit in carburetor 86, respectively, while LPG cutoff solenoid 98 is unpowered to close gaseous fuel line 84.

[0033] In an alternative embodiment of the invention, gasoline cutoff solenoid 96, LPG cutoff solenoid 98, and carburetor cutoff solenoid 94 operate as normally open solenoid valves to ensure fuel is provided to the engine if power to the solenoids is interrupted. To engage gasoline operation, switch 54 provides electrical connection between power source 102 and first contact 104 to power LPG cutoff solenoid 98 to close gaseous fuel line 84 while gasoline cutoff solenoid 96 and carburetor cutoff solenoid 94 are unpowered to open liquid fuel line 80 and the main fuel circuit in carburetor 86, respectively. To engage LPG operation, switch 54 provides electrical connection between power source 102 and second contact 106 to power gasoline cutoff solenoid 96 and carburetor cutoff solenoid 94 to close liquid fuel line 80 and the main fuel circuit in carburetor 86, respectively, while LPG cutoff solenoid 98 is unpowered to open gaseous fuel line 84.

[0034] Electro-mechanical valve system 76 can be configured to switch operation of the generator from multiple fuel sources while the generator is running, also referred to as “on-the-fly” fuel changeover. That is, switch 54 couples power source 102 to LPG cutoff solenoid 98 and one or more of the gasoline cutoff solenoid 96 and carburetor cutoff solenoid 94 to change operation of the engine from liquid fuel to gaseous fuel and from gaseous fuel to liquid fuel while the engine is running. Electro-mechanical valve system 76 provides for precisely timed fuel changeover between the fuel sources to switch engine operation with minimal or no interruption in the performance of the engine, and it can be timed to prevent or substantially prevent fuel overlap between the fuel sources.

[0035] To quickly start and stop liquid fuel delivery to the engine, carburetor cutoff solenoid 94 regulates fuel flow through a liquid fuel path downstream of float bowl 88. Carburetor cutoff solenoid 94 also traps enough gasoline in float bowl 88 to provide quick delivery of gasoline to the engine during changeover from LPG to gasoline to prevent any lag or hesitation in engine performance. During changeover from gasoline

to LPG, carburetor cutoff solenoid 94 blocks fuel flow from float bowl 88 to the engine, thereby preventing an over-rich condition. That is, carburetor cutoff solenoid 94 can block gasoline remaining in float bowl 88 after gasoline cutoff solenoid 96 closes liquid fuel line 80 to prevent mixing gasoline with the LPG. Accordingly, carburetor cutoff solenoid 94 responds quickly upon actuation of switch 54 to limit fuel overlap and prevent overly rich fuel conditions that could adversely affect engine performance.

[0036] In addition, gasoline cutoff solenoid 96 may be opened to fill float bowl 88 with liquid fuel prior to switching engine operation to liquid fuel. That is, float bowl 88 will empty through the idle fuel circuit if carburetor cutoff solenoid 94 only blocks the main fuel circuit. Gasoline delivery to the engine during changeover is delayed if float bowl 88 must first be filled, and such delay could cause the engine to lose power or stall. Therefore, switch 54 may be configured to actuate gasoline cutoff solenoid 96 prior to actuating carburetor cutoff solenoid 94 to ensure adequate fuel in float bowl 88 for a smooth transition from LPG to gasoline.

[0037] In one embodiment of the invention, switch 54 actuates carburetor cutoff solenoid 94 and LPG cutoff solenoid 98 to change engine operation between the liquid fuel and the gaseous fuel so as to prevent fuel flow from liquid fuel source 78 and gaseous fuel source 82 simultaneously. In such an embodiment, electro-mechanical valve system 76 operates as a dual fuel lockout to ensure only one fuel is delivered to the engine. Switch 54 may simultaneously actuate carburetor cutoff solenoid 94 and LPG cutoff solenoid 98 to prevent or substantially prevent simultaneous fuel delivery of the liquid fuel and the gaseous fuel to the engine. In other embodiments, switch 54 actuates any of solenoids 94, 96, 98 in succession to prevent or substantially prevent simultaneous fuel delivery of the liquid fuel and the gaseous fuel to the engine. As such, switch 54 can operate the electro-mechanical valve system 76 to prevent an overly rich air-fuel ratio during cross-over switching between fuel sources, even while operating at full load.

[0038] In another embodiment of the invention, electro-mechanical valve system 76 provides a slight overlap in fuel delivery to the engine to ensure a smooth transition

during changeover. Carburetor cutoff solenoid 94 may close the liquid fuel path in carburetor 86 after LPG cutoff solenoid 98 opens to ensure fuel flow to the engine is not interrupted during changeover from gasoline to LPG. LPG cutoff solenoid 98 may close after carburetor cutoff solenoid 94 opens the liquid fuel path in carburetor 86 to ensure fuel flow to the engine is not interrupted during changeover from LPG to gasoline. Accordingly, switch 54 may actuate LPG cutoff solenoid 98 and carburetor cutoff solenoid 94 in succession to provide fuel overlap when changing engine operation between the liquid fuel and the gaseous fuel. Electro-mechanical valve system 76 can also be configured to provide blended fuel operation, if so desired.

[0039] Switch 54 can institute a predefined delay between actuating any of gasoline cutoff solenoid 96, carburetor cutoff solenoid 94, and LPG cutoff solenoid 98. Adjustable rheostats or predefined electronic delay circuits 108, 110, 112 can be coupled to the electrical connections of any of solenoids 94, 96, 98 to delay their actuation. As such, any of solenoids 96, 94, 98 may be configured to operate according to a user adjustable preset delay to actuate one or more of the solenoids in succession. In some embodiments of the invention, electronic delay circuits 108, 110, 112 provide simultaneous delivery of fuels to the engine for any fraction of a second or for up to several seconds.

[0040] Electro-mechanical valve system 76 can also change engine operation between fuel sources on-the-fly without gasoline cutoff solenoid 96 regulating fuel through liquid fuel line 80. In such an embodiment, upon actuation of switch 54 from gaseous fuel to liquid fuel, carburetor cutoff solenoid 94 can open a liquid fuel path in the carburetor to engage engine operation on liquid fuel and LPG cutoff solenoid 98 can actuate to stop engine operation on gaseous fuel. Also, upon actuation of switch 54 from liquid fuel to gaseous fuel, LPG cutoff solenoid 98 can open the gaseous fuel line 84 to engage engine operation on gaseous fuel and carburetor cutoff solenoid 94 can actuate to stop engine operation on liquid fuel.

[0041] Alternatively, electro-mechanical valve system 76 can change engine operation between fuel sources on-the-fly without carburetor cutoff solenoid 94. In

such an embodiment, gasoline cutoff solenoid 96 can open the liquid fuel line 80 to engage engine operation on liquid fuel upon actuation of switch 54 from gaseous fuel to liquid fuel, and gasoline cutoff solenoid 96 can stop engine operation on liquid fuel upon actuation of switch 54 from liquid fuel to gaseous fuel. Further, gasoline cutoff solenoid 96 and LPG cutoff solenoid 98 can be precisely timed to limit or prevent fuel overlap during changeover without interrupting engine performance. For instance, gasoline cutoff solenoid 96 may be opened prior to closing LPG cutoff solenoid 98 to ensure adequate fuel in float bowl 88 for on-the-fly changeover. Also, gasoline cutoff solenoid 96 may be closed before LPG cutoff solenoid 98 is opened to reduce fuel in float bowl 88 and limit fuel overlap during on-the-fly changeover. Accordingly, switch 54 may be precisely timed to operate gasoline cutoff solenoid 96 and LPG cutoff solenoid 98 to prevent, or substantially prevent, simultaneous fuel delivery of the liquid fuel and the gaseous fuel to the engine.

[0042] Referring now to FIG. 3, a schematic diagram of a fuel system to operate the generator in a tri-fuel arrangement is shown, in accordance with an embodiment of the invention. The fuel system includes an electro-mechanical valve system 114 coupled to a multi-fuel internal combustion engine configured to operate on a liquid fuel supplied from a liquid fuel source 78 and first and second gaseous fuels supplied from a respective first gaseous fuel source 116 and second gaseous fuel source 118. Electro-mechanical valve system 114 is operated by a tri-fuel electrical switch 120 that controls fuel flow to the engine from liquid fuel source 78 and gaseous fuel sources 116, 118. In an exemplary embodiment of the invention, the multi-fuel engine operates on gasoline from liquid fuel source 78, liquid petroleum gas (LPG) from first gaseous fuel source 116, and natural gas (NG) from second gaseous fuel source 118.

[0043] Electro-mechanical valve system 114 may include gasoline cutoff solenoid 96 to open and close a liquid fuel path through liquid fuel line 80 to carburetor 86, a carburetor cutoff solenoid 94 to control liquid fuel flow through the carburetor, and LPG cutoff solenoid 98 to open and close a gaseous fuel path for the first gaseous fuel through LPG line 122 to the engine. Electro-mechanical valve system 114 may also include an NG cutoff solenoid 124, or generally a gaseous fuel cutoff solenoid, to

couple the engine intake to second gaseous fuel source 118 and to control flow of the second gaseous fuel to the engine. NG cutoff solenoid 124 provides a gaseous fuel valve coupled along an NG line 126 to open and close second gaseous fuel source 118 to the engine. That is, NG cutoff solenoid 124 operates to open and close a gaseous fuel path for the second gaseous fuel through NG line 126 to the engine.

[0044] In an exemplary embodiment of the invention, a gaseous fuel line 128 provides NG and LPG to the engine by coupling to carburetor 86 and to both gaseous fuel sources 116, 118. A jet block 130 may be used to couple gaseous fuel line 128 to LPG line 122 and NG line 126. In one embodiment of the invention, jet block 130 is a 2-way branched fitting coupling first gaseous fuel source 116 and second gaseous fuel source 118 to carburetor 86 and located downstream from LPG cutoff solenoid 98 and NG cutoff solenoid 124. Jet block 130 may also comprise a first gaseous fuel jet 132 sized for the first gaseous fuel coupled to the first gaseous fuel source 116, and a second gaseous fuel jet 134 sized for the second gaseous fuel coupled to the second gaseous fuel source 118. The gaseous fuel jets 132, 134 comprise gaseous fuel main jets sized to meter the respective fuels as desired for a particular engine, or based on desired performance for each fuel in a given application. Jet block 130 has an outlet port 136 coupled to gaseous fuel line 128 to provide fuel from first gaseous fuel jet 132 and second gaseous fuel jet 134 to the engine.

[0045] Jet block 130 may be used to modify a dual fuel internal combustion engine into a tri-fuel engine by coupling a second gaseous fuel source to the engine intake. Jet block 130 can incorporate more than two gaseous fuel jets to couple additional gaseous fuel lines to carburetor 86. Each fuel line has a gaseous fuel valve to open and close the line. A fuel switch is wired appropriately to operate the additional solenoids. As such, jet block 130 allows a dual fuel engine to operate as a tri-fuel engine, quad-fuel engine or to operate with additional fuel sources.

[0046] Electro-mechanical valve system 114 includes a tri-fuel switch 120 coupling power source 102 to any of gasoline cutoff solenoid 96, LPG cutoff solenoid 98, NG cutoff solenoid 124, and carburetor cutoff solenoid 94 to selectively operate the

solenoids and engage gasoline operation when actuated to a first position, engage LPG operation when actuated to a second position, and engage NG operation when actuated to a third position. When tri-fuel switch 120 engages engine operation on one of the fuels, it may also stop delivery of the remaining fuels to the engine. As such, solenoids 94, 96, 98, 124 engage engine operation on their respective fuel source upon selection of the tri-fuel switch 120 to the respective fuel source, and the solenoids 94, 96, 98, 124 stop engine operation on their respective fuel source upon selection of the switch to another fuel source.

[0047] Electro-mechanical valve system 114 can be configured to switch operation of the generator from any single fuel to any other single fuel from first gaseous fuel source 116, second gaseous fuel source 118, and liquid fuel source 78 on-the-fly while the engine is running. For instance, tri-fuel switch 120 can actuate any combination of the carburetor cutoff solenoid 94, LPG cutoff solenoid 98, NG cutoff solenoid 124 and gasoline cutoff solenoid 96 to change operation of the engine among the liquid fuel, the first gaseous fuel, and the second gaseous fuel while the engine remains running. Electro-mechanical valve system 114 provides for precisely timed fuel changeover to switch engine operation among fuel sources with minimal or no interruption in the performance of the engine, and it can be timed to prevent or substantially prevent fuel overlap between the fuel sources.

[0048] To change between gaseous fuel and liquid fuel, tri-fuel switch 120 may operate NG cutoff solenoid 124 for NG and LPG cutoff solenoid 98 for LPG corresponding to the description of switch 54 operating LPG cutoff solenoid 98 with respect to FIG. 2. Referring back to FIG. 3, to switch between first gaseous fuel source 116 and second gaseous fuel source 118, tri-fuel switch 120 may simultaneously actuate LPG cutoff solenoid 98 and NG cutoff solenoid 124 to prevent or substantially prevent simultaneous fuel delivery of first gaseous fuel source 116 and second gaseous fuel source 118 to the engine. As such, electro-mechanical valve system 114 can operate as a tri-fuel lockout to ensure only one fuel is delivered to the engine. In other embodiments, tri-fuel switch 120 actuates the NG cutoff solenoid 124 and LPG cutoff solenoid 98 in succession to ensure appropriately timed on-the-fly fuel changeover

between the two gaseous fuels. Adjustable rheostats or predefined electronic delay circuits 108, 110, 112, 138, may be coupled to the electrical connections of any of solenoids 94, 96, 98, 124, to delay their actuation.

[0049] In one embodiment of the invention, solenoids 98, 124, 94, 96 operate as normally closed solenoid valves to ensure excess fuel is not provided to the engine if power to the solenoids is interrupted. To engage LPG operation, tri-fuel switch 120 provides electrical connection between power source 102 and first contact 104 to power LPG cutoff solenoid 98 to open LPG line 122 while gasoline cutoff solenoid 96, carburetor cutoff solenoid 94, and NG cutoff solenoid 124 are unpowered to close liquid fuel line 80, the main fuel circuit in carburetor 86, and NG line 126, respectively. To engage gasoline operation, tri-fuel switch 120 provides electrical connection between power source 102 and second contact 106 to power gasoline cutoff solenoid 96 and carburetor cutoff solenoid 94 to open liquid fuel line 80 and the main fuel circuit in carburetor 86 while LPG cutoff solenoid 98 and NG cutoff solenoid 124 are unpowered to close LPG line 122 and NG line 126, respectively. To engage NG operation, tri-fuel switch 120 provides electrical connection between power source 102 and a third contact 140 to power NG cutoff solenoid 124 to open NG line 126 while gasoline cutoff solenoid 96, carburetor cutoff solenoid 94 and LPG cutoff solenoid 98 are unpowered to close liquid fuel line 80, the main fuel circuit in carburetor 86, and LPG line 122, respectively.

[0050] In an alternative embodiment of the invention, solenoids 98, 124, 94, 96 operate as normally open solenoid valves to ensure fuel is provided to the engine if power to the solenoids is interrupted. To engage LPG operation, tri-fuel switch 120 provides electrical connection between power source 102 and both second contact 106 and third contact 140 to power gasoline cutoff solenoid 96, carburetor cutoff solenoid 94, and NG cutoff solenoid 124 to close liquid fuel line 80, main fuel circuit in carburetor 86, and NG line 126, respectively, while LPG cutoff solenoid 98 is unpowered to open LPG line 122. To engage gasoline operation, tri-fuel switch 120 provides electrical connection between power source 102 and both first contact 104 and third contact 140 to power LPG cutoff solenoid 98 and NG cutoff solenoid 124 to close

LPG line 122 and NG line 126 while gasoline cutoff solenoid 96 and carburetor cutoff solenoid 94 are unpowered to open liquid fuel line 80 and the main fuel circuit in carburetor 86, respectively. To engage NG operation, tri-fuel switch 120 provides electrical connection between power source 102 and both first contact 104 and second contact 106 to power gasoline cutoff solenoid 96, carburetor cutoff solenoid 94, and LPG cutoff solenoid 98 to close liquid fuel line 80, main fuel circuit in carburetor 86, and LPG line 122, respectively, while NG cutoff solenoid 124 is unpowered to open NG line 126.

[0051] Referring now to FIG. 4, a cross-sectional view of carburetor 86 taken transverse to a barrel or throat 142 of the carburetor is shown, in accordance with an embodiment of the invention. Fuel and air are mixed in throat 142 to provide an air-fuel mixture for the multi-fuel internal combustion engine. A butterfly valve 144 is located in throat 142 to provide a choke and throttle 146 for the engine. Carburetor 86 has a float bowl 88 to hold liquid fuel with a float valve 148 to control the fuel level in the bowl. Carburetor 86 has a liquid fuel path 150 from float bowl 88 to throat 142. Liquid fuel path 150 is shown in FIG. 4 referring to main fuel circuit 152 in carburetor 86, but may also include other fuel circuits in the carburetor. Main fuel circuit 152 provides a flow path from float bowl 88 to a nozzle 154 in a venturi 156 upstream from throttle 146. An idle fuel circuit 158 provides a flow path to the throat 142 downstream of throttle 146 to run the engine at idle.

[0052] In one embodiment of the invention, carburetor 86 has a carburetor cutoff solenoid 94 coupled to carburetor 86 to regulate liquid fuel flow to the engine. Carburetor cutoff solenoid 94 actuates to open and close liquid fuel path 150 to the engine downstream from float bowl 88. Carburetor cutoff solenoid 94 has an actuating member 160 that moves to selectively block fuel flow through liquid fuel path 150, comprising main fuel circuit 152, and may be positioned to selectively block fuel flow into the inlet of main fuel circuit 152. Gasoline cutoff solenoid 96 (FIG. 2) closes off the liquid fuel line to carburetor 86 and fuel flowing through idle fuel circuit 158 stops when float bowl 88 empties. In another embodiment of the invention, carburetor cutoff solenoid 94 is configured to control fuel flow through both main fuel circuit 152 and

idle fuel circuit 158. For instance, idle fuel circuit 158 may branch off from main fuel circuit 152 with carburetor cutoff solenoid 94 actuating to block fuel flow into both circuits.

[0053] Referring now to FIG. 5, a cross-sectional view of carburetor 86 is shown taken lengthwise to throat 142, in accordance with an embodiment of the invention. Carburetor 86 is attached to the engine at engine intake 162 to supply a metered mixture of air and fuel and connect a liquid fuel source to the intake. Throat 142 includes venturi 156 and throttle 146 located downstream from venturi 156. A float bowl 88 and a float 166 control and maintain the fuel level in the bowl from an inlet valve 164. Main fuel circuit 152 provides a flow path from float bowl 88 to nozzle 154 in a narrow portion of venturi 156. Idle fuel circuit 158 provides a flow path from float bowl 88 to throat 142 downstream of throttle 146. Transition fuel circuit 168 provides a flow path to throat 142 upstream from throttle 146 and branches off from idle fuel circuit 158. Transition fuel circuit 168 is opened to vacuum conditions as the throttle 146 moves slightly from a closed position to provide additional fuel as the engine transitions from idle.

[0054] Carburetor cutoff solenoid 94 couples to float bowl 88 to selectively control liquid fuel flow through main fuel circuit 152. Carburetor cutoff solenoid 94 includes actuating member 160 capable of blocking fuel flow through main fuel circuit 152 when actuated. FIG. 5 shows actuating member 160 in an extended or blocking position, while FIG. 4 shows actuating member 160 in a retracted or open position. Carburetor cutoff solenoid 94 actuates to quickly start and stop liquid fuel flow from float bowl 88 to the engine through main fuel circuit 152 to provide precisely timed engine changeover between liquid and gaseous fuel sources.

[0055] Beneficially, embodiments of the invention thus provide for a multi-fuel internal combustion engine capable of switching between liquid fuel and gaseous fuel sources while the engine is running. Embodiments of the invention also provide for a multi-fuel internal combustion engine having a fuel system to prevent an overly rich air-fuel ratio during cross-over switching between fuel sources. Embodiments of the

invention also provide for a multi-fuel generator with a remotely mounted gaseous fuel pressure regulator system.

[0056] Therefore, according to one embodiment of the invention, a multi-fuel engine includes an engine operable on a liquid fuel and a gaseous fuel. The multi-fuel engine also includes a liquid cutoff solenoid coupled to open and close a liquid fuel path to the engine, and a gaseous cutoff solenoid coupled to open and close a gaseous fuel source to the engine. A switch couples a power source to the liquid cutoff solenoid and the gaseous cutoff solenoid to switch between fuel sources on-the-fly during engine operation.

[0057] According to another embodiment of the invention, a multi-fuel generator and fuel delivery system includes a multi-fuel internal combustion engine configured to operate on a liquid fuel supplied from a liquid fuel source through a liquid fuel line and a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line, and further includes an alternator driven by the multi-fuel internal combustion engine. The multi-fuel generator and fuel delivery system also has a fuel regulator system and an electro-mechanical valve system. The fuel regulator system includes a primary pressure regulator coupled to a service valve of the pressurized fuel source to regulate fuel supplied from the pressurized fuel source to a reduced pressure, and a secondary pressure regulator coupled to the primary pressure regulator to regulate fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the engine. The electro-mechanical valve system couples to the engine and operates by an electrical switch powered by one of the alternator, a battery, and a magneto to control fuel flow to the engine from the liquid fuel source and the pressurized fuel source.

[0058] According to yet another embodiment of the invention, a multi-fuel internal combustion engine includes an engine operable on liquid fuel supplied through a liquid fuel line from a liquid fuel source and gaseous fuel supplied through a gaseous fuel line from a pressurized fuel source, and a switch to change operation of the engine from liquid fuel to gaseous fuel and from gaseous fuel to liquid fuel while the engine is

running. A liquid fuel cutoff solenoid couples to control fuel flow through the liquid fuel line and engage engine operation on liquid fuel upon actuation of the switch from gaseous fuel to liquid fuel, and a gaseous fuel cutoff solenoid couples to control fuel flow through the gaseous fuel line and engage engine operation on gaseous fuel upon actuation of the switch from liquid fuel to gaseous fuel.

[0059] This written description uses examples to disclose the invention, including the best mode, and also to enable any person skilled in the art to practice the invention, including making and using any devices or systems and performing any incorporated methods. The patentable scope of the invention is defined by the claims, and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they have structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal languages of the claims.

CLAIMS

What is claimed is:

1. A multi-fuel engine comprising:
an engine operable on a liquid fuel and a gaseous fuel;
a liquid cutoff solenoid coupled to open and close a liquid fuel path to the engine;
a gaseous cutoff solenoid coupled to open and close a gaseous fuel source to the engine; and
a switch coupling a power source to the liquid cutoff solenoid and the gaseous cutoff solenoid to switch between fuel sources on-the-fly during engine operation.
2. The multi-fuel engine of claim 1, further comprising a carburetor attached to an intake of the engine to mix air and fuel and connect a liquid fuel source to the intake; and
wherein the liquid cutoff solenoid is coupled to the carburetor to open and close the liquid fuel path downstream from a float bowl in the carburetor; and
further wherein the gaseous cutoff solenoid couples the gaseous fuel source to the intake to control flow of the gaseous fuel to the engine.
3. The multi-fuel engine of claim 1 wherein the switch actuates the liquid cutoff solenoid and the gaseous cutoff solenoid to change engine operation between the liquid fuel and the gaseous fuel so as to prevent fuel flow from a liquid fuel source and the gaseous fuel source simultaneously and allow switching between fuel sources on-the-fly during engine operation.
4. The multi-fuel engine of claim 1 wherein the switch actuates the gaseous cutoff solenoid and the liquid cutoff solenoid in succession to provide fuel overlap when changing engine operation between the liquid fuel and the gaseous fuel.

5. The multi-fuel engine of claim 1 wherein the multi-fuel engine is a dual fuel engine that operates on gasoline from a liquid fuel source and LPG from the gaseous fuel source.

6. The multi-fuel engine of claim 2 further comprising a liquid fuel valve coupling the liquid fuel source to the carburetor, actuated by the switch coupled to the power source.

7. The multi-fuel engine of claim 6 wherein the switch opens the liquid fuel valve to fill the float bowl with liquid fuel prior to switching operation to liquid fuel.

8. The multi-fuel engine of claim 1, wherein the engine is operable on a second gaseous fuel; and

further comprising a second gaseous cutoff solenoid coupling the engine to a second gaseous fuel source to control flow of the second gaseous fuel to the engine.

9. The multi-fuel engine of claim 8 wherein the switch changes operation of the engine among the liquid fuel, the gaseous fuel, and the second gaseous fuel while the engine remains running.

10. The multi-fuel engine of claim 8 wherein the liquid fuel is gasoline, the gaseous fuel is LPG, and the second gaseous fuel is NG.

11. The multi-fuel engine of claim 8 further comprising a 2-way branched fitting coupling the gaseous fuel source and the second gaseous fuel source to a carburetor, wherein the 2-way branched fitting is located downstream from the gaseous cutoff solenoid and the second gaseous cutoff solenoid.

12. The multi-fuel engine of claim 11 wherein the 2-way branched fitting comprises:

a first gaseous fuel jet sized for the gaseous fuel coupled to the gaseous fuel source, and

a second gaseous fuel jet sized for the second gaseous fuel coupled to the second gaseous fuel source.

13. A multi-fuel generator and fuel delivery system comprising:
- a multi-fuel internal combustion engine configured to operate on a liquid fuel supplied from a liquid fuel source through a liquid fuel line and a gaseous fuel supplied from a pressurized fuel source through a gaseous fuel line;
 - an alternator driven by the multi-fuel internal combustion engine;
 - a fuel regulator system comprising:
 - a primary pressure regulator coupled to a service valve of the pressurized fuel source to regulate fuel supplied from the pressurized fuel source to a reduced pressure, and
 - a secondary pressure regulator coupled to the primary pressure regulator to regulate fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the engine; and
 - an electro-mechanical valve system coupled to the engine and operated by an electrical switch powered by one of the alternator, a battery, and a magneto that controls fuel flow to the engine from the liquid fuel source and the pressurized fuel source.

14. The multi-fuel generator and fuel delivery system of claim 13 wherein the electro-mechanical valve system is configured to switch operation of the generator from multiple fuel sources while the generator is running.

15. The multi-fuel generator and fuel delivery system of claim 13 wherein the electro-mechanical valve system is configured to prevent simultaneous delivery of the liquid fuel and the gaseous fuel to the engine.

16. The multi-fuel generator and fuel delivery system of claim 13 wherein the electro-mechanical valve system comprises:

a carburetor cutoff solenoid coupled to a carburetor to control liquid fuel flow to the engine, and

a gaseous fuel cutoff solenoid coupled to the gaseous fuel line to control flow of the gaseous fuel to the engine.

17. The multi-fuel generator and fuel delivery system of claim 16 further comprising a liquid fuel cutoff solenoid coupled to the liquid fuel line to control flow of the liquid fuel to the carburetor.

18. The multi-fuel generator and fuel delivery system of claim 13 wherein the pressurized fuel source comprises a pressurized fuel container located off-board the generator having a regulator mounting device to secure at least the secondary pressure regulator thereto.

19. The multi-fuel generator and fuel delivery system of claim 13 wherein a dual stage pressure regulator comprises the primary pressure regulator and the secondary pressure regulator.

20. A multi-fuel internal combustion engine comprising:

an engine operable on liquid fuel supplied through a liquid fuel line from a liquid fuel source and gaseous fuel supplied through a gaseous fuel line from a pressurized fuel source;

a switch to change operation of the engine from liquid fuel to gaseous fuel and from gaseous fuel to liquid fuel while the engine is running;

a liquid fuel cutoff solenoid coupled to control fuel flow through the liquid fuel line and engage engine operation on liquid fuel upon actuation of the switch from gaseous fuel to liquid fuel; and

a gaseous fuel cutoff solenoid coupled to control fuel flow through the gaseous fuel line and engage engine operation on gaseous fuel upon actuation of the switch from liquid fuel to gaseous fuel.

21. The multi-fuel internal combustion engine of claim 20 wherein the liquid fuel cutoff solenoid is a carburetor cutoff solenoid coupled to a carburetor.

22. The multi-fuel internal combustion engine of claim 20 wherein the liquid fuel cutoff solenoid is coupled along the liquid fuel line.

23. The multi-fuel internal combustion engine of claim 20 wherein the switch institutes a predefined delay between actuating the liquid fuel cutoff solenoid and the gaseous fuel cutoff solenoid.

24. The multi-fuel internal combustion engine of claim 20 wherein the switch operates the liquid fuel cutoff solenoid and the gaseous fuel cutoff solenoid to substantially prevent simultaneous fuel delivery of the liquid fuel and the gaseous fuel to the engine.

25. The multi-fuel internal combustion engine of claim 20 wherein the gaseous fuel cutoff solenoid and the liquid fuel cutoff solenoid operate as normally closed solenoid valves.

26. The multi-fuel internal combustion engine of claim 20 further comprising:

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

an alternator driven by the engine to form a generator; and

a fuel regulator system located off-board the generator and comprising:

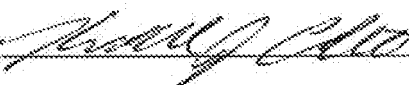
a primary pressure regulator coupled to a service valve of the pressurized fuel source to regulate the fuel supplied from the pressurized fuel source to a reduced pressure, and

a secondary pressure regulator coupled to the primary pressure regulator to regulate the gaseous fuel supplied from the primary pressure regulator to a desired pressure for delivery through the gaseous fuel line to operate the engine.

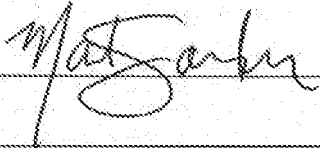
ABSTRACT

A multi-fuel engine includes an engine operable on a liquid fuel and a gaseous fuel. The multi-fuel engine also includes a liquid cutoff solenoid coupled to open and close a liquid fuel path to the engine, and a gaseous cutoff solenoid coupled to open and close a gaseous fuel source to the engine. A switch couples a power source to the liquid cutoff solenoid and the gaseous cutoff solenoid to switch between fuel sources on-the-fly during engine operation.

**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)**

Title of Invention	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE
As the below named inventor, I hereby declare that: This declaration ☒ The attached application, or is directed to: ☐ United States application or PCT international application number _____ filed on _____ The above-identified application was made or authorized to be made by me. I believe that I am the original inventor or an original joint inventor of a claimed invention in the application. I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both. WARNING: Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.	
LEGAL NAME OF INVENTOR Inventor: <u>Kendall J. Collie</u> Date (Optional): <u>9/13/16</u> Signature: 	
Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01 form for each additional inventor.	

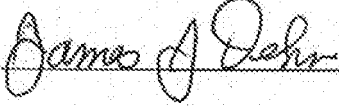
**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)**

Title of Invention	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE
As the below named inventor, I hereby declare that: This declaration ☒ The attached application, or is directed to: ☐ United States application or PCT international application number _____ filed on _____ The above-identified application was made or authorized to be made by me. I believe that I am the original inventor or an original joint inventor of a claimed invention in the application. I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both. WARNING: Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.	
LEGAL NAME OF INVENTOR Inventor: <u>Mark J. Sarder</u> Date (Optional): _____ Signature: 	
Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01 form for each additional inventor.	

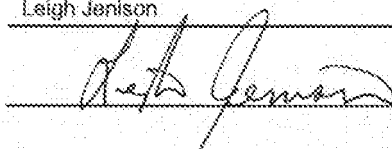
DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

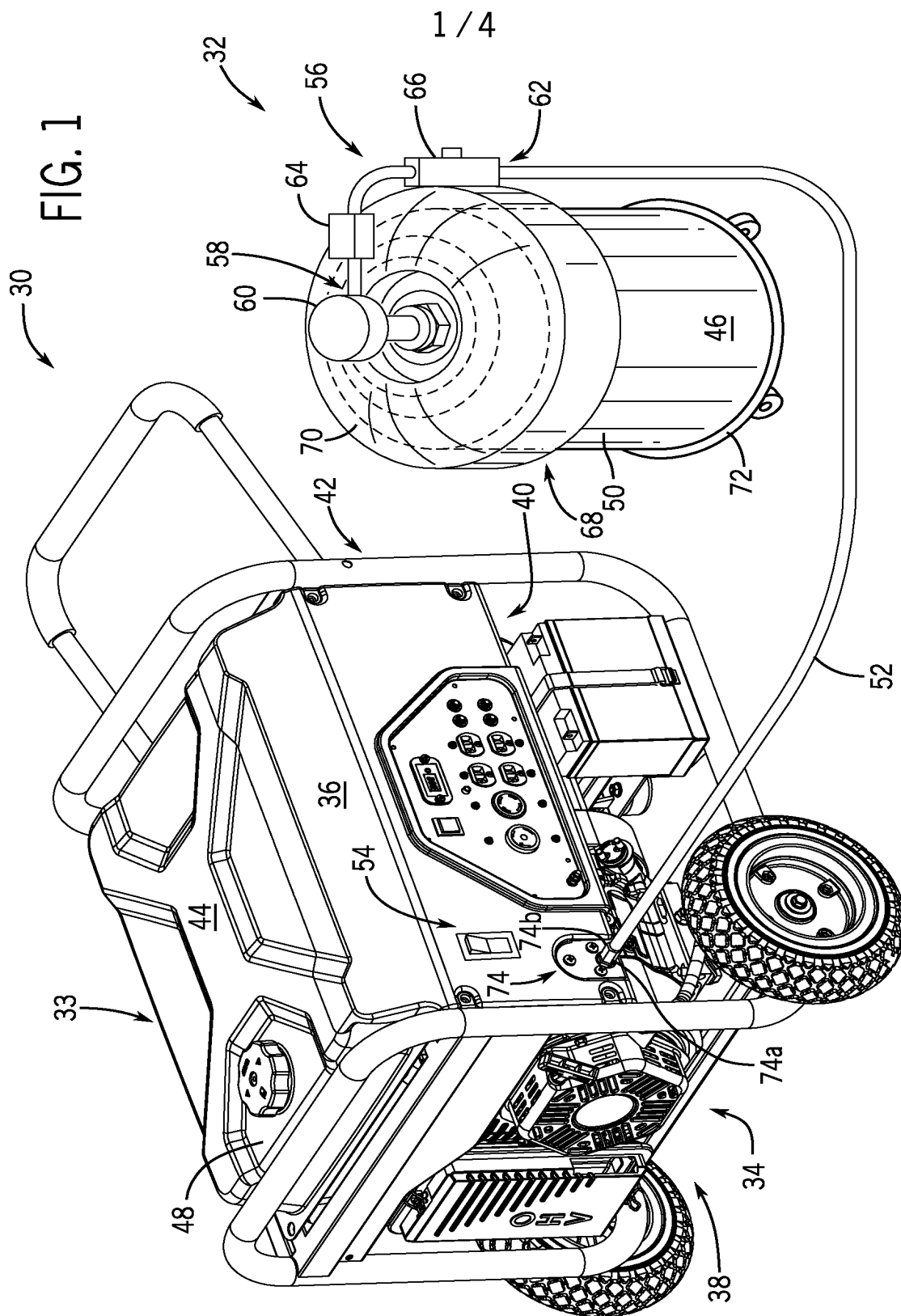
Title of Invention	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE
As the below named inventor, I hereby declare that: This declaration is directed to: ☒ The attached application, or ☐ United States application or PCT international application number _____ filed on _____ The above-identified application was made or authorized to be made by me. I believe that I am the original inventor or an original joint inventor of a claimed invention in the application. I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both. WARNING: Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.	
LEGAL NAME OF INVENTOR Inventor: <u>Aleko D. Sotiriades</u> Date (Optional): _____ Signature: _____	
Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01 form for each additional inventor.	

**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)**

Title of Invention	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE	
As the below named inventor, I hereby declare that: This declaration ☒ The attached application, or is directed to: ☐ United States application or PCT international application number _____ filed on _____ The above-identified application was made or authorized to be made by me. I believe that I am the original inventor or an original joint inventor of a claimed invention in the application. I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both. WARNING: Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.		
LEGAL NAME OF INVENTOR		
Inventor:	James J. Dehn	Date (Optional): 9-13-2016
Signature:		
Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01 form for each additional inventor.		

**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)**

Title of Invention	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE
As the below named inventor, I hereby declare that: This declaration ☒ The attached application, or is directed to: ☐ United States application or PCT international application number _____ filed on _____ The above-identified application was made or authorized to be made by me. I believe that I am the original inventor or an original joint inventor of a claimed invention in the application. I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both. WARNING: Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.	
LEGAL NAME OF INVENTOR	
Inventor: <u>Leigh Jenison</u> Date (Optional): <u>09.13.2016</u> Signature: 	
Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form. Use an additional PTO/AIA/01 form for each additional inventor.	



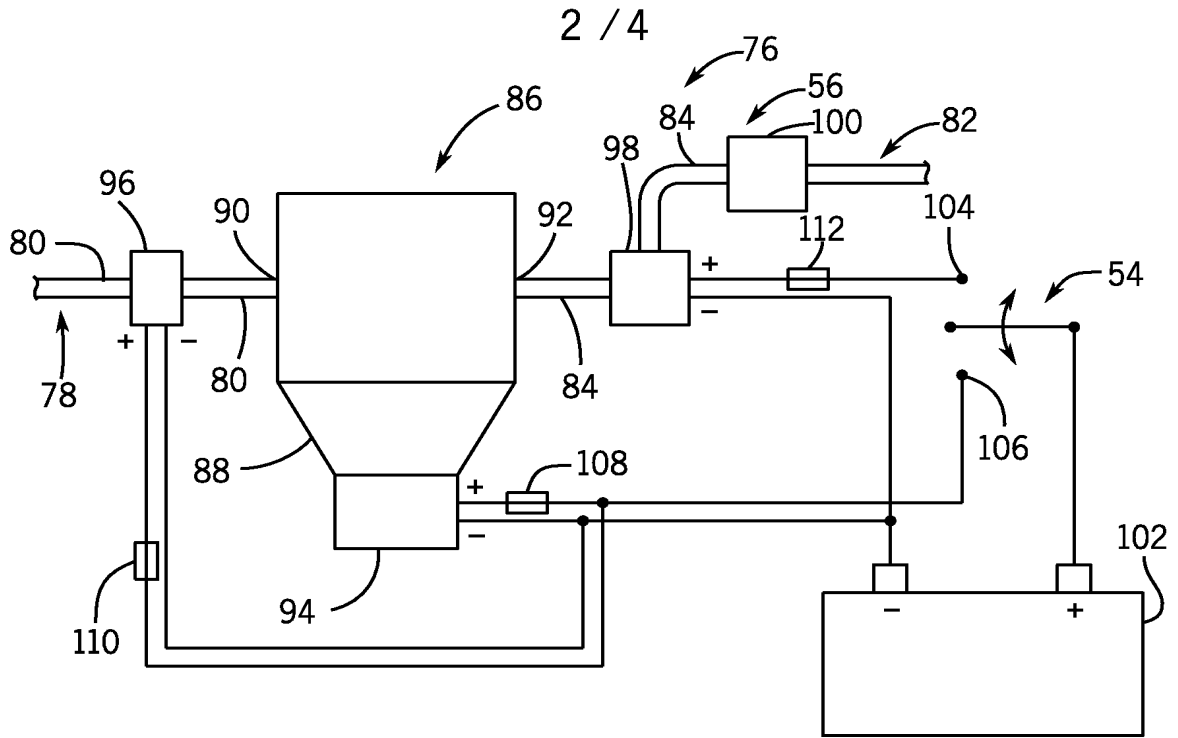


FIG. 2

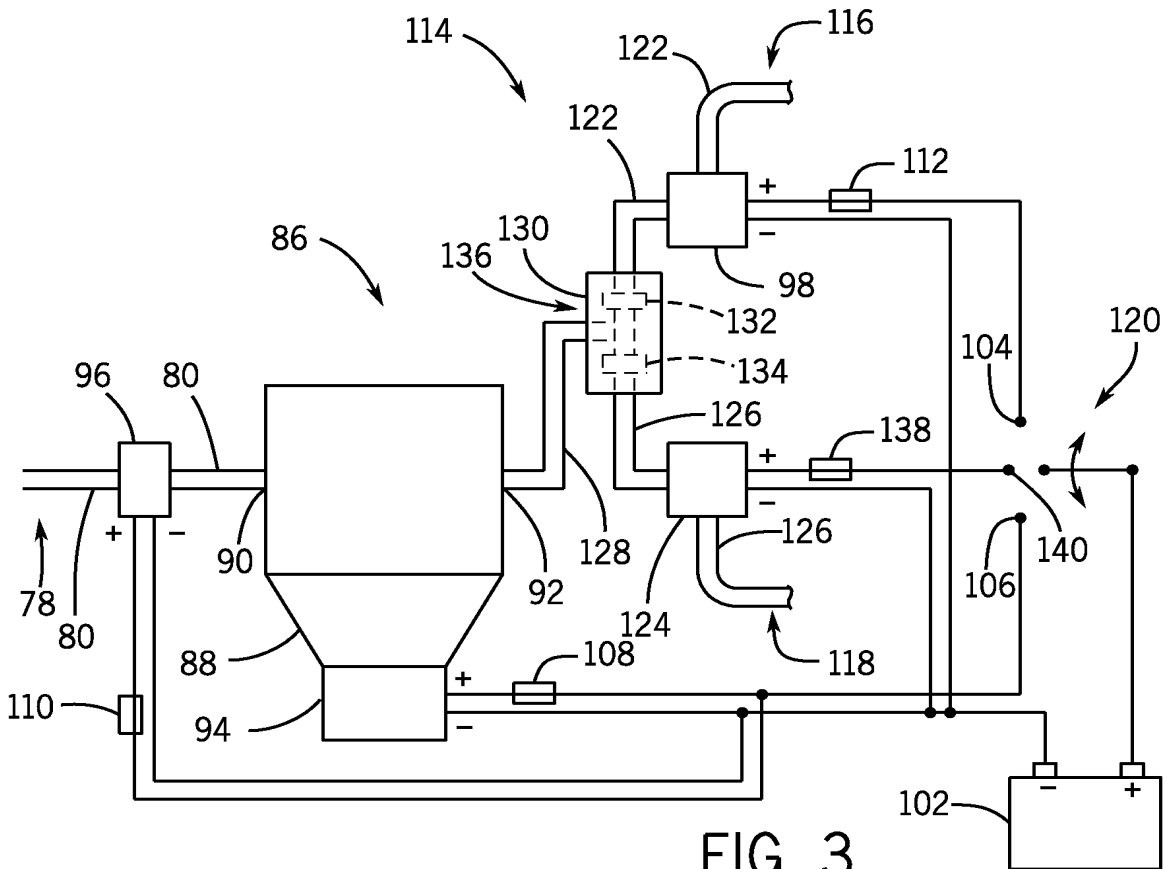


FIG. 3

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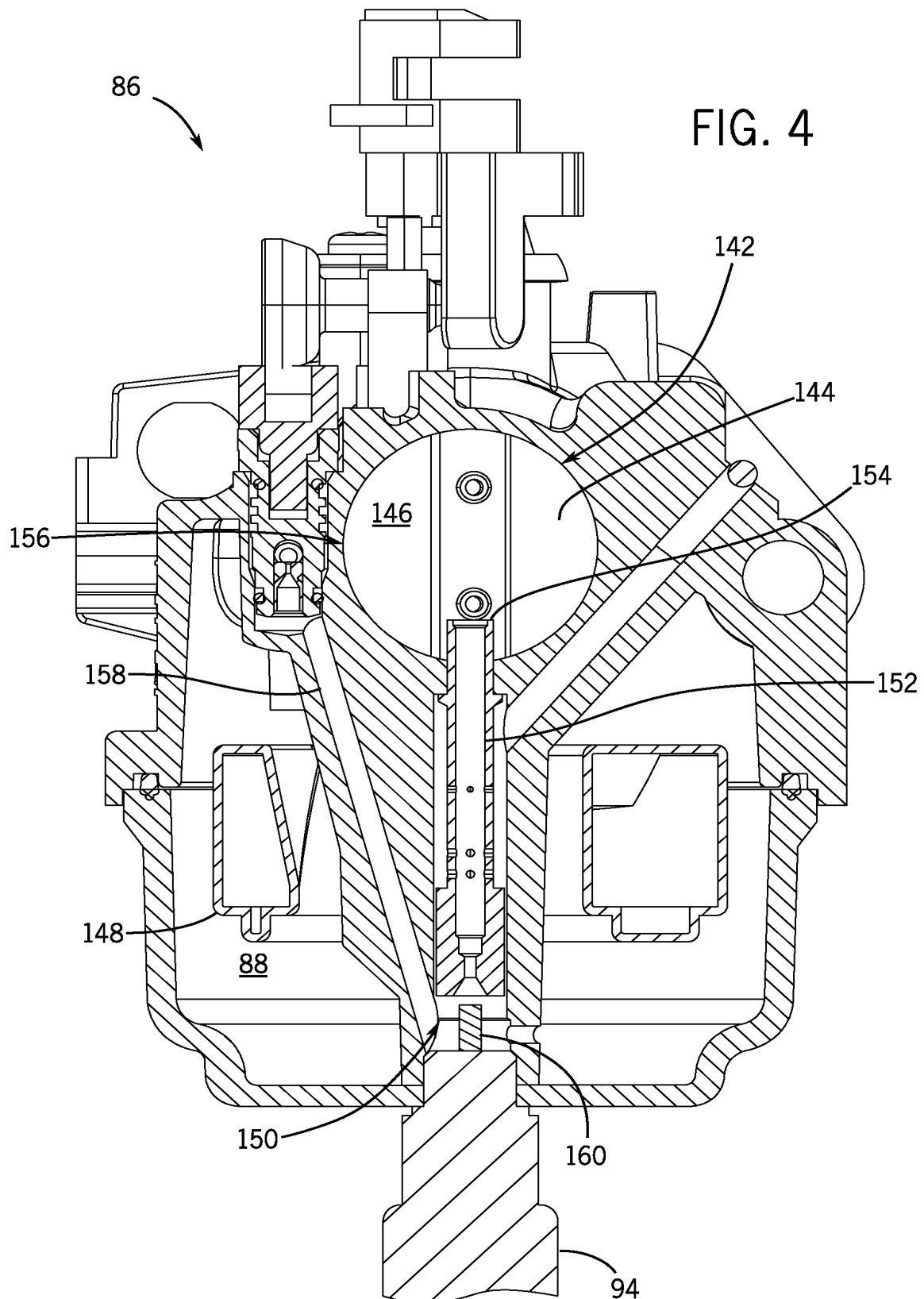
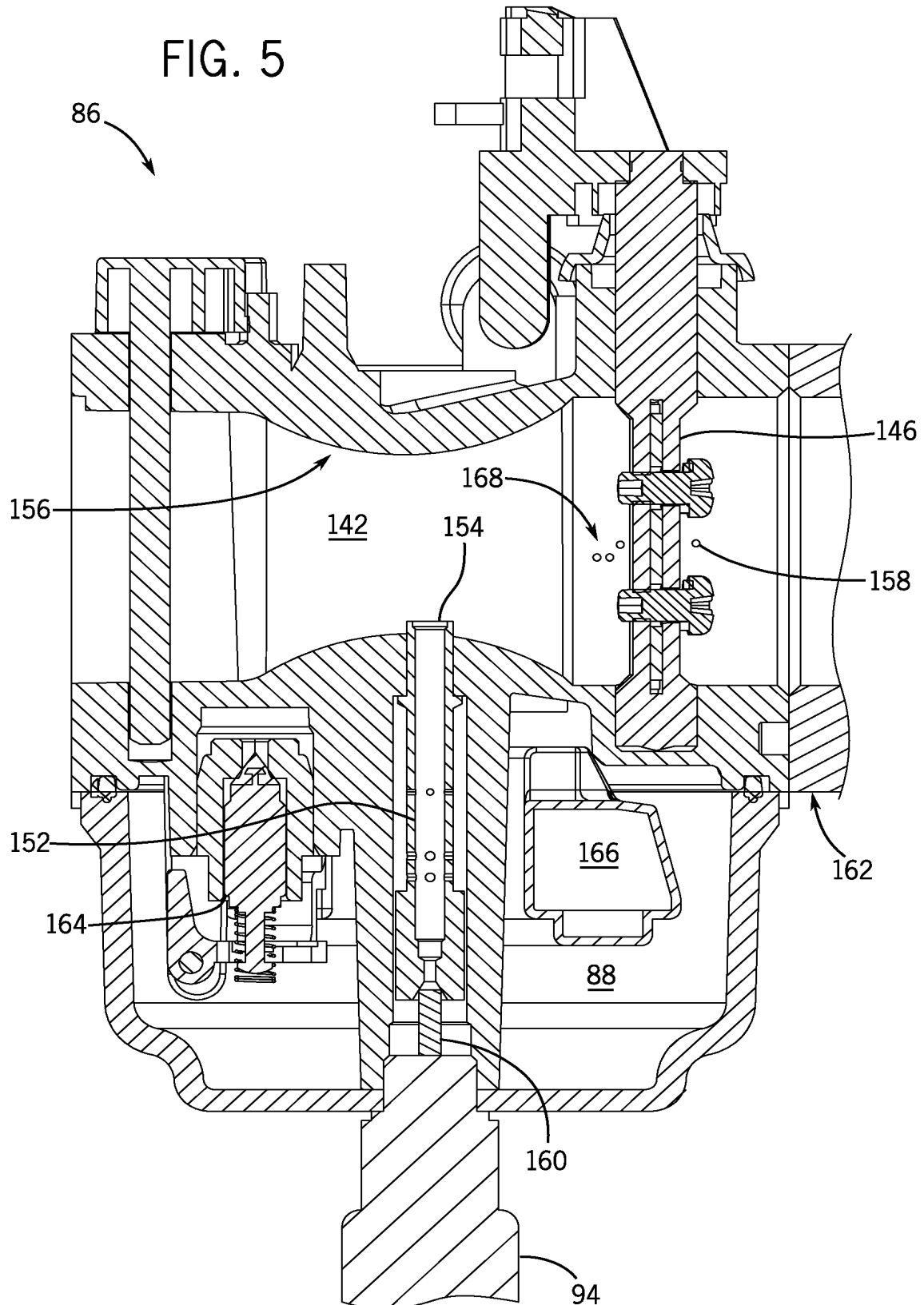


FIG. 5



TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA/82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	
Filing Date	
First Named Inventor	Kendall J. Collie
Title	FUEL SYSTEM FOR A MULTI-FUEL INTERNAL COMBUSTION ENGINE
Art Unit	
Examiner Name	
Attorney Docket Number	CET1090.044

SIGNATURE of Applicant or Patent Practitioner

Signature	/Timothy J. Ziolkowski/	Date (Optional)	
Name	Timothy J. Ziolkowski	Registration Number	38368
Title (if Applicant is a juristic entity)	Patent Practitioner		
Applicant Name (if Applicant is a juristic entity)	Champion Engine Technology, LLC		

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.



*Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**